



Office of the City Manager

December 18, 2018

To: Honorable Mayor and Members of the City Council

From: *Dee* Dee Williams-Ridley, City Manager

Subject: 2019 Update to the Local Hazard Mitigation Plan;
Public Comment Process

The First Draft of the City's 2019 Local Hazard Mitigation Plan (LHMP) update has been released on the City's website (www.CityofBerkeley.info/Mitigation) and at City libraries. Members of the public are invited to provide written feedback on the document until February 28, 2019.

All Commissions have been requested to agendaize the First Draft Plan at their meetings, and to provide written feedback on any areas of significant concern before February 28, 2019. Staff will present the Plan's proposed mitigation strategy at the January 16 meeting of the Planning Commission and the January 23 meeting of the Disaster and Fire Safety Commission. Following the public comment period for the First Draft Plan, staff will review and incorporate appropriate feedback from Commissions and community members into the Final Draft Plan.

The Final Draft Plan will undergo review first by the State of California Office of Emergency Services and Board of Forestry, and then the Federal Emergency Management Agency (FEMA). Staff will make changes to the plan as required by these State and federal bodies.

In fall 2019 (est.) staff will present the Final Draft Plan to the Planning Commission. This meeting will be the first Public Hearing for the Final Draft Plan. At this meeting, staff will request the Commission's recommendation to Council on the Final Draft Plan. Because the LHMP will be an amendment to the City's General Plan, the Planning Commission must make a recommendation to Council on the Final Draft Plan.

In fall 2019 (est.), staff will also present the Final Draft Plan to the Disaster and Fire Safety Commission. Because the Disaster and Fire Safety Commission closely monitors the City's preparedness and mitigation efforts, staff will request that the Commission make a recommendation to Council on the Draft Plan at this meeting.

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Re: 2019 Update to the Local Hazard Mitigation Plan; Public Comment Process

Staff anticipates bringing the Final Draft Plan to City Council for review and adoption in December 2019.

The First Draft Plan's Executive Summary and Actions are attached. Please let me know if you have any questions.

Attachment: 2019 Local Hazard Mitigation Plan: First Draft Executive Summary and Actions

cc: Paul Buddenhagen, Interim Deputy City Manager
David Brannigan, Fire Chief
Mark Numainville, City Clerk
Matthai Chakko, Assistant to the City Manager
Jenny Wong, City Auditor



City of Berkeley

2019 Local Hazard Mitigation Plan

First Draft Executive Summary
and Mitigation Actions

December 18, 2018

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 disaster. 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.

City government 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. The 2014 Local Hazard Mitigation Plan continued 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. Over many years, this constant focus on disasters has made Berkeley, its residents and businesses, much safer.

The federal Disaster Mitigation Act of 2000 (DMA 2000) calls for all communities to prepare mitigation plans. The City adopted a plan that met the requirements of DMA 2000 on June 22, 2004, and an update on December 16, 2014. This is the 2019 update to that plan, called the 2019 Local Hazard Mitigation Plan (2019 LHMP).

Plan Purpose

The 2019 LHMP serves three functions:

1. The 2019 LHMP documents our current understanding of the hazards present in Berkeley, along with our vulnerabilities to each hazard – the ways that the hazard could impact our buildings, infrastructure, community, and environment.
2. The document presents Berkeley City government’s Mitigation Strategy for the coming five years. The Mitigation Strategy reflects a wide variety of both funded and unfunded actions, each of which could reduce the Berkeley’s hazard vulnerabilities.
3. By fulfilling requirements of the DMA 2000, the 2019 LHMP 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.

Plan Organization

Unlike prior versions of the plan, the 2019 LHMP has been structured to specifically address DMA 2000 requirements. The 2019 LHMP is organized as follows:

Element A: Planning Process

This section of the 2019 LHMP describes the process used to develop the document, including how partners, stakeholders, and the community were engaged. It also addresses the City’s approach to maintaining the 2019 LHMP over the five-year planning cycle.

Element B: Hazard Analysis

This section of the 2019 LHMP outlines the different hazards present in Berkeley. Analysis of each hazard includes the areas of Berkeley with exposure to the hazard, the potential impacts of each hazard, and Berkeley's vulnerabilities to each hazard.

Element C: Mitigation Strategy

The Mitigation Strategy section first documents the authorities, policies, programs, and resources that the City brings to bear in implementing mitigation actions. Second, this section outlines a comprehensive range of specific mitigation actions and projects designed to reduce Berkeley's hazard vulnerabilities. This section also describes how the 2019 LHMP is integrated with other City plans.

Element D: Plan Review, Evaluation, and Implementation

This section describes how changes in development have influenced updates to the 2019 LHMP. It also provides a detailed description of Berkeley's progress on the Mitigation Strategy proposed in 2014.

Element E: Plan Adoption

This section will be used to document formal adoption of the Final Draft 2019 LHMP by the Berkeley City Council.

In the pages that follow, this Executive Summary describes highlights from Element B: *Hazard Analysis* and Element C: *Mitigation Strategy*, as well as any key updates that were made to the section since the 2014 version.

Element B: Hazard Analysis

To become disaster resilient, a community must first understand the existing hazards and their potential impacts. Berkeley is exposed to a number of natural and human-caused hazards that vary in their intensity and impacts on the city. This mitigation plan addresses six natural hazards: earthquake, wildland-urban interface (WUI) fire, flood, landslide, and tsunami. Each of these hazards can occur independently or in combination, and can also trigger secondary hazards.

Although this plan is focused on natural hazards, four human-caused hazards of concern are also discussed: hazardous materials release, climate change,ⁱ extreme heat events, and terrorism. They are included because of their likelihood of occurrence and the magnitude of their potential consequences, as outlined in the table below.

Table 1. Summary of Hazard Analysis

Hazard	Likelihood	Severity of Impact
Earthquake	Likely	Catastrophic
Wildland-Urban Interface Fire	Likely	Catastrophic
Rainfall-Triggered Landslide	Likely	Moderate
Floods	Likely	Minor
Tsunami	Possible	Moderate
Climate Change	Likely	Unknown*
Extreme Heat	Likely	Unknown*

**Consequence levels for climate change and extreme heat have not been assigned values, as adequate information to make this determination is not yet available.*

Hazards of Greatest Concern

Earthquake

We do not know when the next major earthquake will strike Berkeley. The United States Geological Survey states that there is a 72% probability of one or more M 6.7 or greater earthquakes from 2014 to 2043 in the San Francisco Bay Region.ⁱⁱ There is a 33% chance that a 6.7 or greater will occur on the Hayward fault system between 2014 and 2043.ⁱⁱⁱ This means that many Berkeley residents are likely to experience a severe earthquake in their lifetime.

A catastrophic earthquake on the Hayward Fault would cause severe and violent shaking and three types of ground failure in Berkeley. Surface fault rupture could occur in the Berkeley hills along the fault, damaging utilities and gas lines that cross the fault. 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. Liquefaction is very likely in the westernmost parts of the city and could occur in much of the Berkeley flats. Liquefaction can destroy pavements and dislodge foundations.

Shaking and ground failure is likely to create impacts that ignite post-earthquake fires. Firefighting will be simultaneously challenged due to broken water mains and damage to electrical, transportation, and communication infrastructure.

In a 6.9 magnitude earthquake on the Hayward Fault, the City estimates that over 600 buildings in Berkeley will be completely destroyed and over 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. This plan estimates that building damage in Berkeley alone could exceed \$2 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, people 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.^{iv}

If a fire occurred today that burned the same area, the loss to structures would be in the billions of dollars.^v Destruction of contents in all of the homes and businesses burned would add hundreds of millions of dollars^{vi} to fire losses. Efforts to stabilize hillsides after the fire to prevent massive landslides would also add costs. 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-triggered landslide, floods, and tsunamis. 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.

Rainfall-Triggered Landslide

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

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 over \$160 million. Storm drain overflow creates localized flooding in many known intersections in Berkeley. With few properties covered by flood insurance, these costs would be borne primarily by Berkeley residents and businesses.

Tsunami

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

While the focus of the 2019 LHMP is on natural hazards as emphasized in the Disaster Mitigation Act of 2000 (DMA 2000),^{vii} the plan provides analysis of four manmade hazards of concern. Climate change is described because its impacts are likely to exacerbate the natural hazards of concern identified in the plan. The 2019 LHMP specifically addresses the hazard of extreme heat events because they are projected to increase exponentially in the next century as climate change continues. Hazardous materials release is addressed in this mitigation plan as a potential impact from a natural hazard. Terrorism is identified as a hazard of concern but is not analyzed in-depth.

Climate Change

Like regions across the globe, the San Francisco Bay Area is already experiencing negative impacts of climate change. These impacts will continue to grow in intensity and will disproportionately affect vulnerable communities such as the elderly, children, people with disabilities, and people with low incomes.

The severity of these impacts will depend on the amount of greenhouse gas emissions produced worldwide over the coming decades. Mitigation of further emissions will reduce Berkeley's exposure to climate change. Berkeley's Climate Action Plan^{viii} identifies the City's plan for emissions reductions, known as climate change mitigation. Simultaneously, we are already experiencing climate change impacts that will intensify over time—including sea level rise, drought, severe storms, and extreme heat – so it is also critical that Berkeley adapt to current and projected impacts in order to protect Berkeley's community, infrastructure, buildings, and economy, known as climate change adaptation.

