City of Santa Monica

2025-2030
Local Hazards Mitigation Plan

Prepared in collaboration with:

Earth Consultants International

1642 E. Fourth Street,
Santa Ana, California
www.earthconsultants.com

City of Santa Monica

2025-2030
Local Hazards Mitigation Plan

Volume I: Mitigation Action Plan

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

SECTION ..... PAGE

Section 4: Goals and Mitigation Actions

Section 5: Plan Maintenance

TABLE OF CONTENTS (continued)

SECTION

VOLUME II: HAZARDS

VOLUME III – APPENDICES

SECTION 1: INTRODUCTION

Throughout history, southern California residents, including people living in the city of Santa Monica and adjacent areas, have experienced a variety of natural hazards common to the area. Indigenous Americans and early European settlers who depended directly on the land for their food, housing and general welfare surely experienced many of the same natural hazards that impact the area today, including earthquakes, floods, wildfires, Santa Ana winds, landslides, and mudflows. Significant, unusual events were likely remembered and passed down from one generation to the next through oral histories. Unfortunately, most of these histories have been lost. In the late 1700s and 1800s, the natural events that disrupted the lives of the settlers were generally recorded in journals, letters, and newspaper articles. With the advent of photography, some of the impacts of natural hazards were recorded in photographs. Beginning in the early 1900s, as people began to attempt to understand and modify their environment to reduce the impact of natural hazards on the local population and the landscape, these events were also recorded in scientific publications. Today we rely on many of these sources to document the area's past exposure to natural hazards. Given that the past is often the key to the present and the future, we use these accounts to assess the area's potential future risks. This is important because as the local population increases, natural hazards have the potential to pose an even higher risk to the population and economic welfare of the region. The impacts of climate change also add to the urgency of developing and adopting mitigation actions that will help the region become increasingly resilient to natural hazards.

As of 2024, if California were a country, it would rank as the fourth largest economy in the world with a gross domestic product of $4.08 trillion[1], and the city of Santa Monica is a vibrant and significant member of that economy. People originally from all over the United States and the world now call Santa Monica home because of its gentle Mediterranean climate, geographical attributes (the bay and ocean are at their doorstep, and the mountains are just a short drive away), and ample job opportunities. However, the southern California terrain is the product of powerfully active natural forces that form and tear down mountains at remarkable rates by geological standards, and when humans interact with this changing environment, there is a high possibility for the population to be negatively impacted. Thus, a natural event, such as an earthquake, has the potential to cause significant damage at the personal, local, and regional levels with the potential for loss of life, injuries, destroyed or impaired structures and infrastructure, loss of income, and the high costs associated with disaster response and recovery.

In addition to earthquakes, Santa Monica residents may also be impacted by windstorms, hurricanes, drought, slope failures, liquefaction, wildfires, soil erosion and expansive soils, and other natural hazards. Some of these, like hurricanes, occur very infrequently, whereas others, such as erodible, expansive and liquefiable soils, can be effectively mitigated with well-understood engineering methods. Being a coastal community, Santa Monica is also susceptible to coastal flooding resulting from a variety of phenomena, including storms, rogue waves, tsunamis, and sea-level rise due to global warming. The historical record and our current state of knowledge indicate that those hazards with the potential to cause the most damage in Santa Monica include earthquakes, strong winds,

[1] Based on data obtained from https://www.gov.ca.gov/2024/07/15/californias-economy-leads-the-nation/#:~:text=World%27s%20fifth%20largest%20economy%20California%20is%20the,to%20the%20U.S.%20Bureau%20of%20Economic%20Analysis and https://en.wikipedia.org/wiki/Economy_of_California#:~:text=The%20economy%20of%20the%20State%20of%20California,world%2C%20behind%20Germany%20and%20ahead%20of%20Japan, both accessed on March 14, 2025.

wildfires, coastal and pluvial flooding (typically due to atmospheric rivers), and slope failures along the coastal bluffs. A very low-probability but high-risk event with the potential for loss of life and damage to infrastructure would be a tsunami caused by an earthquake on one of the faults offshore in Santa Monica Bay. These are the natural hazards that are covered in most detail in this document, given that it is possible to minimize the losses that result from these hazards through careful and robust planning, financial investment and community participation in the implementation of hazard reduction measures.

In alignment with the City's Safety Element of the General Plan, this document also addresses some human-made issues; namely the management of hazardous materials and aviation hazards associated with the current use of Santa Monica airport, and inundation caused by the catastrophic failure of water retention structures. Thus, this report discusses the management of hazardous materials, including the use, storage, and transportation of hazardous materials through the city and in the Santa Monica airport facilities where hazardous substances were previously used, stored, and potentially discarded. Given that natural and human-made events typically only become a hazard when they interact with and impact the built environment and the people that live, work and play therein, possible mitigation actions that can be used to either avoid these hazards or to strengthen our built environment, including buildings and infrastructure, are also discussed.

WHY DEVELOP A LOCAL NATURAL HAZARDS MITIGATION PLAN?

The total global economic cost of damage caused by natural disasters in the past 40-plus years has increased significantly[2]; the result of an overall increase in population, increased development and exposure, and the impact of human-caused climate change. Thus, the average global damage costs for the ten-year period between 1984-1993 is about $30.2 billion, whereas the average global cost for the ten-year period between 2014-2023[3] is $168.2 billion. These figures capture the combined costs of drought, floods, extreme weather, extreme temperature, landslides, dry mass movements, wildfires, volcanic activity and earthquakes. Extreme weather, floods and earthquakes are responsible for most of the losses reported.

In the United States, between 1980 and 2024, there have been 403 weather-related disasters (drought, flooding, freeze, severe storm, tropical cyclone, wildfire, and winter storms) that have each caused more than $1 billion in damages. In fact, combined, these 403 disasters have caused $2,917.5 billion in damages (adjusted for inflation).[4] In California alone, during the same time period, there were 14 drought events, 6 flood events, 3 freeze events, 4 severe storm events, and 19 wildfires that cost between $2 billion and $200 billion each.[5] The costs from the 2025 Palisades and Eaton fires, including property damage, cleanup expenses, infrastructure repair, temporary housing, and business and employment losses, are currently estimated at $250-$275 billion, although the actual cost will likely not be known for years.[6] The available data also show that weather-related losses in the past five years have been two- to three-times the losses experienced in the previous 40 years, showing that the costs from natural disasters are indeed increasing.

2 https://ourworldindata.org/grapher/damage-costs-from-natural-disasters; accessed March 17, 2025.
3 2023 is the last full year for which data are available as of March 17, 2025.
4 https://www.ncei.noaa.gov/access/billions/state-summary/US; accessed April 3, 2025.
5 https://www.ncei.noaa.gov/access/billions/state-summary/CA; accessed April 3, 2025.
6 https://www.accuweather.com/en/weather-news/accuweather-estimates-more-than-250-billion-in-damages-and-economic-loss-from-la-wildfires/1733821, accessed July 30 2025.

Earthquakes in urban areas are also costly. For example, the moderate-sized 1994 Northridge earthquake caused an estimated $20 billion in damages and more than $40 billion in economic losses.[7] Adjusted for inflation to 2025 dollars, these estimates amount to $43.5 billion and $87 billion, respectively.

These costs emphasize the importance of identifying effective ways to reduce a community's vulnerability to disasters. Hazard mitigation plans assist in this endeavor by identifying resources, information, and strategies for risk reduction, while helping to guide and coordinate mitigation activities. With these aims in mind, the City of Santa Monica began work on its first Natural Hazards Mitigation Plan (Plan) in June 2003; the document was completed and approved in 2004, and adopted in 2005. Many of the actions contained therein have since been implemented, helping the City be better prepared for future disasters.

The last update to the City's Plan before this one was completed in 2016. This 2025 update to the City's Plan builds on the 2016 document and incorporates the new requirements for these documents as spelled out in FEMA's Local Mitigation Planning Policy Guide FP 206-21-0002 that became effective on 19 April 2023. In accordance with these requirements, this 2025 Plan does the following:

1. summarizes the natural disasters known to have historically impacted the southern California region, including in the past nine years since the last Plan was completed;
2. addresses how climate change is already impacting the community and presents the most recent peer-reviewed projections on climate change based on future greenhouse gas concentrations trajectories (the Representative Concentration Pathways (RCPs) adopted by the Intergovernmental Panel on Climate Change);
3. discusses the impact that the natural and human-caused hazards pose to the local community, including sensitive populations;
4. summarizes the mitigation actions that the City of Santa Monica has implemented since 2016 to reduce its vulnerability to natural hazards; and
5. provides a list of new strategies, activities and implementation actions that will further prepare the community to resist the impact of potential future natural and some human-caused hazard events, with an emphasis on equitable outcomes to the vulnerabilities identified.

