



# Zero Waste Commission Regular Meeting AGENDA

Tuesday, February 25, 2019, 7:00 p.m.  
City of Berkeley Corporation Yard (Ratcliff Building, Willow Room)  
1326 Allston Way, Berkeley

## PRELIMINARY MATTERS (30 minutes):

### 1. Call to Order and Roll Call

**Christienne de Tournay (Chair)**, appointed by Councilmember Sophie Hahn, District 5  
**Alfred Twu (Vice Chair)**, appointed by Councilmember Kriss Worthington, District 7  
**Annette Poliwka**, appointed by Mayor Jesse Arreguin  
**VACANT**, appointed by Councilmember Linda Maio, District 1  
**VACANT**, appointed by Councilmember Cheryl Davila, District 2  
**Antoinette Stein**, appointed by Councilmember Ben Bartlett, District 3  
**VACANT**, appointed by Councilmember Kate Harrison, District 4  
**Elisabeth Watson**, appointed by Councilmember Susan Wengraf, District 6  
**Brazile Clark**, appointed by Councilmember Lori Droste, District 8

### 2. Approve Agenda

### 3. Public Comment

*Speakers are generally allotted up to three minutes, but may be allotted less time if there are many speakers, at the discretion of the Chair.*

### 4. Announcements from Commissioners

*Commissioners may make general announcements; no action will be taken.*

### 5. Approval of Minutes from the January 28, 2018 Regular Meeting

## INFORMATION AND ACTION ITEMS (90 minutes):

*Items for discussion and possible action*

### 6. Staff Updates (15 minutes)

- Single Use Foodware and Litter Reduction Ordinance
- Transfer Station Feasibility Study
- Zero Waste Strategic Plan
- SB1383 Formal Rulemaking Process

### 7. ACTION ITEM: Elections for Commission Chair and Vice Chair (15 minutes)

### 8. ACTION ITEM (Continued from January Meeting):

Discussion and possible action regarding modifications to the types of plastics accepted in the City's commercial and residential recycling programs due to long-term marketplace changes that impact the marketability of non-bottle plastics #1-#7.

(15 minutes)

9. ACTION ITEM (Continued from January Meeting):  
Discussion and possible action to provide feedback on the City's first draft of the 2019 Update to the Local Hazard Mitigation Plan (Attachment A) (15 minutes)  
*Note: Attachment A includes an explanation of the update process and the Executive Summary of the draft LHMP.*  
*The full draft LHMP is available on the City of Berkeley website: [www.cityofberkeley.info/mitigation/](http://www.cityofberkeley.info/mitigation/)*
10. Deconstruction Subcommittee Update (15 minutes)
11. Discuss Carpet Recycling Promotion for Earth Day (10 minutes)
12. Discuss Future Agenda Items (5 minutes)

## ADJOURNMENT

*Please refrain from wearing scented products to this meeting. This meeting is being held in a wheelchair accessible location. To request a disability-related accommodation(s) to participate in the meeting, including auxiliary aids or services, please contact the Disability Services Specialist at 510-981-6342 (V) or 510-981-6345 (TDD) at least three business days before the meeting date.*

*Communications to Berkeley boards, commissions or committees are public record and will become part of the City's electronic records, which are accessible through the City's website. **Please note: e-mail addresses, names, addresses, and other contact information are not required, but if included in any communication to a City board, commission or committee, will become part of the public record.** If you do not want your e-mail address or any other contact information to be made public, you may deliver communications via U.S. Postal Service or in person to the secretary of the relevant board, commission or committee. If you do not want your contact information included in the public record, please do not include that information in your communication.*

*Please contact the secretary to the relevant board, commission or committee for further information. Zero Waste Commission Secretary: Heidi Obermeit, 1201 2<sup>nd</sup> St. Berkeley, CA 94710, 510-981-6357, [hobermeit@cityofberkeley.info](mailto:hobermeit@cityofberkeley.info)*

**(DRAFT) MINUTES**

The meeting was convened at 7:03 p.m. with Chrise de Tournay, Chair, presiding.

**ROLL CALL**

Present: Chrise de Tournay, Alfred Twu, Annette Poliwka, Alex Sharenko, Katie McKinstry, Margo Schueler, Elisabeth Watson (7:09 arrival)

LOA: None

Absent: Antoinette Stein, Brazile Clark

**MEMBERS OF THE PUBLIC PRESENT: 5**

**STAFF PRESENT: 2**

**PUBLIC COMMENT: 2**

**ACTIONS TAKEN:**

**1. Approval of the January 28, 2019 Regular Meeting Agenda**

M/S/C (McKinstry/Sharenko) to approve the agenda for the January 28, 2019 regular meeting.  
Ayes: Unanimous; Abstain: None; Absent: Stein, Watson, Clark

**2. Approval of the November 26, 2018 Regular Meeting Minutes**

M/S/C (Watson/McKinstry) to approve the minutes from the Nov. 26, 2018 regular meeting.  
Ayes: de Tournay, Twu, Poliwka, Sharenko, McKinstry, Stein;  
Abstain: Schueler; Absent: Stein; Clark

**3. Approval of the Zero Waste Commission 2019 Regular Meeting Schedule**

M/S/C (de Tournay/Poliwka) to approve the following Zero Waste Commission 2019 regular meeting schedule:

- January 28
- February 25
- March 25
- April 22
- May 28
- June 24
- July 22
- September 23
- October 28
- November 25

Ayes: de Tournay, Twu, Poliwka, Schueler, Watson;  
Abstain: Sharenko, McKinstry; Absent: Stein; Clark

**4. Adjournment at 9:01 p.m.**

M/S/C (Sharenko/McKinstry) to adjourn the meeting at 9:01 p.m.