Climate change will have direct impacts and will also exacerbate the natural hazards of concern outlined in this plan. Rising sea levels have the potential to impact infrastructure and community members in west Berkeley and the Berkeley waterfront. This will increase Berkeley's exposure to tsunami inundation and to flooding of critical infrastructure in these areas, which includes sanitary sewers, state highways, and railroad lines. Increased temperatures, when coupled with prolonged drought events, can increase the intensity of wildfires that may occur, and pose significant health and safety risks to vulnerable communities. By 2100, most of the Bay Area will average six heat waves per year, each an average length of ten day.^{ix} Shorter, more intense wet seasons will make flooding more frequent, and may increase the landslide risk in the Berkeley hills. California may experience greater water and food insecurity, and drought will become a more persistent issue as the effects of climate change deepen.

Extreme Heat Events

Multiple factors contribute to the extreme heat hazard, including very high temperatures, nights that do not cool down, consecutive days of extreme heat, and extreme heat during unexpected times of the year. Extreme heat events impact public health, increase fire risk, damage critical facilities and infrastructure, and worsen air quality.

Social factors play a key role in vulnerability to extreme heat events, meaning that people with disabilities, chronic diseases, the elderly, and children under five are the most at risk to heat-

related illnesses.^x Across California, the highest risk of heat-related illness occurs in the typically cooler regions found in coastal areas like Berkeley.

Projections indicate that the number of extreme heat days, warm nights, and heat waves will increase exponentially: by 2099, the City of Berkeley is expected to average 18 days per year with temperatures over 88.3 degrees F.

Hazardous Materials Release

Over the last 25 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.

Terrorism

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

Summary of Changes to the Hazard Analysis

The 2019 LHMP 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.

Institutional community partners have updated information regarding their vulnerabilities to the described hazards, as well as significant mitigation activities that they have completed, are 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 2014. Throughout the plan, the City has updated financial loss estimates for inflation.

Hazards Described in the 2014 Plan

For the first time, the plan identifies extreme heat events as a hazard of concern. Significant changes and updates to the analysis of each hazard are described below:

Earthquake (Section B.5)

- The 2019 LHMP integrates the 2018 HayWired scenario developed by the USGS to help illustrate the potential impacts of a catastrophic earthquake near Berkeley. The plan now includes five maps with data from the scenario.
- Berkeley's liquefaction hazard is now mapped using both overall levels of susceptibility and probability of liquefaction in the 7.0M HayWired scenario.
- The seismic stability of City-owned and leased buildings has been updated to reflect significant retrofit and rebuilding efforts since 2014.
- The City has updated the plan to describe Berkeley's progress on mitigating earthquake vulnerabilities in privately-owned buildings. Detailed analysis along with three new maps have been provided to describe and illustrate the locations of potentially seismically vulnerable buildings, including unreinforced masonry buildings, soft story buildings, non-ductile concrete buildings, and tilt-up or other rigid-wall flexible diaphragm buildings.
- The Earthquake section includes updated descriptions from Key Institutional Partners about mitigation efforts completed or planned. Updated partner profiles include UC Berkeley, Berkeley Lab, Berkeley Unified School District, East Bay Municipal Utility District, AT&T, and Alta Bates Summit Medical Center.
- Earthquake risk and loss estimates have been updated to integrate regional estimates from the 2018 HayWired earthquake scenario.

Wildland-Urban Interface Fire (Section B.6)

The 2019 LHMP integrates hazardous fire zones as defined by the City of Berkeley and the California Department of Forestry onto one map.

The 2019 LHMP presents a new map overviewing the locations of pedestrian pathways in Berkeley. These pathways are key resources for pedestrian evacuation from wildland-urban interface fire.

Rainfall-Triggered Landslide (Section B.7)

This section has been updated to describe hazard occurrences in Berkeley since 2014.

Floods (Section B.8)

The Floods section has been updated to include newly-revised flood exposure maps for Berkeley from the FEMA National Flood Insurance Program.

Tsunami (Section B.9)

The Tsunami section now includes a map of Tsunami Evacuation Playbook zones. These zones, developed by the California Geological Survey, California Governor’s Office of Emergency Services, and the National Ocean and Atmospheric Administration (NOAA), reflect more refined and detailed planning, in which forecasted tsunami amplitudes, storm surge, and tidal information can help guide what areas might be inundated.

The Tsunami section also includes new information about infrastructure vulnerabilities of the Berkeley Marina, based on recent tsunami inundation modeling by the California Geological Survey, University of Southern California, California State Lands Commission, and California Governor’s Office of Emergency Services.

Climate Change (Section B.10)

The Climate Change section has been updated to use the latest available science and policy guidance on the direct and secondary impacts of climate change. It describes recent events that demonstrate climate change impacts that we are already experiencing.

The section provides new analysis of amounts of sea-level rise anticipated under different projected carbon emissions scenarios, as well as new maps of expected levels of inundation from 2-ft, 4-ft, and 5.5-ft sea level rise scenarios using the Adapting to Rising Tides Bay Shoreline Flood Explorer.

Extreme Heat Events (Section B.11)

Extreme heat events are a newly-introduced hazard of concern for the 2019 LHMP. The extreme heat events section describes factors that contribute to the extreme heat hazard, and describe how the Urban Heat Island Effect can further exacerbate impacts of extreme heat events. The section outlines the secondary hazards created by extreme heat, including public health impacts, fire, damage to critical facilities and infrastructure, and worsened air quality.

The section also describes the predicted average number of extreme heat days in Berkeley through the end of the century.

Hazardous Materials Release (Section B.12)

The Hazardous Materials Release section contains updated figures on the number of sites with hazardous materials in Berkeley. Additionally, the section has been updated since 2014 to reflect Berkeley industrial sites with large quantities of extremely hazardous materials. These sites have been mapped for reference.

Element C: Mitigation Strategy

Authorities, Policies, Programs and Resources

Through many years of diligent effort by City government and the community, Berkeley has developed many innovative initiatives to increase our disaster resilience. The authorities, policies, programs and resources that Berkeley will use to support execution of the 2019 LHMP Mitigation strategy include:

- 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. In 2017, work was completed on the James Kenney Recreation Center and the Center Street Garage. Since 2004 the City has strengthened or rebuilt all seven of the City's fire stations, the historic Ratcliff Building (which houses the Public Works Department Operations Center), the Civic Center (which houses many key government functions), the Public Safety Building, a new animal shelter, and all libraries.
- The Berkeley Unified School District, supported by voter-approved bonds, has strengthened all public schools.
- The City of Berkeley has worked diligently to enhance public safety and reduce physical threats from earthquakes by requiring owners of soft story and unreinforced masonry buildings to retrofit their structures.
 - Berkeley was the first city in the nation to inventory the community's soft-story buildings. In 2014 Berkeley mandated retrofit of soft story buildings with five or more dwelling units. Since then, 61 percent of these identified buildings have had retrofits completed.
 - Over 99% of Berkeley's 700 unreinforced masonry buildings have been retrofitted or demolished since a City mandate began in 1991.
- The City offers a comprehensive suite of programs to encourage the community to strengthen buildings to be more hazard-resistant.
 - In early 2017, the Building and Safety Division developed a new Retrofit Grants program with funding from a Hazard Mitigation Grant from the Federal Emergency Management Agency (FEMA) and the California Governor's Office of Emergency Services (Cal OES).
 - Since July 2002, the City has distributed over \$12 million to homeowners through the Transfer Tax Rebate Program, which reduces the real estate transfer tax to building owners who perform seismic safety work.
 - The City participates in the Earthquake Brace + Bolt (EBB) program, a grant program administered by the California Earthquake Authority, providing grants of up to \$3,000 for seismic retrofits of owner-occupied residential buildings with 1-4 dwelling units.
- The City, working together with key partners, is using a comprehensive strategy to aggressively mitigate Berkeley's wildland-urban interface (WUI) fire hazard. These approaches include:

- Prevention through development regulations with strict building and fire code provisions, as well as more restrictive local amendments for new and renovated construction;
 - Enforcement programs including annual inspections of over 1,200 high-risk properties annually;
 - Natural resource protection through four different vegetation management programs;
 - Improvement of access and egress routes;
 - Infrastructure maintenance and improvements to support first responders' efforts to reduce fire spread.
- The Disaster Cache Program incentivizes community-building for disaster readiness. To date, the City has awarded caches of disaster response equipment to neighborhoods, congregations, and UC Berkeley Panhellenic groups that have undertaken disaster readiness activities.
 - 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 support execution of the 2019 LHMP Mitigation strategy, and will help to protect the Berkeley community in our next disaster.

Disaster Mitigation Goals and Objectives

Berkeley will focus on three goals to reduce and avoid long-term vulnerabilities to the hazards identified in Element B: *Hazard Analysis*:

1. The City will evaluate and strengthen all City-owned properties and infrastructure, 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.

Five objectives guide the mitigation strategy:

- 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, extreme heat, and their secondary impacts.
- B. Increase City government's ability to serve the community during and after hazardous events by mitigating risk to key City functions.
- C. Preserve Berkeley's unique character and values from being compromised by hazardous events.
- D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in

the community.

- E. Protect Berkeley’s historically underserved populations from the impacts of hazardous events by applying an equity focus to mitigation efforts.

Overview of Actions

This plan identifies and analyzes 27 mitigation actions to reduce the impacts from hazards described in Element B: *Hazard Analysis*. This suite of actions addresses every natural hazard posing a threat to Berkeley, with an emphasis on new and existing buildings and infrastructure.