This 2025 Plan also details the extensive public participation effort that was undertaken as part of the update. This included several meetings with an expanded advisory team comprised of several City staff members, representatives from the local school district and Santa Monica Community College, the local Chamber of Commerce, local hospitals, and neighboring City and County officials; an online survey open to all City residents, staff, and workers; and several community workshops presented both in-person and online. The survey and workshops were designed to update residents on the hazards and vulnerabilities identified during preparation of this Plan and its companion document, the City's Safety Element of the General Plan, and obtain feedback on mitigation actions and strategies proposed by the residents, City staff and other stakeholders.

As with the original 2005 document and updates since, the 2025 Plan provides a set of action items

[7] https://www.conservation.ca.gov/cgs/earthquakes/northridge; accessed April 3, 2025.

that can help reduce the City's risk from natural hazards through education and outreach programs, by fostering the development of partnerships, and by continuing to implement preventive activities (such as land use programs) that limit or guide development in areas at risk from natural hazards. This 2025 Plan update discusses the City's current hazard conditions, and provides actions that are consistent with current City standards and other relevant Federal, State or regional regulations, including FEMA requirements.

The resources and information contained within this Plan are meant to:

1) establish a basis for coordination and collaboration among City, County, and State agencies, non-governmental and private entities, and people that live and work in the city of Santa Monica;
2) identify and prioritize future mitigation projects designed to promote a more disaster-resilient and sustainable city, including reduced costs associated with disaster response and recovery; and
3) assist in meeting the requirements of federal assistance programs.

The Local Hazards Mitigation Plan works in conjunction with other City plans, including the City's Safety Element of the General Plan and the City's Emergency Operations Plan. The updates presented here will be reflected by reference in these other plans and documents.

Section 322 (a-d) of the Federal Disaster Mitigation Act of 2000 (DMA 2000) requires that local governments, as a condition of receiving Federal disaster mitigation funds, have a mitigation plan that:

1) describes the hazards, risks and vulnerabilities specific to the community,
2) identifies and prioritizes mitigation actions,
3) encourages the development of local mitigation, and
4) provides technical support for these efforts.

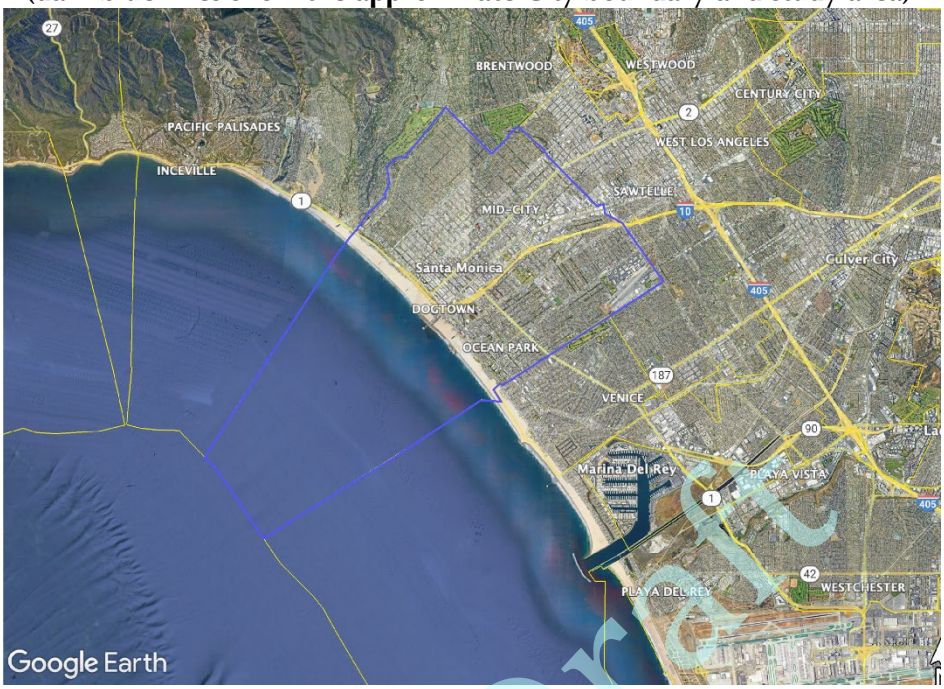
This Local Hazard Mitigation Plan for the City of Santa Monica serves to meet these requirements.

SCOPE AND IMPACT OF THE PLAN

Santa Monica's Local Hazards Mitigation Plan affects the entire city (see Figure 1-1 below).

This Plan provides a framework for planning for the main natural hazards that have the potential to impact the Santa Monica area, in addition to some human-caused hazards identified during the preparation of the Safety Element of the General Plan. The resources and background information in the Plan are applicable City-wide, and the goals and recommendations can lay the groundwork for local mitigation plans and partnerships.

Figure 1-1 – City of Santa Monica
(dark blue lines show the approximate City boundary and study area)



Source: Google Maps (2024)

NATURAL HAZARD LAND USE POLICY IN CALIFORNIA

Planning for natural hazards should be an integral element of any city's land use planning program. All California cities and counties are required to have Safety Elements, one of seven mandatory elements of their General Plans, that document the natural hazards specific to the area and provide the framework by which ordinances to reduce these hazards are implemented. However, Safety Elements are typically updated only once every 15 to 25 years and are often superseded by other local and statewide planning regulations (in 2023 Santa Monica began the process of updating the City's Safety Element that was last issued in 1995; City Council approved the Safety Element update at their meeting on February 11, 2025).

With the requirements for Local Hazard Mitigation Plans, the Federal Emergency Management Agency (FEMA) essentially exported the California municipal Safety Element idea to the rest of the United States, but with an expanded format that includes the requirement for a more publicly open and economically quantifiable planning process for community disaster reduction. FEMA also requires that Local Hazard Mitigation Plans be reviewed on a yearly basis and be updated every five years. Thus, whereas Safety Elements traditionally emphasize hazard mapping and develop forward-looking land use planning policies to minimize those hazards, FEMA has directed that, following the hazard mapping effort, an emphasis be placed on hazard mitigation policies that are based on quantifiable vulnerability, loss, and risk analysis. FEMA also requires extensive public participation recognizing that without public education and citizen buy-in of mitigation needs, it is nearly impossible to mobilize the level of support necessary to fully begin to deal with multi-hazard mitigation over multi-decadal timescales. Given that climate change is expected to increase the frequency, duration and intensity of natural hazards, such as wildfires, extreme heat, drought, storms, heavy precipitation, and sea level rise, and that extreme weather hazards are now

responsible for a significant portion of the costs from natural disasters in the United States, Local Hazard Mitigation Plans are now also required to address climate change.

The continuing challenge faced by local officials and State government is to keep the local hazard mitigation plans effective in responding to the changing conditions and needs of California's diverse and growing communities without forgetting the effect that low-probability but high-risk natural events (such as major earthquakes, which can skip entire generations and are therefore likely to be dismissed over time) can have on the built environment. This is particularly true in the case of planning for natural hazards where communities must balance development pressures with detailed information on the nature and extent of hazards. Planning for natural hazards therefore calls for local plans to include inventories, policies, and ordinances to guide the safe development of areas that history shows can be greatly impacted by infrequent but large-magnitude natural hazard events. These inventories should include the compendium of hazards facing the community, the built environment at risk, the personal property that may be damaged by hazard events, and most of all, the people who live in the shadow of these hazards. Mitigation actions and strategies need to provide for equitable outcomes that benefit the whole community, ensuring that undeserved and socially vulnerable populations can recover from a disaster.

SUPPORT FOR NATURAL HAZARD MITIGATION

Like disaster preparedness, response, and recovery, all mitigation is local, and the primary responsibility for the development and implementation of risk reduction strategies and policies lies with local jurisdictions, including cities, counties, special districts and tribes. Local jurisdictions, however, are not alone. Partners and resources exist at the regional, State and Federal levels. Numerous California and Federal agencies have a role in the research and public education about natural hazards and in natural hazard mitigation. Some of these key agencies include:

- The California Governor's Office of Emergency Services (Cal OES) is responsible for disaster mitigation, preparedness, response, recovery, and the administration of federal funds to California's local jurisdictions after a major disaster declaration.