Ayes: Unanimous; Abstain: None; Absent: Stein, Clark

The next regular meeting of the Zero Waste Commission will be held on February 25, 2019 at 7:00 p.m. at the City of Berkeley Corporation Yard (Willow Room), 1326 Allston Way, Berkeley.

Respectfully Submitted:

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Heidi Obermeit, Secretary

DRAFT

## **Local Hazard Mitigation Plan Update Process**

The Local Hazard Mitigation Plan (LHMP) identifies natural hazards in Berkeley and outlines a five-year strategy to further protect Berkeley's people, buildings, infrastructure, and environment from those hazards. The City began updating the 2019 LHMP in 2018. This update effort will allow Berkeley to continue to spend and apply for federal mitigation grant programs and State funding. The update effort and is anticipated to be completed at the end of 2019.

### **Hazard Mitigation**

Mitigation activities reduce or eliminate risk prior to a disaster and are an important element of the disaster life cycle. Examples of mitigation include:

- Seismic retrofitting of structures to prevent damage or collapse in earthquakes;
- Vegetation management to prevent spread of wildfire.

Mitigation **does not include** disaster preparedness activities, such as:

- Purchasing equipment to use in emergency response;
- Conducting drills;
- Storage of disaster supplies for post-disaster relief.

### **Berkeley's Local Hazard Mitigation Plan**

The City of Berkeley adopted its first Local Hazard Mitigation Plan in 2004, and an update in 2014. The Plan is comprised of two distinct components:

1. Hazard Analysis: Identifies the hazards facing the community, the likelihood that each hazard will impact the community, and how people, buildings, infrastructure, and environment are vulnerable to each hazard.
2. Mitigation Strategy: Identifies objectives for reducing disaster risk in Berkeley, along with specific mitigation actions to meet those objectives.

### **Update Process**

Just as in the Plan's original development and 2014 update, the 2019 LHMP update process is being led by a Core Project Team of City staff. The Team is updating the Plan in consultation with the numerous organizations, business, and individuals who make up the Berkeley community.

### **Community Engagement**

Engagement of the Berkeley community is critical to this plan update. Since early 2018, the Core Project Team has been working with hazard researchers and institutional community partners to update the Plan's Hazard Analysis. The Plan uses the most current scientific research to present Berkeley's hazards and their potential impacts. The document includes information about vulnerabilities and mitigation actions undertaken by nongovernmental institutions in Berkeley.

The Core Project Team will also engage Berkeley community representatives and the public in Plan review. As leaders in the Berkeley community, Commissioners and City Councilmembers will be requested to help the City publicize the First Draft 2019 LHMP, which will be posted on December 18, 2018 on the City of Berkeley website and at City libraries. Members of the public will be invited to provide written feedback on the document until February 28, 2019.

#### Commission Engagement

In 2004, Berkeley City Council adopted the Disaster Mitigation Plan as an annex to the Disaster Preparedness and Safety Element of the City's General Plan. In 2014, the Berkeley City Council adopted an updated version called the Local Hazard Mitigation Plan. This 2019 LHMP Update must be adopted by City Council, so that the City can maintain compliance with (and eligibility for) federal mitigation assistance programs and other State funding opportunities.

When the First Draft 2019 LHMP is posted for public review on December 18, 2018, all Commissions will be requested to agendaize the First Draft 2019 LHMP at their meetings and to provide written feedback on any areas of significant concern. Written feedback on the First Draft 2019 LHMP will be accepted until February 28, 2019.

Additionally, the Planning Commission and Disaster and Fire Safety Commission will play specific roles in the Plan update. Staff will present different elements of the Plan to these Commissions on these dates:

- November 7, 2018: Planning Commission presentation – Project Introduction
- December 5, 2018: Disaster and Fire Safety Commission Presentation – Project Introduction/Hazard Analysis
- January-February 2019: All Commissions consider LHMP for discussion and feedback to staff, if appropriate
  - January 23/February 27, 2019 (tentative): Disaster and Fire Safety Commission Presentation – Mitigation Strategy
  - January 16/February 6, 2019 (tentative): Planning Commission Presentation – Mitigation Strategy”

Following the public comment period for the First Draft 2019 LHMP, the Core Project Team will review and incorporate appropriate feedback from Commissions and community members.

The Core Project Team will then consult with the State of California Office of Emergency Services, the State Department of Forestry, and the Federal Emergency Management Agency to make any additional adjustments required.