Tables 1, 2, and 3 below summarize all of the actions. The tables group actions by their priority level (see Element C.5.a for details on prioritization of actions), and identify the hazard(s) and each action addresses.

Table 2. High-Priority Actions in mitigation strategy

Name	Action	Hazards
Building Assessment	Continue appropriate seismic and fire safety analysis based on current and future use for all City-owned facilities and structures.	Earthquake Wildland-Urban Interface Fire Landslide Floods Tsunami Climate Change Extreme Heat
Strengthen and Replace City Buildings	Strengthen or replace City buildings in the identified prioritized order as funding is available.	Earthquake Wildland-Urban Interface Fire Landslide Floods Tsunami Climate Change Extreme Heat
Buildings	Reduce hazard vulnerabilities for non-City-owned buildings throughout Berkeley.	Earthquake Wildland-Urban Interface Fire Landslide Floods

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Name	Action	Hazards
Retrofit Grants	Implementation of the Retrofit Grants Program which helps Berkeley building owners increase safety and mitigate the risk of damage caused by earthquakes	Earthquake
Soft Story	Continued Implementation of the Soft Story Retrofit Program, which mandates seismic retrofit of soft story buildings with 5+ residential units.	Earthquake
Unreinforced Masonry (URM)	Complete the ongoing program to retrofit all remaining non-complying Unreinforced Masonry (URM) buildings.	Earthquake
Concrete Retrofit Ordinance Research	Monitor passage and implementation of mandatory seismic retrofit ordinances for concrete buildings in other jurisdictions to assess best practices.	Earthquake
Gas Safety	Improve the disaster-resistance of the natural gas delivery system to increase public safety and to minimize damage and service disruption following a disaster.	Earthquake Wildland-Urban Interface Fire Landslide Tsunami
Fire Code	Reduce fire risk in existing development through fire code updates and enforcement.	Wildland-Urban Interface Fire
Vegetation Management	Reduce fire risk in existing development through vegetation management.	Wildland-Urban Interface Fire Climate Change
Hills Pedestrian Evacuation	Manage and promote pedestrian evacuation routes in Fire Zones 2 and 3.	Earthquake Wildland-Urban Interface Fire
Hills Roadways and Parking	Improve responder access and community evacuation in Fire Zones 2 and 3 through roadway maintenance and appropriate parking restrictions.	Earthquake Wildland-Urban Interface Fire
Undergrounding	Coordinate with PG&E for the construction of undergrounding in the Berkeley Hills within approved Underground Utility Districts (UUDs).	Earthquake Wildland-Urban Interface Fire
EBMUD	Work with EBMUD to ensure an adequate water supply during emergencies and disaster recovery.	Earthquake Wildland-Urban Interface Fire

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Name	Action	Hazards
Extreme Heat	Reduce Berkeley’s vulnerability to extreme heat events and associated hazards.	Climate Change Extreme Heat
Hazardous Materials	Mitigate hazardous materials release in Berkeley through inspection and enforcement programs.	Earthquake Wildland-Urban Interface Fire Landslide Floods Tsunami
Air Quality	Define clean air standards for buildings during poor air quality events and use those standards to assess facilities for the Berkeley community.	Wildland-Urban Interface Fire Extreme Heat
National Flood Insurance Program (NFIP)	Maintain City participation in the National Flood Insurance Program.	Floods
Hazard Information	Collect, analyze and share information with the Berkeley community about Berkeley hazards and associated risk reduction techniques.	Earthquake Wildland-Urban Interface Fire Landslide Floods Tsunami Climate Change Extreme Heat
Partnerships	Coordinate with and encourage mitigation actions of key City partners.	Earthquake Wildland-Urban Interface Fire Landslide Floods Tsunami Climate Change Extreme Heat

Table 3. Medium-Priority Actions in mitigation strategy

Name	Action	Hazards
Severe Storms	Reduce Berkeley’s vulnerability to severe storms and associated hazards through proactive research and planning, zoning regulations, and improvements to stormwater drainage facilities.	Landslide Floods Climate Change
Energy Assurance	Implement energy assurance strategies at critical City facilities.	Earthquake Wildland-Urban Interface Fire Landslide Floods Tsunami Climate Change Extreme Heat
Climate Change Integration	Mitigate climate change impacts by integrating climate change research and adaptation planning into City operations and services.	Climate Change Extreme Heat
Sea Level Rise	Mitigate the impacts of sea level rise in Berkeley.	Climate Change
Water Security	Collaborate with partners to increase the security of Berkeley’s water supply from climate change impacts.	Climate Change

Table 4. Low-Priority Actions in mitigation strategy

Name	Action	Hazards
Tsunami	Mitigate Berkeley’s tsunami hazard.	Tsunami
Streamline Rebuild	Streamline the zoning permitting process to rebuild residential and commercial structures following disasters.	Earthquake Wildland-Urban Interface Fire Landslide Floods Tsunami

ⁱ Human action directly influences the probability that climate change will occur. Climate change is referenced as a natural hazard here because of its potential to exacerbate natural hazards described in this plan.

ⁱⁱ Detweiler, Shane and Wein, A., 2018, The HayWired Earthquake Scenario – Earthquake Hazards: U.S. Geological Survey Scientific Investigations Report 2017-5013-A-H, p.3.

ⁱⁱⁱ Detweiler, Shane and Wein, A., 2018, The HayWired Earthquake Scenario – Earthquake Hazards: U.S. Geological Survey Scientific Investigations Report 2017-5013-A-H, p.4.

^{iv} City of Berkeley. *Fire Hazard Mitigation Plan*. February 25, 1992.

^v Total square footage of buildings in burn area is 9,386,281 square feet.

^{vi} In 2004, estimate was \$500 million.

^{vii} Public Law 106-390

^{viii} Berkeley Climate Action Plan (City of Berkeley, 2009) www.cityofberkeley.info/climate/

^{ix} San Francisco Bay Area 2017 Risk Profile (ABAG, 2017, p58-59)

http://resilience.abag.ca.gov/wp-content/documents/mitigation_adaptation/RiskProfile_4_26_2017_optimized.pdf

^x San Francisco Bay Area 2017 Risk Profile (ABAG, 2017) http://resilience.abag.ca.gov/wp-content/documents/mitigation_adaptation/RiskProfile_4_26_2017_optimized.pdf

The following pages are extracted from the Mitigation Strategy.

C.5 Details of Actions

The 2019 LHMP Mitigation Strategy is detailed below. First, the document describes the process used to prioritize the actions. Next, the document overviews the constituent parts of each action, including responsibility, potential funding sources, and expected timeframes. Third, each action is presented in detail.

C.5.a Action Prioritization

The City incorporated eight key factors into the prioritization strategy used for 2019 mitigation actions. These criteria are described below and summarized in the table that follows.

Key Factors

1. Support of goals and objectives

Actions that support multiple goals and objectives are prioritized.

2. Cost/benefit relationship

A detailed benefit cost analysis is required for FEMA grant eligibility. A less formal approach is taken here to weigh the relative costs and benefits of various actions. Because some projects may not be implemented for up to 10 years, the associated costs and benefits may change significantly over time. The following parameters were used to establish high, medium and low costs and benefits.

Costs:

- *High:* Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases)
- *Medium:* The project could be implemented with existing funding but would require a reapportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years
- *Low:* The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.

Benefits:

- *High:* Project will provide an immediate reduction of risk exposure for life of property.
- *Medium:* Project will have a long-term impact on the reduction of risk exposure for life of property, or project will provide an immediate reduction in the risk exposure for property.
- *Low:* Long-term benefits of the project are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly.

3. Funding availability

Actions with secured funding are prioritized.

4. Hazards addressed

Actions addressing the Plan's hazards of greatest concern (earthquake and wildland-urban interface fire) are prioritized.

5. Public and political support

Actions with public and political support are prioritized.

6. Adverse environmental impact

Actions with low environmental impact are prioritized.

7. Environmental benefit

Actions that provide an environmental benefit are prioritized.

8. Timeline for completion

Actions that are ongoing, or that can be completed in the short-term, are prioritized.

- Ongoing: Currently being funded and implemented under existing programs
- Short-term: To be completed in 1-5 years
- Long-term: To be completed in more than 5 years

The following table summarizes prioritization criteria. Using these factors, mitigation actions have been divided into high, medium, and low priorities. Some actions may not meet all criteria within their prioritization category. In these cases, the City's Core Planning Team assigned the most suitable category.

Table 7. 2019 Action Prioritization Structure

Factors	Priority		
	High	Medium	Low
1. Support of goals and objectives	Supports multiple goals and objectives	Supports goals and objectives	Will mitigate the risk of a hazard
2. Cost/benefit relationship²	Benefits exceed cost	Has benefits that exceed costs	Benefits do not exceed the costs or are difficult to quantify
3. Funding availability³	Funding has not been secured, but the action is grant eligible under identified grant programs	Funding has not been secured, but the action is grant eligible under identified grant programs	Funding has not been secured, and a grant funding source has not been identified
4. Hazards addressed	Addresses hazards of greatest concern	May not address hazards of greatest concern	Addresses hazards identified in Hazard Analysis
5. Public and political support	Has public and political support	Has public and political support	May not have public and political support
6. Adverse environmental impact	No environmental impact	Low environmental impact	May not have a low environmental impact
7. Environmental benefit	Environmental benefit	No environmental benefit	No environmental benefit
8. Timeline for completion	Can be completed in the short term (1 to 5 years) or is ongoing	Can be completed in the short-term, once funding is secured	Timeline for completion is long-term (6-10 years)

² Actions that address other hazards, but for which benefits exceed costs, may also be considered high priority.