- The California Geological Survey (CGS) and the U.S. Geological Survey (USGS) are responsible for geologic hazard characterization, public education, and the development of partnerships aimed at reducing risk. The Earthquake (Section 6), Tsunami (Section 7), Flooding (Section 8), and Landslide (Section 9) hazards sections of the Plan utilized maps, publications and consensus reports issued by the California Geological Survey and/or the U.S. Geological Survey.

- The Statewide California Earthquake Center (SCEC; used to be the Southern California Earthquake Center) gathers information about earthquakes, integrates this information on earthquake phenomena, and communicates this to end-users and the general public to increase earthquake awareness, reduce economic losses, and save lives. Many publications, research data and website information provided by SCEC were referred to in the Earthquake section of this report.

- The California Department of Forestry and Fire Protection (CAL FIRE) is responsible for all aspects of wildland fire protection on state lands, including administration of the state's private and public forests. Fire hazards prevention, suppression and rescue services in the

city are provided by the Santa Monica Fire Department (SMFD). The Fire Hazards section (Section 10) of the Plan relies extensively on data provided by and available from both the CalFire and SMFD websites.

- The Federal Emergency Management Agency (FEMA) provides an extensive array of products and services designed to help communities prepare for disasters, in addition to providing assistance after a disaster. As part of these efforts, FEMA manages the National Flood Insurance Program, including the preparation and issuance of Flood Insurance Studies and Flood Insurance Rate Maps that delineate areas within the 100-year and 500-year flood zones. The Flooding Hazards section (Section 8) of this Plan relies on the FEMA-provided maps for Santa Monica, in addition to other resources that provide information on how to reduce the impact of flooding. Local Hazard Mitigation Plans like this one are mandated by FEMA. Thus, to facilitate the preparation of these documents FEMA has also prepared several guides and publications that are referred to in this document. FEMA also developed and distributes the GIS-based risk assessment software called HazUS (Hazards US), which can be used to estimate the risk from the natural hazards of earthquake, tsunami, hurricane, and floods. This software was used for this study to estimate the costs of four different earthquake scenarios, in addition to tsunamis, coastal flooding, and dam inundation. The results of these scenarios are summarized in the appropriate section of this report.

- The California Division of Water Resources (DWR) plans, designs, constructs, operates, and maintains the State Water Project; regulates dams; provides flood protection; and assists in emergency management. It also educates the public and serves local water needs by providing technical assistance. Dam inundation maps and other data prepared for and administered by the DWR and other departments under the DWR were used in the Flooding Hazards section of the Plan addressing inundation due to dam failure.

- The National Oceanic and Atmospheric Administration (NOAA) keeps records of storms and other natural hazard events for all regions of the United States, and conducts climate change research. The NOAA database was used extensively in the Tsunami, Flooding, Wildfire, and Climate Change and Extreme Weather sections (Sections 7, 8, 10 and 11) of this Plan. NOAA's National Weather Service also serves as the administrator of the NOAA Tsunami Program, supporting a worldwide network of tsunami detection, forecast, and warning systems to serve the US coastline.

- The Intergovernmental Panel on Climate Change (IPCC) is a United Nations project that compiles and publishes scientific studies related to climate change for the purpose of determining the state of knowledge on climate change, providing policymakers with data on the implications and potential future risks associated with climate change, and putting forward adaptation and mitigation options. Various reports issued by the IPCC were used in the Climate Change and Extreme Weather section (Section 11) of this Plan.

In addition to the agencies listed above, this report also used information extracted from various other sources including dozens of peer-reviewed scientific papers, books and news articles. The specific publications, books, and webpages referenced during the preparation of this Plan are identified in the appropriate section and are listed in Appendix I: References. Thus, information contained in the Plan is based on research from a variety of sources including those described above, with emphasis on data previously collected by the consultant for the Technical Background Report

to the City's Safety Element of the General Plan Update. The consultant was helped on this effort by staff from the City of Santa Monica, who conducted data research, facilitated steering committee meetings and public workshops, and developed the final Local Hazard Mitigation Plan.

The following section and subsections outline the methodology followed, including discussion of the specific requirements that the Plan addresses; the individuals that participated in the process of developing this Plan update; the research methods followed; and the public participation process.

PLAN METHODOLOGY

Guidelines and Requirements for Mitigation Plans

The following are the Federal requirements for approval of a Natural Hazard Mitigation Plan:

- open public involvement, with public meetings that introduce the process and project requirements;
- the public must be afforded opportunities for involvement in identifying and assessing risk, drafting a Plan, and public involvement in approval stages of the Plan;
- community cooperation, with opportunity for other local government agencies, the business community, educational institutions, and non-profits to participate in the process; and
- incorporation of local documents, including the City's General Plan, the Zoning Ordinance, the Building Codes, and other pertinent documents.

The following components must be part of the planning process:

- complete documentation of the planning process;
- a detailed risk assessment on hazard exposures in the community;
- a comprehensive mitigation strategy, which describes the goals and objectives, including proposed strategies, programs and actions that can be implemented to reduce or minimize long-term vulnerabilities;
- a plan maintenance process, which describes the method and schedule of monitoring, evaluating and updating the Plan and integration of the Hazard Mitigation Plan into other planning mechanisms;
- formal adoption by the City Council; and
- plan review by both FEMA and Cal OES.

These requirements are spelled out in greater detail in the following sections of the Plan and supporting documentation.

Input From the Resilience Planning Committee

The Resilience Planning Committee (RPC) guided the development and update of the Mitigation Plan, and played an integral role in developing the mission, goals, and action items. The committee consisted of representatives from the following agencies in the City of Santa Monica:

- ✓ City of Santa Monica Manager's Office, Office of Emergency Management
- ✓ City of Santa Monica Fire Department, Fire Prevention
- ✓ City of Santa Monica Public Works Department, Administration

- ✓ City of Santa Monica Public Works, Engineering and Street Services
- ✓ City of Santa Monica Community Development Department, City Planning
- ✓ City of Santa Monica Information Services Department, GIS

Input on specific sections of the Plan was also provided by representatives from the following agencies and organizations:

City of Santa Monica Departments

- ✓ City of Santa Monica Attorney's Office
- ✓ City of Santa Monica Manager's Office, Office of Emergency Management
- ✓ City of Santa Monica Community Development Department, Building and Safety
- ✓ City of Santa Monica Community Development Department, City Planning
- ✓ City of Santa Monica Department of Transportation
- ✓ City of Santa Monica Finance Department
- ✓ Santa Monica Fire Department, Fire Administration
- ✓ Santa Monica Fire Department, Fire Prevention
- ✓ City of Santa Monica Housing and Human Services Department
- ✓ City of Santa Monica Information Services Department
- ✓ City of Santa Monica Police Department
- ✓ City of Santa Monica Public Works Department, Administrative Services
- ✓ City of Santa Monica Public Works Department, Engineering & Street Services
- ✓ City of Santa Monica Public Works Department, Office of Sustainability and the Environment
- ✓ City of Santa Monica Public Works Department, Santa Monica Airport
- ✓ City of Santa Monica Rent Control Department

Regional Government Partners

- ✓ City of Los Angeles, Emergency Management Department
- ✓ County of Los Angeles, Office of Emergency Management

Local Educational Institutions

- ✓ Santa Monica College (SMC)
- ✓ Santa Monica-Malibu Unified School District (SMMUSD)

Local Hospitals

- ✓ University of California, Los Angeles (UCLA) Health/Santa Monica Medical Center
- ✓ Providence Saint John's Health Center

Local Non-Profits

- ✓ American Red Cross
- ✓ Westside Food Bank

Local Business Organizations

- ✓ Downtown Santa Monica Business Improvement District
- ✓ Santa Monica Chamber of Commerce
- ✓ Santa Monica Travel and Tourism

Hazard Specific Research

Santa Monica's consultant and City staff collected data and compiled research on the natural hazards that have historically impacted the southern California region, with an emphasis on the Santa Monica area, and identified several hazards that have the potential to cause damage in the city. These include earthquakes, tsunamis, coastal floods, inundation due to dam failure, slope failures or landslides, windstorms, sea-level rise, and extreme weather events related to climate change. Human-caused incidents that also have the potential to result in localized damage to the community include urban fires, releases of hazardous materials and aircraft accidents. Noise pollution related to the airport was identified as a nuisance. Other potential hazards that were identified by the Resilience Planning Committee members that are not addressed in this document include pandemics, terrorist acts, civil unrest, active shooter incidents, riots and protests, and cyberattacks to infrastructure. The City has guidelines that address several of these potential hazards already in place and chose to align this Plan's hazards with those in the City's Safety Element, approved in 2025. Future versions of this Plan may include some of these subjects.