Following these plan edits, the Core Project Team will present the Final Draft Plan to two Commissions. Because the LHMP is an annex to the City's General Plan, the Planning Commission must make a recommendation to Council on the Final Draft 2019 LHMP. Because the Disaster and Fire Safety Commission closely monitors the City's preparedness and mitigation efforts, the Core Planning team will request that the Commission make a

recommendation to Council on the Final Draft 2019 LHMP. These meetings are tentatively scheduled as follows:

- October 2019 (est.): Staff presents Final Draft 2019 LHMP to Planning Commission and requests recommendation to City Council (First Public Hearing).
- October 2019 (est.): Staff presents Final Draft 2019 LHMP to Disaster and Fire Safety Commission and requests recommendation to City Council.

#### Local Hazard Mitigation Plan Key Dates

- December 18, 2018: First Draft 2019 LHMP released on City website and at City libraries.
- February 28, 2019: Deadline for written feedback from community members and Commissions.
- September 2019 (est.): Final Draft 2019 LHMP posted on City website.
- October 2019 (est.): Staff requests Final Draft 2019 LHMP recommendation for Council approval from Disaster and Fire Safety Commission.
- October 2019 (est.): Staff requests Final Draft 2019 LHMP recommendation for Council approval from Planning Commission (First Public Hearing).
- December 2019 (est.): Staff presents Final Draft Plan to City Council for review and adoption (Second Public Hearing).



City of Berkeley

# **2019 Local Hazard Mitigation Plan**

First Draft

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,<sup>i</sup> 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**

<b>Hazard</b>	<b>Likelihood</b>	<b>Severity of Impact</b>
<b>Earthquake</b>	Likely	Catastrophic
<b>Wildland-Urban Interface Fire</b>	Likely	Catastrophic
<b>Rainfall-Triggered Landslide</b>	Likely	Moderate
<b>Floods</b>	Likely	Minor
<b>Tsunami</b>	Possible	Moderate
<b>Climate Change</b>	Likely	Unknown*
<b>Extreme Heat</b>	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.<sup>ii</sup> There is a 33% chance that a 6.7 or greater will occur on the Hayward fault system between 2014 and 2043.<sup>iii</sup> 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.<sup>iv</sup>

If a fire occurred today that burned the same area, the loss to structures would be in the billions of dollars.<sup>v</sup> Destruction of contents in all of the homes and businesses burned would add hundreds of millions of dollars<sup>vi</sup> 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 tsunami. These hazards could cause significant damage and losses in Berkeley. However, unlike earthquake and WUI fire, their impacts are likely to be smaller, and confined to specific areas.

#### **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),<sup>vii</sup> 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<sup>viii</sup> 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.<sup>ix</sup> 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.<sup>x</sup> 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
<b>Building Assessment</b>	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
<b>Strengthen and Replace City Buildings</b>	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
<b>Buildings</b>	Reduce hazard vulnerabilities for non-City-owned buildings throughout Berkeley.	Earthquake Wildland-Urban Interface Fire Landslide Floods

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

<b>Name</b>	<b>Action</b>	<b>Hazards</b>
<b>Extreme Heat</b>	Reduce Berkeley’s vulnerability to extreme heat events and associated hazards.	Climate Change Extreme Heat
<b>Hazardous Materials</b>	Mitigate hazardous materials release in Berkeley through inspection and enforcement programs.	Earthquake Wildland-Urban Interface Fire Landslide Floods Tsunami
<b>Air Quality</b>	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
<b>National Flood Insurance Program (NFIP)</b>	Maintain City participation in the National Flood Insurance Program.	Floods
<b>Hazard Information</b>	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
<b>Partnerships</b>	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**

<b>Name</b>	<b>Action</b>	<b>Hazards</b>
<b>Severe Storms</b>	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
<b>Energy Assurance</b>	Implement energy assurance strategies at critical City facilities.	Earthquake Wildland-Urban Interface Fire Landslide Floods Tsunami Climate Change Extreme Heat
<b>Climate Change Integration</b>	Mitigate climate change impacts by integrating climate change research and adaptation planning into City operations and services.	Climate Change Extreme Heat
<b>Sea Level Rise</b>	Mitigate the impacts of sea level rise in Berkeley.	Climate Change
<b>Water Security</b>	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**

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



<sup>i</sup> 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.

<sup>ii</sup> 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.

<sup>iii</sup> 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.

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

<sup>v</sup> Total square footage of buildings in burn area is 9,386,281 square feet.

<sup>vi</sup> In 2004, estimate was \$500 million.

<sup>vii</sup> Public Law 106-390

<sup>viii</sup> Berkeley Climate Action Plan (City of Berkeley, 2009) [www.cityofberkeley.info/climate/](http://www.cityofberkeley.info/climate/)

<sup>ix</sup> 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](http://resilience.abag.ca.gov/wp-content/documents/mitigation_adaptation/RiskProfile_4_26_2017_optimized.pdf)

<sup>x</sup> 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](http://resilience.abag.ca.gov/wp-content/documents/mitigation_adaptation/RiskProfile_4_26_2017_optimized.pdf)