³ Medium priority projects will become high priority projects once funding is secured.

C.5.b 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
- *Lead Organization(s) and Staff Lead(s)*: City departments and divisions, along with particular City staff positions, which will be responsible for implementing and administering the action
- *Priority*: High, Medium or Low priority assigned to the action using criteria outlined in Appendix E: *Prioritization Structure*
- *Timeline*: Outlines expected timeframes for completion of 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, including staff time, contracted work, equipment purchase, etc. **Note: Funding allocations are made through the City-wide 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

C.5.b.i High-Priority Actions

<p>2019 Building Assessment</p>	<p>Continue appropriate seismic and fire safety analysis based on current and future use for all City-owned facilities and structures.</p>
<p>Proposed Activities</p>	<ul style="list-style-type: none"> a) Continue analysis of structures supporting critical emergency response and recovery functions, and make recommendations for structural and nonstructural improvements. b) Continue to prioritize analysis of remaining structures based on occupancy and structure type, taking historic significance into consideration. Use analysis to make recommendations for structural and nonstructural improvements. c) Continue to integrate unsafe structures into a prioritized program for retrofit or replacement.
<p>Related Natural Hazard(s)</p>	<p>Earthquake Wildland-Urban Interface Fire Landslide Floods Tsunami Climate Change Extreme Heat</p>
<p>Associated LHMP Objective(s)</p>	<ul style="list-style-type: none"> 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, extreme heat, and their secondary impacts. B. Increase City government’s ability to serve the community during and after hazardous events by mitigating risk to key City functions.
<p>Related Policies from the General Plan or Climate Action Plan</p>	<p>General Plan Policy S-10, Action B General Plan Policy S-20, Actions G and H General Plan Policy UD-7, Actions A and B General Plan Policy UD-12, Actions A and C</p>

Lead Organization(s) and Staff Lead(s)	Public Works Department: Facilities Division Staff Lead: Supervising Civil Engineer (for facilities)
Priority	High
Timeline	Ongoing
Additional Resources Required	Resources have been identified to perform some of this work; however, additional resources could allow for more facilities and structures to be analyzed in the coming five years.
Potential Funding Sources	General Fund T1 Bond

2019 Strengthen and Replace City Buildings	Strengthen or replace City buildings in the identified prioritized order as funding is available.
Proposed Activities	<ul style="list-style-type: none"> a) Retrofit North Berkeley Senior Center b) West Berkeley Service Center c) Old City Hall d) Veterans Memorial Building e) Live Oak Community Center f) Seek funding to seismically strengthen or replace additional City buildings in a prioritized order.
Related Natural Hazard(s)	<ul style="list-style-type: none"> Earthquake Wildland-Urban Interface Fire Landslide Floods Tsunami Climate Change Extreme Heat

Associated LHMP Objective(s)	<p>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, extreme heat, and their secondary impacts.</p> <p>B. Increase City government’s ability to serve the community during and after hazardous events by mitigating risk to key City functions.</p> <p>C. Preserve Berkeley’s unique character and values from being compromised by hazardous events.</p>
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy S-20, Action H</p> <p>General Plan Policy UD-12, Actions A and C</p>
Lead Organization(s) and Staff Lead(s)	<p>Public Works Department – Engineering Division Staff Lead: Supervising Civil Engineer (for facilities)</p> <p>Parks, Recreation and Waterfront Department Staff Lead: Department Director</p>
Priority	High
Timeline	<p>North Berkeley Senior Center: Completion in 2010</p> <p>Other projects: Funding-dependent</p> <p>Live Oak Community Center: Start construction in 2019 (funding-dependent)</p> <p>Frances Albrier Community Center: Funding-dependent</p> <p>Seek funding: Ongoing</p>
Additional Resources Required	<p>North Berkeley Senior Center: No additional resources required</p> <p>West Berkeley Service Center: To be determined</p> <p>Old City Hall retrofit: To be determined</p> <p>Veterans Memorial Building retrofit: To be determined</p> <p>Live Oak Community Center: Additional resources required</p> <p>Frances Albrier Community Center: Additional resources required</p> <p>Seek funding: No additional resources required</p>

Potential Funding Sources	Pre-Disaster Mitigation Grant Program (PDM) Hazard Mitigation Grant Program (HMGP) General Fund T1 Bond Other City-Issued Bonds
Activity Type(s) (Federal Mitigation Grant Funding only)	Mitigation: Structural Retrofitting of existing buildings Mitigation: Nonstructural retrofitting of existing buildings and facilities

2019 Buildings	Reduce hazard vulnerabilities for non-City-owned buildings throughout Berkeley.
Proposed Activities	<ul style="list-style-type: none"> a) 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. b) Explain requirements and provide guidance to owners of potentially hazardous structures to facilitate retrofit, including owners participating in the Earthquake Brace and Bolt program and those applying for Transfer Tax rebates.
Related Natural Hazard(s)	<p>Earthquake</p> <p>Wildland-Urban Interface Fire</p> <p>Landslide</p> <p>Floods</p>
Associated LHMP Objective(s)	<ul style="list-style-type: none"> 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, extreme heat, and their secondary impacts. C. Preserve Berkeley’s unique character and values from being compromised by hazardous events. D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in the community.

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> <p>General Plan Policy UD-7, Actions A and B</p> <p>General Plan Policy UD-12, Actions A and C</p>
Lead Organization and Staff Lead	<p>Planning and Development Department – Building and Safety Division (Building Code and Retrofit Guidance)</p> <p>Staff lead: Building Official</p> <p>Planning and Development Department – Office of Energy and Sustainable Development (Earthquake Brace and Bolt Program)</p> <p>Staff lead: Sustainability Planner</p> <p>Finance Department – Revenue Collection Division (Transfer Tax Rebate Program)</p> <p>Staff lead: Revenue Collection Manager</p>
Priority	High
Timeline	<p>Enactment of 2019 Building Code: January 1, 2020</p> <p>Technical assistance: Ongoing</p>
Additional Resources Required	No additional resources required

2019 Retrofit Grants	Implementation of the Retrofit Grants Program which helps Berkeley building owners increase safety and mitigate the risk of damage caused by earthquakes
Proposed Activities	<p>a) Assist participating property owners with the grant process, including dissemination of program rules and guidelines.</p> <p>b) Project Manager will:</p> <ul style="list-style-type: none"> a. Respond to inquiries from owners, tenants, engineers and contractors about the grant program, including FEMA compliance procedures and requirements b. Environmental and Historic Preservation Reviews (EHP) for specified projects c. Review plan submittals for compliance with City guidelines and FEMA requirements d. If more funding is secured, conduct outreach to

	property owners to offer additional <i>Retrofit Grants</i>
Related Natural Hazard(s)	Earthquake
Associated LHMP Objective(s)	<p>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, extreme heat, and their secondary impacts.</p> <p>C. Preserve Berkeley’s unique character and values from being compromised by hazardous events.</p> <p>D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in the community.</p>
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy S-20, Actions D</p> <p>General Plan Policy S-15, Action A</p> <p>General Plan Policy-17, Action A</p>
Lead Organization(s) and Staff Lead(s)	<p>Planning and Development Department: Building & Safety Division</p> <p>Staff Lead: Program and Administration Manager</p>
Priority	High
Timeline	<p>April 1, 2019: Building Permit deadline for Retrofit Grants applicants</p> <p>August 1, 2019: Deadline for obtaining building permit or permit with a status “ready for issuance”</p> <p>Complete construction within nine (9) months of receiving notification of FEMA approval</p> <p>If a second grant is secured, an additional three-year timeline will be established for that grant.</p>
Additional Resources Required	The Planning and Development Department is seeking additional Hazard Mitigation Grant funding from Cal OES / FEMA.
Potential Funding Sources	Hazard Mitigation Grant Program (HMGP)

Activity Type(s) (Federal Mitigation Grant Funding only)	Mitigation: Structural Seismic Retrofitting of existing buildings
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2019 Soft Story	Continued Implementation of the Soft Story Retrofit Program, which mandates seismic retrofit of soft story buildings with 5+ residential units.
Proposed Activities	<ul style="list-style-type: none"> a) Continue to inform impacted property owners of the requirement to seismically retrofit their building b) Designated project manager will: <ul style="list-style-type: none"> a. Respond to inquiries from owners, tenants, engineers, contractors and realtors about the mandatory program, compliance procedures and requirements b. Review plan submittals for soft-story seismic retrofits c. Issue permits and perform field inspections d. Remove retrofitted buildings from the Soft-Story Inventory e. Review appeals to accommodate unique circumstances preventing owners from meeting program requirements; consider time extensions, etc. f. Enforce soft story ordinance; issue citations to owners who are out of compliance.
Related Natural Hazard(s)	Earthquake
Associated LHMP Objective(s)	<ul style="list-style-type: none"> 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, extreme heat, and their secondary impacts. C. Preserve Berkeley’s unique character and values from being compromised by hazardous events. D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in the community. E. Protect Berkeley’s historically underserved populations from the impacts of hazardous events by applying an equity focus to mitigation efforts.

Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-20, Actions B, C, D, E, and F General Plan Policy S-15, Action A
Lead Organization and Staff Lead	Planning and Development Department – Building and Safety Division Staff Lead: Program and Administration Manager
Priority	High
Timeline	January 2017: Deadline for soft-story building owners to submit a permit application for retrofit January 2019 OR two years after permit application: Deadline for soft-story retrofit completion
Additional Resources Required	No additional resources required
Potential Funding Sources	Permit Service Center Enterprise Fund
Activity Type(s) (Federal Mitigation Grant Funding only)	Not eligible for federal mitigation grant funding

2019 URM	Complete the ongoing program to retrofit all remaining non-complying Unreinforced Masonry (URM) buildings.
Proposed Activities	<ul style="list-style-type: none"> a) Work 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. b) Apply available legal remedies, including but not limited to citations, to owners who fail to comply with the URM ordinance.
Related Natural Hazard(s)	Earthquake
Associated LHMP Objective(s)	<ul style="list-style-type: none"> 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, extreme heat, and their secondary impacts. D. Connect with residents, community-based organizations, institutions, businesses, and essential

	lifeline systems in order to increase mitigation actions and disaster resilience in the community.
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-20, Action A
Lead Organization and Staff Lead	Planning and Development Department - Building and Safety Division Staff Lead: Program and Administration Manager
Priority	High
Timeline	Complete all remaining URM retrofits/demolitions by January 2020
Additional Resources Required	No additional resources required
Potential Funding Sources	Permit Service Center Enterprise Fund Hazard Mitigation Grant Program (HMGP)

2019 Concrete Retrofit Ordinance Research	Monitor passage and implementation of mandatory seismic retrofit ordinances for concrete buildings in other jurisdictions to assess best practices.
Proposed Activities	<ul style="list-style-type: none"> a) Monitor mandatory seismic retrofit ordinances for concrete buildings passed by other municipalities for effectiveness and best practices b) Communicate and collaborate with other cities and Structural Engineers Association of California (SEAOC) regarding implementation challenges and successes
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 earthquakes, wildfires, landslides, floods, tsunamis, climate change, extreme heat, and their secondary impacts.

	<p>C. Preserve Berkeley’s unique character and values from being compromised by hazardous events.</p> <p>D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in the community.</p>
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-10, Action C
Lead Organization(s) and Staff Lead(s)	<p>Planning and Development Department: Building & Safety Division</p> <p>Staff Lead: Program and Administration Manager</p>
Priority	High
Timeline	<p>Monitor effectiveness of mandatory seismic retrofit ordinances for concrete buildings: Ongoing</p> <p>Outreach to other municipalities regarding best practices: Ongoing</p>
Additional Resources Required	No additional resources required

2019 Gas Safety	Improve the disaster-resistance of the natural gas delivery system to increase public safety and to minimize damage and service disruption following a disaster.
Proposed Activities	<p>a) Maintain 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.</p> <p>b) Promote electrification of buildings, both existing buildings and new construction, to mitigate hazards associated with natural gas usage and the impacts of damage to infrastructure after a hazard occurs.</p>
Related Natural Hazard(s)	<p>Earthquake</p> <p>Wildland-Urban Interface Fire</p> <p>Landslide</p>

	Tsunami
Associated LHMP Objective(s)	<p>B. Reduce the potential for loss of life, injury and economic damage to Berkeley residents and businesses from earthquakes, wildfires, landslides, floods, tsunamis, climate change, extreme heat, and their secondary impacts.</p> <p>D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in the community.</p> <p>E. Protect Berkeley’s historically underserved populations from the impacts of hazardous events by applying an equity focus to mitigation efforts.</p>
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-12, Action C
Lead Organization(s) and Staff Lead(s)	<p>Fire Department – Office of Emergency Services Staff Lead: Emergency Services Coordinator (Shutoff Valve Program)</p> <p>Planning Department – Office of Energy and Sustainable Development (Electrification) Staff Lead: Climate Action Program Coordinator (Electrification)</p>
Priority	High
Timeline	Ongoing
Additional Resources Required	<p>Shutoff Valve Program: No additional resources required</p> <p>Promoting electrification: Additional funding required for implementation</p>
Potential Funding Sources	<p>General Fund</p> <p>Measure GG Special Revenue Fund</p> <p>Ratepayer funds from PG&E or East Bay Community Energy</p> <p>Grants from Energy Foundation, Urban Sustainability Directors Network, California Energy Commission, California Air Resources Board, Bay Area Air Quality</p>

Management District, U.S. Department of Energy

<p>2019 Fire Code</p>	<p>Reduce fire risk in existing development through fire code updates and enforcement.</p>
<p>Proposed Activities</p>	<ul style="list-style-type: none"> a) Periodically update the Berkeley Fire Code and adopt the California Fire Code with local amendments to incorporate the latest knowledge and State regulations to protect people and property against known risks in both structural and non- structural building and site components. b) Evaluate Fire Prevention Division staffing necessary to adequately perform and enforce required inspections for both Annual and HFA inspections. c) Consider expansion of the number of properties to be included in the Hazardous Fire Area inspection program. d) Maintain Fire Department efforts to reduce fire risk through inspections: <ul style="list-style-type: none"> a. Annual building inspections in all Fire Zones b. Hazardous Fire Area inspections c. Multi-unit-residential building inspections in all Fire Zones e) Create a standard for written vegetation management plans for major construction projects in Fire Zones 2 and 3. f) Evaluate inspection procedures and adjust inspection cycle annually based on changing climatic conditions. g) Develop and enforce Fire Code requirement for fire fuel clearance on public roadways.
<p>Related Natural Hazard(s)</p>	<p>Wildland-Urban Interface Fire</p>
<p>Associated LHMP Objective(s)</p>	<ul style="list-style-type: none"> 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, heat waves, and their secondary impacts. C. Preserve Berkeley’s unique character and values from being compromised by hazardous events.
<p>Related Policies</p>	<p>General Plan Policy S-21: Fire Preventative Design</p>

from the General Plan or Climate Action Plan	Standards, Action A General Plan Policy S-23: Property Maintenance, Action B General Plan Policy UD-7, Actions A and B General Plan Policy UD-12, Actions A and C Climate Action Plan – Adaptation, Goal 1D, Action 3
Lead Organization(s) and Staff Lead(s)	Fire Department – Division of Fire Prevention Staff Lead: Fire Marshal
Priority	High
Timeline	Fire Code Adoption: May and November 2019, and November 2022 Staffing evaluation: Ongoing HFA expansion research: February 2019 Inspections: Ongoing/Funding-dependent Vegetation Management Standard: Funding-dependent Inspection system evaluation: Funding-dependent Roadway clearance: Conceptual Plan in 2020, Implement Pilot with Community Education in 2021, Plan Enforcement in 2022
Additional Resources Required	Inspections: Additional staffing required Vegetation Management Standard: Additional staffing required Inspection system evaluation: Additional staffing required Roadway clearance code: Additional staffing required
Potential Funding Sources	Pre-Disaster Mitigation Grant Program (PDM) Hazard Mitigation Grant Program (HMGP) General Fund New City tax
Activity Type(s) (Federal Mitigation Grant Funding only)	Mitigation: Hazardous Fuels Reduction

<p>2019 Vegetation Management</p>	<p>Reduce fire risk in existing development through vegetation management.</p>
<p>Proposed Activities</p>	<ul style="list-style-type: none"> a) Maintain Fire Fuel Chipper Program b) Maintain Fire Fuel Abatement Program on Public Land c) Maintain Fire Fuel Debris Bin Program d) Maintain Weekly Curbside Plant Debris Collection e) Pursue external funding to increase education and awareness of vegetation management standards for fire fuel reduction f) Work with partners and stakeholders to identify fire fuel reduction zones and to promote and facilitate removal of vegetation in those zones to mitigate fire spread. g) Pursue external funding to perform vegetation management on public and private property h) Develop and enforce Fire Code requirement for fire fuel clearance on public roadways (see Fire Code action for details)
<p>Related Natural Hazard(s)</p>	<p>Wildland-Urban Interface Fire Climate Change</p>
<p>Associated LHMP Objective(s)</p>	<ul style="list-style-type: none"> 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, heat waves, and their secondary impacts. D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in the community.
<p>Related Policies from the General Plan or Climate Action Plan</p>	<p>General Plan Policy S-23, Action A</p>
<p>Lead Organization(s) and Staff Lead(s)</p>	<p>Department of Parks Recreation and Waterfront – Parks Division Fire Fuel Chipper Program Staff Lead: Senior Landscape Gardener (Senior Forestry Supervisor)</p>

	<p>Fire Fuel Abatement Program on Public Land Staff Lead: Senior Landscape Supervisor</p> <p>Fire Fuel Debris Bin Program and Weekly Curbside Plant Debris Collection: Department of Public Works – Zero Waste Division</p> <p>Staff Lead: Solid Waste and Recycling Manager</p> <p>Fire Department</p> <p>Staff Lead: Captain of Professional Standards Division (Pursue funding for education and vegetation management)</p> <p>Fire Chief (Fire Fuel Reduction Zones)</p>
Priority	High
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: No additional resources required</p> <p>Vegetation management activities on public/private lands: Additional resources required, amount to be determined</p> <p>Fire fuel reduction zones: Additional resources required, amount to be determined</p>
Potential Funding Sources	<p>City General Fund Refuse Fee</p> <p>Pre-Disaster Mitigation Grant Program (PDM)</p> <p>Hazard Mitigation Grant Program (HMGP)</p> <p>Assistance to Firefighters Grant</p> <p>California Climate Investments Fire Prevention Grant Program</p>
Activity Type(s) (Federal Mitigation Grant Funding only)	Mitigation: Hazardous Fuels Reduction