As mentioned previously, research materials used in the preparation of this Plan include publications by federal agencies such as FEMA, USGS and NOAA; state agencies such as CGS, Cal OES and CalFire; the City of Santa Monica's Safety Element, and other sources. The City's consultant conducted research by referencing historical local sources, interviewing City of Santa Monica employees and residents who provided invaluable data regarding past local disasters, and locating information specific to the City of Santa Monica in historical documents.

City of Santa Monica's staff proposed and then evaluated the feasibility and potential effectiveness of the mitigation activities, resources and programs, and potential action items presented in this updated Plan. This evaluation was based on their experience in implementing the action items in the Safety Element and the previous 2016 Plan, and based on feedback from stakeholder surveys and interviews.

Public Participation Process and Stakeholder Surveys

As mentioned earlier, the City of Santa Monica began preparation of the first, original version of its Local Hazard Mitigation Plan in 2003; the Plan was completed and approved by both the State and FEMA in 2004, and adopted in 2005. Work on the first update of this original document began in the summer of 2013, with the final revised update adopted in March 2016.

Work on this 2025 updated Plan began on June 27, 2023 when the City of Santa Monica entered in a contractual agreement with Earth Consultants International, Inc., the consultant retained to work with the City on preparing this update. The City's Office of Emergency Management identified the City departments and local agencies that would be part of the Resilience Planning Committee (RPC), and the kick-off meeting for the project was held at the EOC's meeting room on September 14, 2023. Work on the various sections of the Plan, including HazUS loss estimations for several earthquake, tsunami and flood scenarios began in earnest thereafter, with drafts of several of the hazard sections submitted for review by the City throughout 2024 and into early 2025. The findings of the HazUS loss estimations were presented to the RPC at a workshop on January 23, 2024.

Work on the Technical Background Report to the Safety Element, and the Safety Element proper, companion documents to the Plan, was conducted in parallel, with similar hazards addressed in all these documents. As part of the public participation component for both the Safety Element and the

Local Hazard Mitigation Plan, a survey was posted online that asked respondents to weigh in on the natural and environmental hazards of most concern to them and their perceived level of preparedness for a variety of hazards. The online survey was available in English and Spanish and paper copies in both languages were made available at both the Main Library and the Pico Branch Library. The results of that survey informed the direction of both the Safety Element and the Plan. The Safety Element was completed in August 2024, with City Council approving the document on February 11, 2025. The Final Safety Element, Technical Background Report to the Safety Element, and Vulnerability Assessment for the Safety Element can be accessed here.

Public workshops to discuss the Local Hazard Mitigation Plan were conducted on April 30 and May 2, 2024. The April 30 workshop materials were prepared in Spanish with a real-time translation available to attendees in an effort to reach and inform the City's Spanish-speaking residents. An online version of the presentation was also held on May 22, 2024. The meeting was recorded and placed on YouTube. Availability to this YouTube recording was advertised in the City of Santa Monica News website (SaMoNews) and a several other City of Santa Monica webpages. As of March 19, 2025, the online presentation had been viewed 278 times; and as of August 5, 2025, the presentation had been viewed 318 times. The PowerPoint presentation slides are included in Appendix B.

Following the public workshop presentations, another meeting with the RPC was held on May 15, 2024. After a PowerPoint presentation that summarized the objectives of the Plan and the findings regarding the hazards covered in the Plan was completed, the committee members were asked to break out into groups and develop a list of potential action items intended to reduce or mitigate the hazards assigned to them. During the last 90 minutes of the meeting, the break-out groups discussed their recommendations, and the top recommendations for each hazard category were identified. Following this meeting, a survey was prepared and distributed to all committee members and City staff asking for the action items identified to be ranked according to priority. The action items and the priority ranking based on this survey are presented in Section 4 of this report.

It is important to note that while work on this Plan update was being conducted, the City of Santa Monica and adjacent areas were impacted by several natural disasters. The most significant and costly of these events include:

1. Between December 2022 and March 2023, the southern California region experienced a series of atmospheric rivers that dropped significant precipitation on the local mountains, causing debris flows and landslides locally. At least three Disaster Declarations that included Los Angeles County were issued in response to these storms.
2. On August 20, 2023, the southern California region was impacted by heavy rain and strong winds brought on by Tropical Storm Hilary, with numerous areas reporting street flooding, mudslides and debris flows.
3. Between February 4 and February 8, 2024, the southern California region was impacted by a slow-moving atmospheric river that dropped between 6 and 12 inches of rain, again causing flooding, mudslides and debris flows.
4. On December 9-10, 2024, the area experienced strong Santa Ana winds that fanned the Franklin Fire that ultimately consumed more than 4,000 acres in Malibu. The Santa Monica area was impacted by both ash and smoke from those fires, and traffic associated with the closure of Pacific Coast Highway (PCH).

5. On January 7-8, 2025, another round of extremely strong Santa Ana winds hit the southern California region and fanned the Palisades and Eaton fires. The Palisades fire extended south to within 1/3 mile of the city of Santa Monica. Much of the city north of Montana Avenue was in an evacuation zone, with mandatory evacuation orders issued for all residents on San Vicente Boulevard and all areas north to the City limits in place for almost a full week. Warning notifications were issued for areas between San Vicente Boulevard and Montana Avenue, from 11th Street to PCH, and from 11th Street to 26th Street, and from Montana Avenue to Wilshire Boulevard between 10th Street and PCH. Ash and smoke from the fire impacted the community and especially vulnerable populations. The winds cost the City over $180,000, with these expenses associated with the clearing of almost 50 fallen trees and 122 tree limb failures, and the transport of 375 tons of vegetation debris to appropriate landfills. Short- and long-term effects of these fires include a decrease in local tourism and business activity, an increased demand on Santa Monica's rental market, resulting in rising rents. Santa Monica also provided and continues to provide a refuge for many displaced by the fires, potentially causing additional strain on the City's real-estate market.

City emergency management personnel working on this Plan were the primary responders to these regional events, participating in mitigation, response and recovery activities. In addition, sections of the report that had already been drafted were updated after these events occurred, triggering additional revisions. The fires in 2024 and 2025 in particular, occurred after the action items for this next five-year cycle had been identified and prioritized. As a result, new action items that address wildfires that had not been originally identified as priorities were added to this Plan. These actions were partly based on public feedback during wildfire community meetings and during the Safety Element Council presentation. This is also discussed in Section 4.

PLAN STRUCTURE

The resources and information cited in the Plan provide a strong local perspective and help identify strategies and activities to make the City of Santa Monica more disaster-resilient.

Each section of the Local Natural Hazards Mitigation Plan provides information and resources to assist City staff and the public in understanding the hazard-related issues facing Santa Monica's citizens, businesses, and the environment. Combined, the sections of the Plan work together to create a document that guides the mission to reduce risk and prevent loss from future natural hazard events and some human-made situations.

The structure of the Plan enables the user to refer to specific sections of interest. It also allows the City to review and update specific sections as needed when new data become available. The ability to update individual sections of the Plan places less of a financial burden on the City. Decision-makers can allocate funding and staff resources to selected pieces in need of review, thereby avoiding a full update, which can be costly and time-consuming. New data can be easily incorporated, resulting in a Local Hazards Mitigation Plan that remains current and relevant to the City of Santa Monica.

Santa Monica's Local Hazard Mitigation Plan is organized in three volumes, as follows:

1. Volume I contains the Executive Summary followed by Sections 1 through 5: introduction, Community Profile, Risk Assessment, Goals and Action Items, and Plan Maintenance.

2. Volume II discusses the hazards addressed in the document, with each of the main hazards identified assigned a specific section.

3. Volume III includes several appendices that support the information presented in Volumes I and II, including documentation on the public participation effort, resources, and list of references, among others.

Updates to these volumes include additions summarizing natural hazard events that impacted the southern California area and Santa Monica between 2016 and January 2025, and changes or updates to the regulations issued by both the Federal and State governments aimed at reducing the impact of natural hazards. Each section of the Plan is discussed further below, with an emphasis on the specific changes made as part of this update.

Volume I: Mitigation Action Plan

Executive Summary: Five-Year Action Plan

The Five-Year Action Plan provides an overview of the Hazard Mitigation Plan's mission, goals, and action items.

Section 1: Introduction

The Introduction describes the background and purpose of developing the Local Natural Hazard Mitigation Plan for the City of Santa Monica.

Section 2: Community Profile

This section presents the history, geography, demographics, and socioeconomics of the city of Santa Monica, with emphasis on the most recently available census data (2020 and 2022 American Community Survey) and development changes in the City since 2016. This section serves as a tool to provide an historical perspective of natural hazards in Santa Monica, and a springboard to understand how natural hazards can impact the City in the future.

Section 3: Risk Assessment

This section provides information on hazard identification, vulnerability and risk associated with the natural hazards, and some human-made hazards, found to pose a risk to the city of Santa Monica.

Section 4: Goals and Action Items

This section is the "Policy Document" that enumerates the specific action items that Santa Monica has chosen to undertake to further reduce its risk to the hazards described in Volume II of the document. Section 4 is completely new, presenting the action items that the City has prioritized for possible implementation during the five-year period between 2025 and 2030.

Section 5: Plan Maintenance

This section provides information on Plan implementation, monitoring and evaluation, and lists the action items and hazard-reduction activities completed by the City in the past nine years (2016-2024 inclusive).

Volume II: Hazard Specific Information

Hazard-specific information on six major categories of natural hazards is addressed in this Plan. Chronic hazards, such as coastal and pluvial flooding and strong Santa Ana winds, occur with some regularity and may be forecast through scientific methods. Catastrophic hazards do not occur with the frequency of chronic hazards, but notwithstanding, they can have devastating impacts on life, property, and the environment. In southern California, because of its geology and terrain, earthquakes, floods, wildfires, landslides and windstorms have the potential to be both catastrophic as well as chronic.

The hazards addressed in the Plan include:

Section 6: **Earthquakes**—including ground shaking, fault rupture, liquefaction, and slope failure due to ground shaking.

Section 7: **Tsunamis**—including both tele-tsunamis and locally generated tsunamis.

Section 8: **Floods**—including coastal flooding due to storms, fluvial (riverine) flooding, and pluvial (urban) flooding associated with atmospheric rivers. This section also discusses inundation due to catastrophic failure of above-ground water storage tanks and reservoirs.

Section 9: **Landslides**—including rock falls, topples, slides, spreads, mud or debris flows, and soil slips. This section also describes the geologic setting and geologic units that underlie Santa Monica.

Section 10: **Wildfires and Urban Fires**—including the wildfires that have recently impacted the hills north of Santa Monica; structure fires and after-earthquake fires. The section also describes the model ordinances and codes used to reduce the fire hazard, and the City's fire suppression capabilities.

Section 11: **Climate Change and Severe Weather**—including extreme heat, drought, sea-level rise, and severe windstorms. Each of these phenomena are described within both a historical and future context specific to Santa Monica with an emphasis on the effects that climate change may have on the frequency and intensity of these events, and the impact that these weather events can have on socially vulnerable populations.

Section 12: **Hazardous Materials Management**—new section that addresses the potential release onto the environment of hazardous materials due to leaking underground storage tanks, transportation accidents, damaged pipelines, earthquakes, and the use of hazardous materials in household. The section describes past releases of potentially hazardous materials in Santa Monica and the resources available to reduce and manage these events.

Section 13: **Airport Hazards**—new section that discusses aviation accidents and incidents, noise nuisance related to airport traffic, and the past and current use of hazardous materials at the Santa Monica Airport.

Each of the hazard-specific sections includes information on the history, hazard causes and characteristics, hazard and vulnerability assessment, risk analysis, and local, state, and national resources available to mitigate or reduce the impact of these hazards. Goals and action items aimed

at reducing these hazards, if identified as priorities for the next five-year cycle, are provided in Section 4.

Volume III: Resources

The Plan appendices are designed to provide users of Santa Monica's Local Natural Hazards Mitigation Plan with additional information to assist them in understanding the contents of the Mitigation Plan, and potential resources to assist them with implementation.

Appendix A: Master Resource Directory

This appendix provides a resource directory, which includes City, regional, State, and national resources and programs that may be of technical and/or financial assistance to the City of Santa Monica during Plan implementation. Most of the same data are also included at the end of Sections 6 through 11, where resources specific to the hazards addressed are listed.

Appendix B: Public Participation Process

This appendix includes specific information on the various public processes used during development of the 2025 Plan, including meetings, public workshops, and presentations made during the update process, and the individuals that participated in the process of developing the 2025 Plan update. Copies of the PowerPoint presentations prepared for the meetings and workshops are included here.

Appendix C: Benefit Cost Analysis

This appendix describes FEMA's requirements for benefit cost analysis in natural hazards mitigation, as well as various approaches that FEMA recommends be used for conducting an economic analysis of proposed mitigation activities.

Appendix D: List of Acronyms

This appendix provides a list of acronyms for City, regional, state, and federal agencies and organizations that may be referred to within Santa Monica's Local Natural Hazards Mitigation Plan.

Appendix E: Glossary

This appendix provides a glossary of terms used throughout the Plan.

Appendix F: California Disasters

This appendix lists major California disasters since 1950. This list was updated to include events that occurred between 2016 and through January 2025.

Appendix G: List of Dams

This appendix provides a list of major dams and reservoirs in Los Angeles County.

Appendix H: Maps

This appendix contains the maps referenced throughout the Plan.

Appendix I: References

This appendix lists the references (plans, studies, technical reports and websites) used in the preparation of the Plan.

Appendix J: Plan Adoption

Documentation regarding the formal adoption of the 2025 Plan Update.

CHANGES FROM THE 2016 PLAN

Several sections of the 2025 Plan Update have been modified from the 2016 Plan. Changes made to specific sections of the Plan are summarized further below.

Section 1: Summarizes the process by which the 2025 Plan was created, with emphasis on the review process and the opportunities provided for City Staff and the public to review and provide feedback on the document.

Section 2: This section was expanded, providing a more detailed description of Santa Monica's physiographic location to better set the stage for why Santa Monica is susceptible to the natural hazards covered in this document. The population and demographics sections were completely revised and expanded to provide a more thorough analysis of the City's population based on data from the 2020 Census and 2022 American Community Survey.

Section 3: This section of the Plan was enhanced to identify in table format those hazards that the Resilience Planning Committee agreed pose a potential hazard to the City, with rankings for probability of occurrence and potential level of risk. This section also identifies the critical facilities in the city and their vulnerability to the various natural hazards described in the Plan.

Section 4: The Action Items portion has been completely revised and updated to present the mitigation measures that the City has identified as current priorities in its effort to reduce its risk to the natural and human-made hazards identified. The action items are classified into three groups as follows: 1) action items that are already being implemented on an on-going basis, as part of the development or re-development process; 2) action items to be implemented in the short-term, that is, the next 5-year cycle (2025-2030); and 3) long-term action items that the City is considering for implementation in the next approximately 10 years that reference long-term policies and programs identified in the updated 2025 Safety Element of the General Plan.

Section 5: This section was completely updated to discuss how the Plan will be maintained in the next 5 years, and how progress on natural hazard reduction efforts will be measured. This section also identifies those action items listed in the 2016 Plan that have already been completed or are being implemented on an on-going basis.

Section 6: The earthquake hazards section was updated to describe the more recent earthquake events that impacted the southern California area through January 2025; provide a detailed description of the local and regional faults that could cause an earthquake that would be felt in Santa Monica; and more significantly, include the 2018 Alquist-Priolo Earthquake Fault Zones (APEFZ) for the Santa Monica fault issued by the California Geological Survey in 2018. Any property in Santa Monica located within an APEFZ identified by the State is now required to conduct a fault investigation if the property is to be re-developed into a structure more than two-stories high. This section also presents the findings of HazUS-based loss estimations conducted for the city addressing the impact that an earthquake on the Santa Monica, San Andreas, Newport-Inglewood or Palos Verdes faults would have on the city, including estimates of damage to structures, critical and

essential facilities; casualties; and economic losses. The previous plan provided data on the structures impacted by the Northridge earthquake, but did not provide loss estimates for a plausible future earthquake scenario.

Section 7: The updated tsunami hazards section discusses significant tsunami events including the December 26, 2004 Indian Ocean earthquake and tsunami that killed more than 220,000 people worldwide. This catastrophe prompted the development and deployment of an international tsunami monitoring system, and led several communities, including many cities in California, to identify evacuation routes and develop tsunami training programs. The updated section describes the potential for southern California to be impacted by tsunamis generated by any of several subducting faults along the Pacific Ring of Fire, which would create a distant-source tsunami (teletsunami), and by faults in the Santa Monica Bay. An earthquake on a local fault could have a catastrophic effect on the city. To evaluate the risk of both a teletsunami and a local tsunami on Santa Monica, this section includes HazUS-based loss estimates for a tsunami originating in the Aleutian Islands in Alaska, and a local tsunami caused by an earthquake on the offshore section of the Palos Verdes fault in Santa Monica Bay.