2019 Hills Pedestrian Evacuation	Manage and promote pedestrian evacuation routes in Fire Zones 2 and 3.
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Proposed Activities	<ul style="list-style-type: none"> a) Public Works Staff will maintain paths on an as-needed basis, and will coordinate with the Berkeley Path Wanderers to maintain public pathways to provide safe pedestrian evacuation routes from the hill areas. b) Maintain signage for public pathways to identify safe and accessible pedestrian evacuation routes from the hill areas. c) Update City maps of all emergency access and evacuation routes to include pedestrian pathways. d) Publicize up-to-date maps of all emergency access and evacuation routes.
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 earthquakes, wildfires, landslides, floods, tsunamis, climate change, extreme heat, and their secondary impacts.</p>
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>
Lead Organization(s) and Staff Lead(s)	<p>Department of Public Works (Maintenance)</p> <p>Paths: Engineering Division – Assistant Public Works Engineer</p> <p>Signage: Transportation Division – City Traffic Engineer</p> <p>Department of Information Technology (Mapping)</p> <p>GIS Division GIS Coordinator</p> <p>Fire Department (Outreach)</p> <p>Office of Emergency Services - Emergency Services Coordinator</p>
Priority	High
Timeline	Ongoing

Additional Resources Required	No additional resources required (additional funding could facilitate additional activities)
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2019 Hills Roadways and Parking	Improve responder access and community evacuation in Fire Zones 2 and 3 through roadway maintenance and appropriate parking restrictions.
Proposed Activities	<ul style="list-style-type: none"> a) Maintain and improve roadways in Fire Zones 2 and 3. b) Maintain community-driven process to identify and consider areas for parking restrictions and red curbing. c) Explore options for comprehensive parking restrictions in Fire Zones 2 and 3 during Red Flag and/or Extreme Fire Weather conditions. d) Develop and enforce Fire Code requirement for fire fuel clearance on public roadways (see Fire Code action for details)
Related Natural Hazard(s)	<p>Earthquake</p> <p>Wildland-Urban Interface Fire</p>
Associated LHMP Objective(s)	<ul style="list-style-type: none"> 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, extreme heat, and their secondary impacts. B. Increase City government’s ability to serve the community during and after hazardous events by mitigating risk to key City functions. D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in the community.
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy S-16, Action A</p> <p>General Plan Policy T-25, Action A</p> <p>General Plan Policy T-28, Action D</p> <p>General Plan Policy S-22, Action A</p>
Lead Organization(s) and	<p>Roadway maintenance</p> <p>Public Works Department: Engineering Division</p>

Staff Lead(s)	<p>Staff Lead: Supervising Civil Engineer</p> <p>Community-driven parking restrictions</p> <p>Public Works Department: Transportation Division</p> <p>Staff Lead: Supervising Traffic Engineer</p> <p>Fire weather parking restrictions</p> <p>Fire Department: Office of Emergency Services</p> <p>Staff Lead: Assistant Chief</p> <p>Fire Department: Fire Prevention Division</p> <p>Staff Lead: Fire Marshal</p>
Priority	High
Timeline	<p>Roadway maintenance: Ongoing</p> <p>Community-driven parking restrictions: Ongoing</p> <p>Fire weather parking restrictions: Conceptual Plan in 2020, Implement Pilot with Community Education in 2021, Plan Enforcement in 2022</p>
Additional Resources Required	No additional resources required

2019	Coordinate with PG&E for the construction of undergrounding in the Berkeley Hills within approved Underground Utility Districts (UUDs).
Undergrounding	
Proposed Activities	<p>a) Construction of undergrounding in the Berkeley Hills within UUD No. 48 (portions of Grizzly Peak Blvd., Summit Rd., Avenida Dr., Fairlawn Dr., and Senior Ave.)</p> <p>b) Construction of undergrounding of overhead utility wires within UUD No. 35A (Vistamont Ave., Rochdale Way, and Rosemont Ave from Woodmont Ave. to Vistamont Ave.)</p> <p>c) Construction of undergrounding of overhead utility wires on Bayview Place</p>
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 earthquakes, wildfires, landslides, floods, tsunamis, climate change, extreme heat, and their secondary impacts.</p> <p>B. Preserve Berkeley’s unique character and values from being compromised by hazardous events.</p>
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy T-28, Action E</p> <p>General Plan Policy S-1, Actions B and C</p> <p>General Plan Policy S-12, Action B</p> <p>General Plan Policy S-22, Action A</p> <p>General Plan Policy UD-8, Action A</p>
Lead Organization(s) and Staff Lead(s)	<p>Public Works Department- Engineering</p> <p>Staff Lead: City Engineer</p>
Priority	High
Timeline	<p>UUD No. 48</p> <p>Hold Community Meeting for Lighting Selection: November 2018</p> <p>Secure Easements for Above Ground Structures: November 2018 - March 2019</p> <p>Advertise for Bids: February 2019</p> <p>Construction Contract Award: Late Spring 2019</p> <p>Construction Start: Summer 2019</p> <p>UUD No. 35A</p> <p>On hold</p> <p>UUD Bayview Place</p> <p>On hold</p>
Additional Resources Required	<p>Funding for UUD No.48:</p> <p>General Fund for staff time, consultant services, lighting, and payment for easements if it is required</p> <p>Assessed fees for lighting</p> <p>Rule 20A Funds for construction</p>

	<p>Funding for UUD 35A: General Fund Remaining Rule 20A Funds</p> <p>Funding for UUD Bayview Place: Property Owner Funds (20B) General Fund for consultant services</p>
Potential Funding Sources	<p>Funding for UUD No.48: General Fund Rule 20A Funds</p> <p>Funding for UUD 35A: General Fund Rule 20A Funds</p> <p>Funding for UUD Bayview Place: Property Owner Funds</p>
Activity Type(s) (Federal Mitigation Grant Funding only)	Federal mitigation grant funding is not anticipated

2019 EBMUD	Work with EBMUD to ensure an adequate water supply during emergencies and disaster recovery.
Proposed Activities	<p>a) Coordinate with EBMUD regarding plans to install a new 48-inch aqueduct by 2020 to be able to continue potable and firefighting water supply following a seismic event.</p> <p>b) Explore project approaches with EBMUD to expedite replacement of problem pipelines in Berkeley neighborhoods exposed to wildland-urban interface fire and seismic ground failure.</p> <p>c) Coordinate with EBMUD to ensure that pipeline replacement projects and upgrades are coordinated with the City's five-year street paving program and other City programs.</p>
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 earthquakes, wildfires, landslides, floods, tsunamis, climate change, extreme heat, and their secondary impacts.</p> <p>D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in the community.</p>
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-12: Utility and Transportation Systems, Action A
Lead Organization(s) and Staff Lead(s)	Department of Public Works – Engineering Division Staff Lead: City Engineer
Priority	High
Timeline	Ongoing
Additional Resources Required	No additional resources required

2019 Extreme Heat	Reduce Berkeley’s vulnerability to extreme heat events and associated hazards.
Proposed Activities	<p>a) 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, focusing on the most vulnerable populations impacted and improving access to resources, into City operations and services.</p> <p>b) Continue to create and maintain shading by maintaining the health of existing trees and sustaining municipal tree planting with a focus on efforts in areas where there are fewer trees.</p> <p>c) Continue to implement energy efficiency ordinances for existing residential and commercial buildings to improve building comfort, including in extreme</p>

	<p>weather conditions, and to reduce energy use.</p> <p>d) Encourage cooling technologies for the built environment through voluntary programs to mitigate the urban heat island effect. This can include strategies like green roofs, cool roofs, and cool pavements, increased vegetation, as well as electric heat pumps and natural ventilation which can provide cooling to buildings in an extreme heat event.</p>
Related Natural Hazard(s)	<p>Climate Change</p> <p>Extreme Heat</p>
Associated LHMP Objective(s)	<p>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, extreme heat, and their secondary impacts.</p> <p>D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in the community.</p> <p>E. Protect Berkeley’s historically underserved populations from the impacts of hazardous events by applying an equity focus to mitigation efforts.</p>
Related Policies from the General Plan or Climate Action Plan	<p>Climate Action Plan - Adaptation Goal 1, Policies A and D</p> <p>General Plan Policy EM-29: Street and Park Trees</p>
Lead Organization(s) and Staff Lead(s)	<p>Planning Department – Office of Energy and Sustainable Development (Monitor Impacts, Energy Efficiency Ordinances, Cooling Technologies)</p> <p>Staff Lead: Climate Action Program Coordinator</p> <p>Department of Parks, Recreation and Waterfront – Parks Division (Tree Planting)</p> <p>Staff Lead: Parks Superintendent</p>
Priority	<p>High</p>
Timeline	<p>Ongoing</p>
Additional Resources Required	<p>Scientific monitoring, energy efficiency ordinances, cooling technologies: Additional funding required for implementation</p>