Section 8: The flood hazards section was updated to describe the storms that have impacted the Los Angeles region, including Santa Monica between 2014 and January 2025, with an emphasis on atmospheric rivers. The impacts of tropical storm Hilary were also discussed. The revised section also provides HazUS-based loss estimates for Santa Monica as a result of the catastrophic failure of Stone Canyon dam and reservoir, a water storage facility owned by the City of Los Angeles in the hills above Bel Air that, if it failed, could inundate a portion of Santa Monica along its eastern boundary, near and surrounding the Interstate 10 (I-10).

Section 9: The landslides section was modified significantly to include a more in-depth description of different types of slope failure, and includes a slope distribution map and a slope instability map for Santa Monica. The maps identify those areas in Santa Monica that are susceptible to slope damage, such as the properties along the city's northern boundary, the hillside areas south of the Brentwood Country Club, the coastal bluffs facing the Pacific Coast Highway (PCH), the slopes facing the I-10, and the hillside areas north of Penmar Golf Course. The section also discusses in detail the mitigation actions, both past and ongoing that have been implemented to reduce slope failures along the coastal bluffs in Pacific Palisades Park.

Section 10: The renamed wildfire and urban fire section was updated significantly and includes a description of the most significant wildland fires in California that have generated an increased awareness of this issue in light of climate change, triggering changes in regulations and insurance practices. The regulatory context and Federal, State and local programs that have been developed to mitigate the hazard of wildfires are discussed extensively with an emphasis on how these programs apply to and are being implemented in Santa Monica. The 2025 Plan also discusses in far more detail the potential for structure fires to occur in the city, especially in mixed-use areas and in older neighborhoods, and the potential for fires to occur following an earthquake.

Section 11: The climate change and severe weather section combines and expands on the severe windstorm/thunderstorm and climate change/sea level rise sections in the 2016 Plan, and relies on the more recent projections of greenhouse gas concentrations and sea level rise issued in 2022 by the Intergovernmental Panel on Climate Change (IPCC) and other organizations. The section summarizes significant weather events that have impacted Los Angeles County between 2016 and

January 2025, with emphasis on those events that have occurred near Santa Monica.

Additional Changes: The 2016 updated Plan addressed two human-related hazards related to community events and the Exposition Light Rail. The Community Events section discussed the potential impacts of a large group of people concentrating in a limited geographic area, including increased chance for an act of terrorism or civil unrest to occur, and the potential for a large number of casualties if a community event coincided with a natural disaster, such as an earthquake, severe weather event, or structural fire in a high-occupancy building. Action plans designed to deal with hazards associated with large groups of people were developed and are now routinely implemented by the City as needed.

The Exposition Light Rail section discussed the risks associated with train accidents in an urban environment where the train lines extend through the city rather than around it. Some of the issues mentioned included accidents due to human error, equipment malfunction, and the potential impact of what at the time was a proposed project on existing street widths, especially the lack of 20-foot-wide lane for fire engine access. Several mitigation measures to be implemented by the various responsible agencies including the Exposition Construction Authority, METRO, Santa Monica City staff, and the Santa Monica Fire Department were identified and included in the design and construction, effectively mitigating several of the concerns that the City had originally identified. As a result, these hazards are not covered in the 2025 Plan.

Instead, the 2025 Plan includes two new sections on human-caused hazards associated with hazardous materials and the use and potential reuse of the Santa Monica airport facilities. These sections replace the sections that addressed hazards related to community events, and the construction and use of the Exposition Light Rail that were included in the 2016 Plan. Santa Monica has a Community Events Committee that addresses the permits and deployment of resources necessary to manage most community events in the City, and has developed a series of special operations plans to address a variety of events that would result in large groups of people converging in a small geographic area. The Exposition Light Rail section in the 2016 Plan enumerated the series of actions that the Los Angeles County Metro, City of Santa Monica staff and various other organizations implemented in the design-build process to make the light rail and associated stations compatible with street traffic, pedestrian safety, and ability of the Fire Department and other emergency response organizations to respond to emergencies as needed.

The **Appendices** were updated as needed to reflect the most current information, with emphasis on changes made between 2016 and 2024 (or January 2025 where the data were available).

SECTION 2: COMMUNITY PROFILE

WHY PLAN FOR NATURAL HAZARDS IN THE CITY OF SANTA MONICA?

Earthquakes, rainstorms, and strong winds have previously exposed the Los Angeles metropolitan area, including the city of Santa Monica, to the financial and emotional costs of recovery. These same natural hazards, and other natural and human-made hazards described herein, have the potential to pose a future negative impact on the city. Santa Monica is essentially "built-out," with population growth generally associated with the replacement of low-density housing with medium- and high-density housing.

Given that natural hazards are inevitable, and that populations in hazardous areas are increasing in response to development, there is a need to develop strategies, coordinate resources, and increase public awareness to reduce the risk and losses from future natural hazard events. Identifying the risks posed by natural hazards, and developing strategies to reduce their impact can assist in protecting life and property. In Santa Monica, local residents have worked together with City staff and other stakeholders to create this Local Hazards Mitigation Plan (LHMP) document that addresses the potential hazards of most concern to Santa Monica's residents.

GEOGRAPHY AND THE ENVIRONMENT

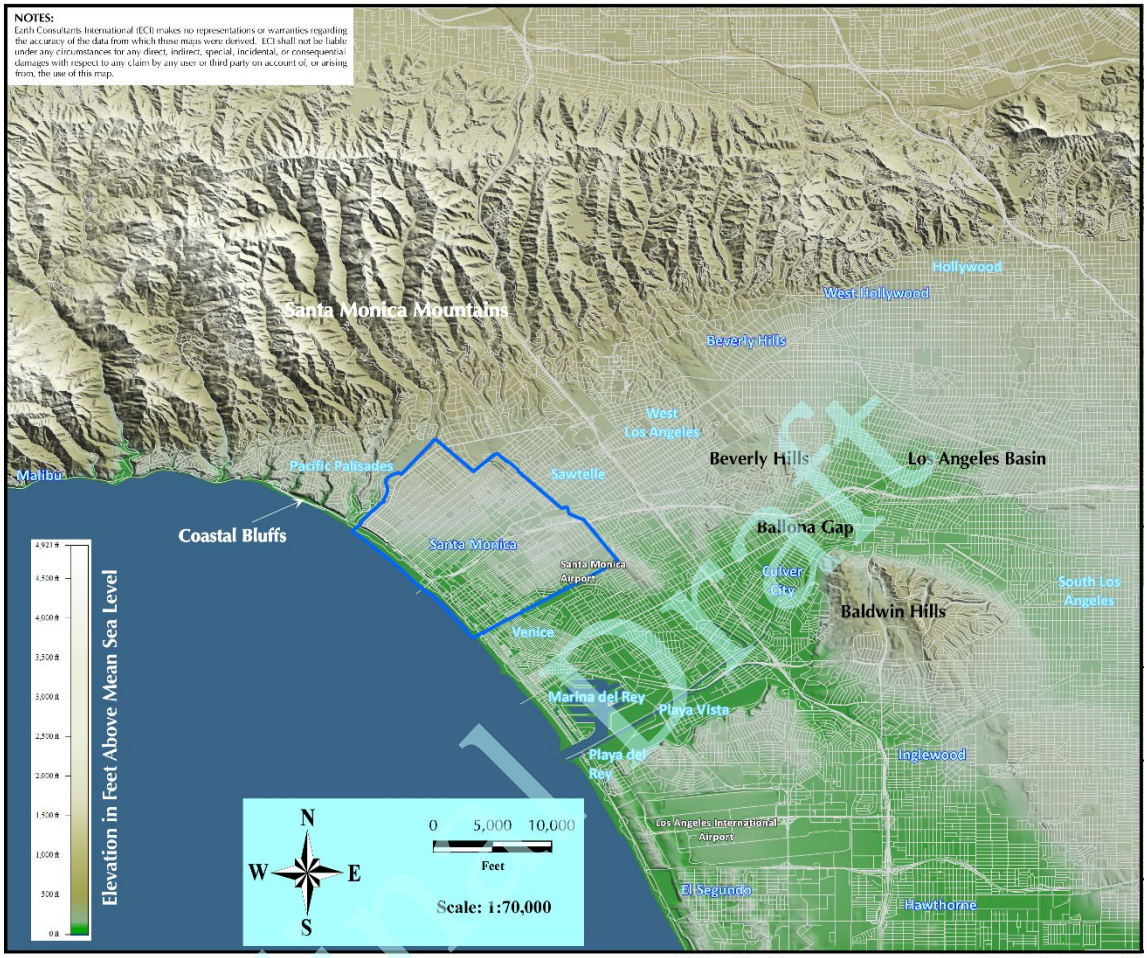
Physiographic Location and Description

The city of Santa Monica is 8.4 square miles in area and is located in the northwestern margin of the Los Angeles Basin. Santa Monica is bordered by communities that are part of the city of Los Angeles to the north, east, and south, and by the Pacific Ocean to the west (Figure 2-1). The city's coastal location, along one of the widest stretches of beach along the Santa Monica Bay region, make Santa Monica both a sought-after living locale and a top tourist destination.