Potential Funding Sources	<p>Tree planting: Dependent on State of California Environmental Enhancement Mitigation Program Grant</p> <p>City General Fund</p> <p>Tree planting grants</p> <p>City Parks Tax Fund 450</p> <p>Ratepayer funds from PG&E or East Bay Community Energy</p> <p>Grants from Energy Foundation, Urban Sustainability Directors Network, California Energy Commission, California Air Resources Board, Bay Area Air Quality Management District, U.S. Department of Energy</p>
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2019 Hazardous Materials	Mitigate hazardous materials release in Berkeley through inspection and enforcement programs.
Proposed Activities	<ul style="list-style-type: none"> a) Implement Hazardous Materials Release Response Plans and Inventories (HMRRP) Program b) Implement California Accidental Release Prevention (CalARP) Program c) Implement Underground Storage Tank (UST) Program d) Implement Aboveground Petroleum Storage Act Requirement for Spill Prevention e) Implement Hazardous Waste Generator and Onsite Hazardous Waste Treatment Programs f) Implement Hazardous Materials Management Plans (HMMP) and Hazardous Materials Inventory Statements per California Fire Code g) Enforce California Fire Code for Hazardous Materials Compliance (See Fire Code Action)
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)	<p>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, extreme heat, and their secondary impacts.</p> <p>D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in the community.</p>
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy EM-12, Action A</p> <p>General Plan Policy EM-13, Action A</p> <p>General Plan Policy EM-14, Actions A and B</p>
Lead Organization(s) and Staff Lead(s)	<p>Planning: Toxics Division (all programs except Fire Code enforcement)</p> <p style="padding-left: 40px;">Staff Lead: Hazardous Materials Manager</p> <p>Fire Department: Fire Prevention Division (Fire Code)</p> <p style="padding-left: 40px;">Staff Lead: Fire Marshal</p>
Priority	High
Timeline	Ongoing
Additional Resources Required	No additional resources required

2019 Air Quality	Define clean air standards for buildings during poor air quality events and use those standards to assess facilities for the Berkeley community.
Proposed Activities	<p>a) Participate in regional efforts to define standards and tools to predict buildings' ability to deliver clean air to occupants during poor air quality events.</p> <p>b) Apply standards and tools to assess City facilities' ability to provide clean air to occupants during poor air quality events.</p> <p>c) Coordinate with willing Berkeley partners to apply standards and tools to partner facilities.</p> <p>d) Use findings to develop a list of potential clean air facilities (City-run and partner-run) to the community.</p>

Related Natural Hazard(s)	Wildland-Urban Interface Fire Extreme Heat
Associated LHMP Objective(s)	<p>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, extreme heat, and their secondary impacts.</p> <p>D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in the community.</p> <p>E. Protect Berkeley’s historically underserved populations from the impacts of hazardous events by applying an equity focus to mitigation efforts.</p>
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-20
Lead Organization(s) and Staff Lead(s)	<p>Standards Development: Department of Health, Housing and Community Services: Public Health and Environmental Health Divisions</p> <p style="padding-left: 40px;">Staff Leads: Health Officer/Environmental Health Division Manager</p> <p>Standards Implementation at City Facilities: Department of Public Works:</p> <p style="padding-left: 40px;">Staff Lead: Facilities Division – Supervising Civil Engineer</p> <p style="padding-left: 40px;">Staff Lead: Building Maintenance Supervisor</p> <p>Partner Coordination and Community Outreach: Fire Department: Office of Emergency Services</p> <p style="padding-left: 40px;">Staff Lead: Chief of Special Operations</p>
Priority	High
Timeline	To be determined
Additional Resources Required	To be determined

2019 NFIP	Maintain City participation in the National Flood Insurance Program.
Proposed Activities	<ul style="list-style-type: none"> a) Continue to use the most current FEMA information defining flood areas. b) Continue to incorporate FEMA guidelines and suggested activities into City plans and procedures for managing flood hazards.
Related Natural Hazard(s)	Floods
Associated LHMP Objective(s)	<ul style="list-style-type: none"> 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, extreme heat, and their secondary impacts. B. Increase City government’s ability to serve the community during and after hazardous events by mitigating risk to key City functions. D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in the community.
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-28 Flood Insurance, Actions B and C
Lead Organization(s) and Staff Lead(s)	<p>Public Works Department:</p> <p>Engineering Division (NFIP application to City projects; Program Management)</p> <p>Staff Leads: Manager of Engineering, Director of Public Works</p> <p>Planning Department (application to private projects):</p> <p>Land Use Planning Division (determines if new project is subject to NFIP regulations)</p> <p>Staff Lead: Land Use Manager</p> <p>Building and Safety Division (coordinates to ensure that projects are compliant with Flood Zone Development Ordinance)</p>

Staff Lead: Senior Plan Check Engineer	
Priority	High
Timeline	Ongoing
Additional Resources Required	No additional resources required

2019 Hazard Information	Collect, analyze and share information with the Berkeley community about Berkeley hazards and associated risk reduction techniques.
Proposed Activities	<ul style="list-style-type: none"> a) Track changes in hazard risk using the best-available information and tools. b) Collect and share up-to-date hazard maps identifying areas subject to heightened risk from hazards. c) Publicize financial and technical assistance resources for risk reduction.
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> <p>Extreme Heat</p>
Associated LHMP Objective(s)	<ul style="list-style-type: none"> 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, extreme heat, and their secondary impacts. B. Increase City government’s ability to serve the community during and after hazard events by mitigating risk to key City functions. C. Preserve Berkeley’s unique character and values from being compromised by hazard events. D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in

	<p>order to increase mitigation actions and disaster resilience in the community.</p> <p>E. Protect Berkeley’s historically underserved populations from the impacts of hazardous events by applying an equity focus to mitigation efforts.</p>
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>General Plan Policy UD-12, Actions A and C</p> <p>Climate Action Plan: Adaptation Action A</p>
Lead Organization(s) and Staff Lead(s)	<p>Fire Department – Office of Emergency Services</p> <p>Lead Staff: Emergency Services Coordinator</p> <p>Office of Energy and Sustainable Development (Climate Change Hazards)</p> <p>Lead Staff: Climate Action Program Coordinator</p>
Priority	High
Timeline	Ongoing
Additional Resources Required	No additional resources required
Potential Funding Sources	<p>General Fund</p> <p>Measure GG Special Revenue Fund</p>

2019 Partnerships	Coordinate with and encourage mitigation actions of key City partners.
Proposed Activities	<p>a) Coordinate with and encourage mitigation actions of:</p> <ul style="list-style-type: none"> • Institutions serving the Berkeley community • Berkeley organizations and nonprofits • Other partners whose actions affect the Berkeley community

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> <p>Extreme Heat</p>
Associated LHMP Objective(s)	<p>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, extreme heat, and their secondary impacts.</p> <p>B. Increase City government’s ability to serve the community during and after hazardous events by mitigating risk to key City functions.</p> <p>C. Preserve Berkeley’s unique character and values from being compromised by hazardous events.</p> <p>D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster resilience in the community.</p> <p>E. Protect Berkeley’s historically underserved populations from the impacts of hazardous events by applying an equity focus to mitigation efforts.</p>
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy S-5 The City’s Role in Leadership and Coordination, Actions A and B</p> <p>General Plan Policy UD-7, Actions A and B General Plan Policy UD-12, Actions A and C</p> <p>General Plan Policy S-12 Utility and Transportation Systems, Action A</p>
Lead Organization(s) and Staff Lead(s)	<p>Fire Department: Office of Emergency Services</p> <p>Staff Lead: Assistant Chief of Special Operations</p>
Priority	High
Timeline	Ongoing

Additional Resources Required	To be determined
Potential Funding Sources	General Fund Measure GG Special Revenue Fund

C.5.b.ii Medium-Priority Actions

2019	Reduce Berkeley’s vulnerability to severe storms and associated hazards through proactive research and planning, zoning regulations, and improvements to stormwater drainage facilities.
Severe Storms	
Proposed Activities	<ul style="list-style-type: none"> a) Use development standards to ensure that new development does not contribute to an increase in flood potential. b) Complete the Watershed Management Plan to recommend improvements to problem areas in individual watersheds, and develop a Stormwater Master Plan to perform hydraulic analysis and condition assessment, and identify flow capacity and flooding issues as basis for the Watershed Management Plan. c) Design public improvements such as streets, parks and plazas, for retention and infiltration of stormwater by diverting urban runoff to bio-filtration systems.
Related Natural Hazard(s)	<p>Landslide</p> <p>Floods</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 earthquakes, wildfires, landslides, floods, tsunamis, climate change, extreme heat, and their secondary impacts.
Related Policies from the General Plan or Climate Action Plan	<p>General Plan Policy S-26, Actions B and C</p> <p>General Plan Policy S-27 New Development</p> <p>Climate Action Plan - Adaptation Goal 1, Policy C</p>
Lead Organization and Staff Lead	<p>Planning Department – Land Use Planning Division (Development Standards)</p> <p style="padding-left: 40px;">Staff Lead: Land Use Manager</p> <p>Public Works Department – Engineering Division</p> <p style="padding-left: 40px;">Staff Lead: Supervising Civil Engineer (Watershed Management Plan and Public Improvements)</p>
Priority	Medium

Timeline	Ongoing
Additional Resources Required	Development Standards: To be determined Watershed Management Plan/Stormwater Master Plan: To be determined Public Improvements Design: To be determined
Potential Funding Sources	City General Fund Permit Service Center Enterprise Fund Measure M Bond Funds Pre-Disaster Mitigation Grant Program (PDM) Hazard Mitigation Grant Program (HMGP)
Activity Type(s)	Mitigation: Infrastructure Retrofit