Santa Monica is located at the foothills of the Santa Monica Mountains, with the northern half of the city sitting on a broad, gently south-sloping alluvial fan that was formed by streams draining the mountains to the north. These mountains, together with the San Gabriel Mountains to the east, are part of the west-trending Transverse Ranges, which form the northern boundary to the Los Angeles Basin. The mountains form a topographic, geomorphic, geologic, and tectonic barrier in the region. On its west side, the low-lying beach forms a buffer between the Pacific Ocean and the coastal bluffs. The southern portion of the city is sitting on older marine, lake, playa and estuarine deposits that are now slightly to moderately elevated above the active floodplain of Ballona Creek, located to the south.

Ground surface elevations across the city vary from 0 to 10 feet above mean sea level (amsl) along the beach, to approximately 175 feet amsl at the eastern end of the Santa Monica Airport and 340 to 370 feet amsl near the northeastern corner of the city, on Brentwood Knoll and near the intersection of 26th Street with La Mesa Drive. The coastal bluffs in the northwestern corner of the city rise approximately 50 to 150 feet above the beach below. Farther north, in the Pacific Palisades area, the bluffs are approximately 200 feet high.

Figure 2-1: Physiographic Map of Santa Monica and Surrounding Areas
(physiographic elements in black and white; cities in darker blue; City of Los Angeles neighborhoods in light blue; for a larger version of this map refer to Map H-1 in Appendix H)



Major Rivers and Other Bodies of Water

There are no major rivers or floodways extending through or near the city of Santa Monica. Ballona Creek, which flows into the ocean just south of the Marina del Rey area, is now a relatively small, mostly channelized distributary of the Los Angeles River, but in centuries past, this stream used to carry the Los Angeles River floodwaters out to sea through the Ballona Lagoon, a shallow estuary that historically extended north to within 0.5 miles of Santa Monica. The last time this happened was between 1815 and 1825 (for a more in-depth discussion on this topic, see Section 8). Geologic maps and older topographic maps of the region suggest that streams draining the foothills of the Santa Monica Mountains in the area east of Brentwood Knoll converged in what today is the east-central portion of Santa Monica and then drained west following the low-lying area now mostly occupied by the I-10 Freeway. Most intermittent drainage in this area is now captured by catch basins and storm drains.

The north end of the city generally coincides with the southern side of the canyon formed by Santa Monica Creek, and near its northwestern end, with the southern portion of Rustic Creek Canyon.

During the last glacial maximum, when sea-level was approximately 300 feet lower than today, these creeks incised down to reach equilibrium with the lower sea-level, in the process forming the deeply incised canyons that are there today. Both of these creeks are concrete-lined and have significant flows only following rainstorm events. Flooding in these streams does not impact Santa Monica, except at their mouth, where they debouch at the beach. Here, in the northwestern corner of Santa Monica, FEMA has identified a 100-year flood zone due to storms. The coastal region is within a 100-year flood zone dominated by storm surges.

Santa Monica is downstream of the Stone Canyon dam and reservoir. If the dam failed, the floodwaters could inundate a portion of the city, in the area around Olympic Boulevard and the I-10 Freeway, with significant impacts on the residential and commercial structures in the area, and thus the residents and workers that occupy those buildings. This is also discussed further in Section 8.

Climate

Santa Monica enjoys a Mediterranean-type climate, with typically mild, sunny winters, and warm, dry summers. Its coastal location, however, provides an ameliorating effect, with smaller daily and seasonal ranges in temperature compared to other locations farther inland. Average daily temperatures in the city of Santa Monica range from about 56 to 57 degrees Fahrenheit in the winter months (December to February) to 65 to 69 degrees in the summer months (July through September). However, the temperatures can vary by more than 17 degrees, as the average minimum and average maximum ranges measured at the Santa Monica Pier (Table 2-1) and the Santa Monica Airport (Table 2-2) weather stations show. Table 2-3 shows that historically, temperatures in Santa Monica have deviated substantially from the average values, with both unseasonally cold and hot temperatures having been measured in the city. Note, however, that most unseasonally cold days were measured in the first 20 years of the 1900s, whereas most of the unseasonally hot days have been measured in the past decade or so.

Table 2-1: Mean Minimum (Min), Average (Ave) and Maximum (Max) Monthly Temperature at the Santa Monica Pier

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Min	49.6	49.7	51.8	53.2	55.8	59.2	61.5	62.3	60.9	58.5	53.6	49.5	55.5
Ave	**55.8**	**56.0**	**56.8**	**58.3**	**59.6**	**62.7**	**65.4**	**66.0**	**65.5**	**63.0**	**60.3**	**56.5**	**60.5**
Max	62.0	62.2	61.8	63.4	63.4	66.3	69.4	69.7	70.0	67.5	66.9	63.4	65.5

Monthly climate normal based on data collected at the Santa Monica Pier between 1991 and 2020. From https://www.weather.gov/ accessed May 16, 2024.

Table 2-2: Mean Minimum (Min), Average (Ave) and Maximum (Max) Monthly Temperature at the Santa Monica Municipal Airport

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Min	48.7	49.0	51.0	52.8	56.6	59.6	62.9	63.2	62.3	58.1	52.0	47.7	55.3
Ave	**57.3**	**57.3**	**58.7**	**60.4**	**62.7**	**65.5**	**69.0**	**69.8**	**69.2**	**66.1**	**61.0**	**57.0**	**62.8**
Max	66.0	65.6	66.4	68.1	68.9	71.4	75.1	76.5	76.1	74.0	70.1	66.2	70.4

Monthly climate normal based on data collected at the Santa Monica Municipal Airport between 1991 and 2020. From https://www.weather.gov/ accessed May 20, 2024.

Table 2-3: Record Monthly Temperatures (°F) and Years of Record in Santa Monica

Temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
High	88 2018	90 2022	94 2015	95 2009	94 2014	92 1957	92 2018	95 1983	**103** **2010**	101 2017	100 1966	89 1979	**103** **2010**
Low	**26** **1913**	32 1903	28 1907	33 1917	39 1915	41 1908	42 1906	47 1919	40 1907	37 1919	32 1919	30 1916	**26** **1913**

Based on data recorded between 1900 and 2023 as follows: 1900-1938, Santa Monica weather station near the intersection of 11th Street and Olympic Boulevard; 1939-2000, Santa Monica Pier; 2001-2023, Santa Monica Municipal Airport.
***Source**: https://www.extremeweatherwatch.com/cities/santa-monica, with data from the NOAA National Climate Data Center accessed on September 1, 2023.*

Rainfall in the Santa Monica area averages around 12 inches per year. The data available suggest that the Santa Monica Pier, on average, receives about 1.7 inches more rain per year than the Santa Monica Airport. However, because the time range covered by the records differs between these two stations, the differences could also be indicative of an overall drier trend. This is presented on Table 2-4. This table also presents data for three different rain stations in Los Angeles (station at the Civic Center, which in 1999 was replaced by the station at USC[1], and a station at LAX). The table also lists average rainfall totals at the San Gabriel Fire Station illustrating that areas at higher elevations, above the Los Angeles basin, generally receive noticeably more rainfall. Rainfall averages by month for the Santa Monica area are summarized on Figure 2-2 below, which shows that most precipitation occurs during the winter months between November and March, with very little to no rain measured in June through September.