2019 Energy Assurance	Implement energy assurance strategies at critical City facilities.
Proposed Activities	<ul style="list-style-type: none"> a) Identify potential actions to mitigate energy assurance vulnerabilities at critical City facilities during planning/conceptual design. b) Provide guidance to help the City consider opportunities to design, finance and implement clean energy assurance strategies (e.g., photovoltaic-supplemented generation, energy efficiency activities, and/or mobile charging stations).
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> <p>Extreme Heat</p>

Associated LHMP Objective(s)	<p>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, extreme heat, and their secondary impacts.</p> <p>B. Increase City government’s ability to serve the community during and after hazardous events by mitigating risk to key City functions.</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 Climate Action Plan – Chapter 4, Goal 5: Increase Energy Efficiency and Renewable Energy Use in Public Buildings – Policies 5a and 5b</p>
Lead Organization(s) and Staff Lead(s)	<p>Department of Public Works – Facilities Division (Identify actions)</p> <p style="padding-left: 40px;">Staff Lead: Supervising Civil Engineer (for facilities)</p> <p>Planning Department – Office of Energy and Sustainable Development (Clean Energy Opportunities)</p> <p style="padding-left: 40px;">Staff Lead: Climate Action Program Manager</p>
Priority	Medium
Timeline	Ongoing
Additional Resources Required	Additional resources to analyze specific energy assurance options for individual projects.
Potential Funding Sources	<p>General Fund</p> <p>T1 Bond</p> <p>Measure GG Special Revenue Fund</p> <p>Ratepayer funds from PG&E or East Bay Community Energy</p> <p>Grants from Energy Foundation, Urban Sustainability Directors Network, California Energy Commission, California Air Resources Board, Bay Area Air Quality Management District, U.S. Department of Energy</p>

2019 Climate Change Integration	Mitigate climate change impacts by integrating climate change research and adaptation planning into City operations and services.
Proposed Activities	<ol style="list-style-type: none"> a) Determine staffing needs to monitor research and oversee integration of climate change adaptation into City operations and services b) Develop and implement a process to integrate adaptation planning into City operations. Activities include: <ol style="list-style-type: none"> a. Train City staff on the basic science and impacts of climate change and on climate adaptation strategies b. Develop policy and programs to address potential climate impacts in municipal capital and land use planning
Related Natural Hazard(s)	Climate Change Extreme Heat
Associated LHMP Objective(s)	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, extreme heat, and their secondary impacts.
Related Policies from the General Plan or Climate Action Plan	<ul style="list-style-type: none"> • Climate Action Plan – Adaptation, Goal 1A • Climate Action Plan – Community Outreach and Empowerment, Goal 1A • Climate Action Plan – Implementation, Monitoring and Reporting, Goals 2, 3 and 4
Lead Organization(s) and Staff Lead(s)	Planning Department – Office of Energy and Sustainable Development Staff Lead: Climate Action Program Manager
Priority	Medium
Timeline	Determine staffing needs: 3-4 years Staff Training: Ongoing Address climate impacts in municipal planning processes: 1-2 years
Additional	To be determined

Resources Required	
Potential Funding Sources	General Fund Permit Service Center Enterprise Fund

2019	Mitigate the impacts of sea level rise in Berkeley.
Sea Level Rise	
Proposed Activities	<ul style="list-style-type: none"> a) Monitor and participate in regional and State-level research on projected sea-level rise in Berkeley and the region. b) Develop guidelines, regulations, and review development standards to ensure new and existing public and private developments and infrastructure are protected from floods due to sea-level rise.
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 earthquakes, wildfires, landslides, floods, tsunamis, climate change, extreme heat, and their secondary impacts.
Related Policies from the General Plan or Climate Action Plan	<p>Climate Action Plan, Adaptation Policies A and 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>
Lead Organization(s) and Staff Lead(s)	<p>Planning Department – Office of Energy and Sustainable Development (Monitor Research/Integrate Considerations)</p> <p style="padding-left: 40px;">Staff Lead: Climate Action Program Manager</p> <p>Planning Department – Land Use Planning Division (Development Regulations)</p> <p style="padding-left: 40px;">Staff Lead: Division Director</p>
Priority	Medium
Timeline	Research: Ongoing

	Policy Development: 2 years
Additional Resources Required	<p>Research: Additional staff capacity or funding needed for further analysis.</p> <p>Policy Development: Additional staff capacity to develop regulations and standards.</p>
Potential Funding Sources	<p>General Fund</p> <p>Permit Service Center Enterprise Fund</p> <p>Adapting to Rising Tides, San Francisco Bay Conservation & Development Commission, National Oceanic & Atmospheric Administration, Urban Sustainability Director’s Network, or Resource Legacy Fund</p>

2019	Collaborate with partners to increase the security of Berkeley’s water supply from climate change impacts.
Water Security	
Proposed Activities	<ul style="list-style-type: none"> a) Partner with East Bay Municipal Utility District (EBMUD) to provide and market incentives for residents, businesses and institutions to conserve water. b) Partner with agencies such as EBMUD and StopWaste 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. c) Encourage water efficiency and conservation in existing buildings, such as incorporating water assessments into existing policies or creating a compliance program for SB407.
Related Natural Hazard(s)	Climate Change
Associated LHMP Objective(s)	<ul style="list-style-type: none"> 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, extreme heat, and their secondary impacts. D. Connect with residents, community-based organizations, institutions, businesses, and essential lifeline systems in order to increase mitigation actions and disaster

	resilience in the community.
Related Policies from the General Plan or Climate Action Plan	Climate Action Plan - Adaptation Goal 1, Policy B General Plan Policy EM-25: Groundwater General Plan Policy EM-26: Water Conservation General Plan Policy EM-31: Landscaping
Lead Organization(s) and Staff Lead(s)	Planning Department – Office of Energy and Sustainable Development Staff Lead: Climate Action Program Coordinator (Water Recycling/Incentives) Staff Lead: Sustainability Planner (Landscaping Techniques) Staff Lead: Climate Action Program Coordinator (Water Efficiency and Conservation)
Priority	Medium
Timeline	Encourage water efficiency in existing policies: 2-3 years
Additional Resources Required	Additional staff capacity.
Potential Funding Sources	General Fund Permit Service Center Enterprise Fund

C.5.b.iii Low-Priority Actions

2019	Mitigate Berkeley’s tsunami hazard.
Tsunami	
Proposed Activities	<ul style="list-style-type: none"> a) Fund and replace damaged finger docks. b) Secure funding for replacement of D and E docks; begin the permitting process once funding is secure c) Begin the permitting process for piling replacement. d) Repair University Avenue, Marina Boulevard, and Spinnaker Way in order to mitigate tsunami vulnerabilities. e) Collaborate with the California Office of Emergency Services, the California Geological Survey, and the Federal Emergency Management Agency to document and explore additional tsunami hazard mitigation measures for Berkeley’s maritime communities.
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 earthquakes, wildfires, landslides, floods, tsunamis, climate change, extreme heat, and their secondary impacts.
Related Policies from the General Plan or Climate Action Plan	General Plan Policy S-19: Risk Analysis, Action A
Lead Organization(s) and Staff Lead(s)	<p>All activities: Parks, Recreation and Waterfront Department – Marina Division</p> <p>Staff Lead: Waterfront Manager, Alexandra Endress, and Waterfront Supervisor, Stephen Bogner.</p> <p>Cal OES/CGS/FEMA collaboration: Fire Department – Office of Emergency Services</p> <p>Staff Lead: Emergency Services Coordinator</p>
Priority	Low

Timeline	Activities a) - d): funding-contingent Activity e) To be determined
Additional Resources Required	a) Finger Dock Replacement: estimated \$100k-\$500k b) D and E Dock Replacement: estimated \$4-7 million c) Piling replacement: estimated \$50k for permitting only d) Roadway repair: estimated \$4-6 million e) No additional resources required
Potential Funding Sources	Pre-Disaster Mitigation Grant Program (PDM) Hazard Mitigation Grant Program (HMGP) General Fund City-Issued Bonds
Activity Type(s) (Federal Mitigation Grant Funding only)	Mitigation: Infrastructure Retrofit

2019	Streamline the zoning permitting process to rebuild residential and commercial structures following disasters.
Streamline Rebuild	
Proposed Activities	<ul style="list-style-type: none"> a) Explore a Zoning Amendment to BMC 23C.04.100 that streamlines the Zoning permitting process to allow damaged industrial and commercial buildings, and dwelling units to rebuild by right following disasters. b) Consider different treatment for buildings in high-risk areas, such as: <ul style="list-style-type: none"> a. Imposing higher standards of building construction for rebuilding b. Excluding buildings in these areas from the amendment c) Define the standard for documentation of current conditions for residential and commercial property owners to rebuild by right (in conformity with current applicable codes, specifications and standards) following disasters. d) Define the process for the City to accept and file this documentation. e) Outreach to property owners about this documentation process.

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)	<p>C. Preserve Berkeley’s unique character and values from being compromised by hazardous events.</p> <p>E. Protect Berkeley’s historically underserved populations from the impacts of hazardous events by applying an equity focus to mitigation efforts.</p>
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> <p>General Plan policy UD-7, Action C</p>
Lead Organization(s) and Staff Lead(s)	<p>Planning Department – Land Use Planning Division</p> <p>Staff Lead: Division Manager</p>
Priority	Low
Timeline	2 years
Additional Resources Required	Staff with capacity to focus on this effort
Potential Funding Sources	General Fund