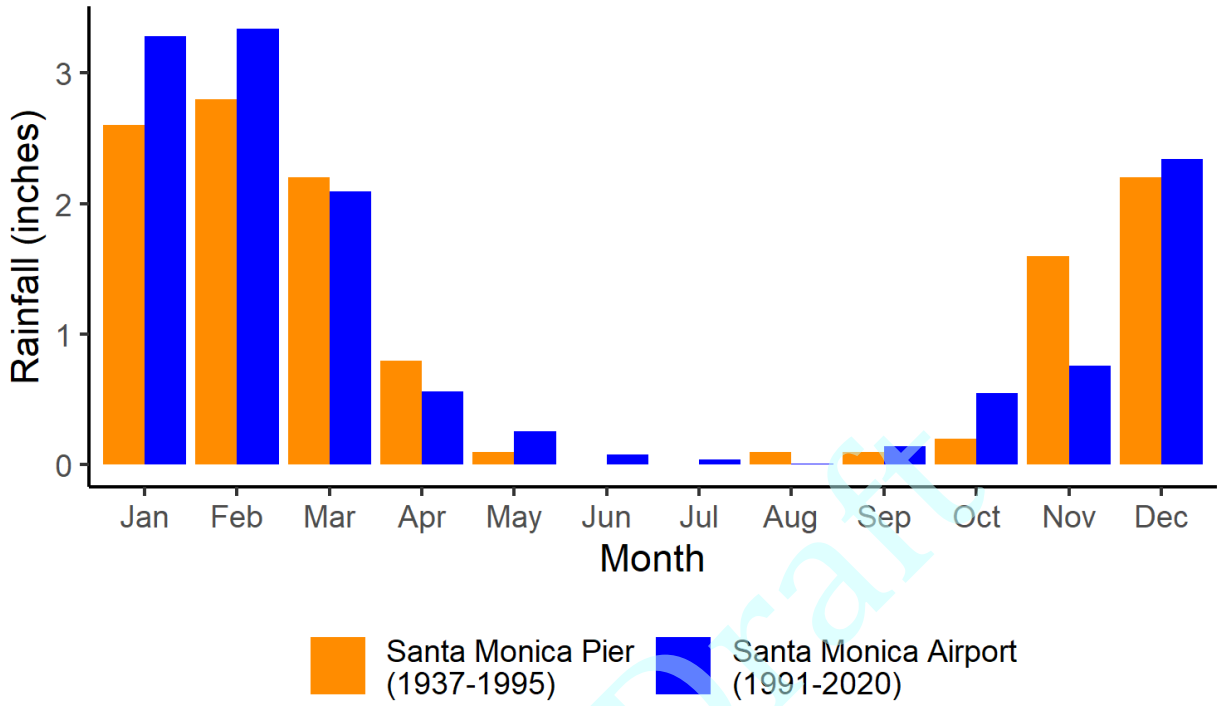
Table 2-4: Averages of Annual Cumulative Rainfall for Santa Monica (historical and current), Los Angeles (historical and current), and San Gabriel (historical)

Weather Station Location and Time Range	Cumulative Inches per Year (Averaged)
Santa Monica Pier (1948-2005)	12.87
Santa Monica Airport (1998-2024)	11.19
Los Angeles Civic Center (1950-1995)	14.9
Los Angeles USC (30-year average between 1999-2020)	14.25
Downtown Los Angeles (1844-2024 combined between Civic Center and USC stations)	14.82
Los Angeles International Airport - LAX (1944-2024)	11.99
San Gabriel Fire Department (1939-1995)	17.46

Sources: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?casmon, https://www.laalmanac.com/weather/we139a.php, https://www.laalmanac.com/weather/we13.php, https://www.laalmanac.com/weather/we09a.php, https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?casgfd; all accessed July 2, 2024.

[1] According to https://www.laalmanac.com/weather/we13.php (accessed on July 2, 2024), on May 20, 2024, the official Downtown Los Angeles weather observation site was relocated from the University of Southern California (USC) campus to the Frank Hotchkin Memorial Training Center in Elysian Park. The new site is approximately four miles northeast of the USC campus, at the training center for the Los Angeles Fire Department, on the south side of Dodger Stadium.

Figure 2-2: Average Annual Rainfall by Month, Recorded at the Santa Monica Pier Weather Station (historical values) and the Santa Monica Airport ("current normals")



However, "average" precipitation means very little in this region, as annual rainfall amounts have ranged from one-third the normal amount to more than double the normal amount, with rainfall in southern California characterized as "feast or famine." This is covered in more detail in Section 8.

Soils and Rocks

The sediments and soils underlying Santa Monica determine to some extent the potential geologic hazards that may occur in different regions of the city. Therefore, understanding the geologic characteristics of the sediments underlying Santa Monica is an important first step in hazard mitigation and avoiding at-risk development. The types and characteristics of the unconsolidated sediments, soils, and, at depth, the bedrock, that underlie the city are also a reflection of the geologic and climatic processes that have affected this region in the past several million years.

Although located near the rugged Santa Monica Mountains, the landscape within the city itself is relatively simple (for a geologic map of the area, refer to Figure 9-2, and Plates H-3a and H-3b in Appendix H). The northern portion of the city is underlain by a broad, gently south-sloping alluvial fan that emanated from the mountains to the north. These deposits were transported to their current location by ancestral streams and/or gravity (as mudflows or slopewash) over thousands to tens of thousands of years, building an approximately 80- to 100-foot-thick section of sand, gravelly sand and silt at the base of the mountains. We know that the Santa Monica Mountains are the source for these sediments because the gravels, which occur in large amounts in the alluvial fan deposits, typically consist of clasts of bedrock types that crop out in these mountains. The rock type most often seen in the gravelly sections is Santa Monica slate, a dark bluish gray metamorphic rock, but

lesser amounts of granitic, volcanic and sedimentary rocks also common in the Santa Monica Mountains are also present. The alluvial surface is now disconnected from the mountains by the deep ravine of Santa Monica Canyon. At depth below the alluvial fan deposits is a thick sequence of non-marine and marine sediments that extend to depths of between 5,000 and 12,000 feet.

On its western boundary, the low-lying beach serves as a buffer between the Pacific Ocean and the coastal bluffs (the Pacific Palisades), with ongoing erosional processes causing the retreat of these bluff faces. The beach areas and the stream channels north and south of the city are filled with historical to latest Holocene (less than about 4,000 years old) deposits. Near the southwestern portion of the city, between Barnard Way on the west, Main Street on the east, and Strand Street on the north, wind-deposited (eolian) deposits have been mapped. All of these youthful sediments are susceptible to differential settlement, liquefaction (if water occurs within about 35 feet of the ground surface), and erosion. Older marine, lake (lacustrine), playa or estuarine deposits, now elevated above the active floodplain, are present in the southern portion of the city. These deposits consist of sand, silty sand and gravel, in some areas cemented by calcite accumulation or modified by soil-forming processes. These deposits may be corrosive to metals or concrete, and where capped by soils, may have a high expansion potential. These issues can be mitigated if recognized prior to or during construction.

Other Significant Geologic Features

The city of Santa Monica is located in the western half of southern California, and as a result lies on the Pacific (tectonic) Plate. The Pacific Plate moves northwesterly at a rate of approximately 50 millimeters (2 inches) per year relative to the North American plate, with the San Andreas fault system forming the boundary between plates. The city of Santa Monica is also located near the transition zone between the Transverse Ranges and the Peninsular Ranges physiographic provinces (regions of distinct geology, topography and sometimes ecology). Aligned with the San Andreas fault, the Peninsular Ranges province is represented by a series of northwest-trending faults, mountain ranges and valleys stretching from the base of the Santa Monica Mountains on the north to the Mexican border to the south. The west-trending Santa Monica-Hollywood fault zone, and the Santa Monica Mountains and San Gabriel Mountains to the east, are part of the Transverse Ranges province.

Earthquake faults in this region are mainly of the strike-slip and oblique-slip type, and where they have been most recently active, they have deformed the landscape and altered drainage patterns. Examples of strike-slip faults in this region include the Palos Verdes, Newport-Inglewood and Elsinore-Whittier faults. The Newport-Inglewood fault zone trends southeasterly across the Los Angeles Basin and is responsible for uplifting the chain of low hills and mesas that extends from Beverly Hills to Newport Beach across the relatively flat coastal plain (including Beverly Hills, Cheviot Hills, Dominguez Hills, Signal Hill, and Newport Mesa). The fault is an active structure and was the source of the 1933 magnitude (M) 6.4 Long Beach earthquake. The Santa Monica fault is considered a left-lateral oblique-slip fault that is in part responsible for uplift of the Santa Monica Mountains. Several traces of this fault have been mapped across the city of Santa Monica. The Santa Monica fault has not caused a significant earthquake in historical times, but is considered seismically active. This is discussed further in Section 6.

The Los Angeles Basin experiences many small tremors every year, but its history has been shaped by several relatively infrequent, but powerful earthquakes. The first historical earthquake in southern California was recorded in 1769, when the Portolá expedition was camped next to the Santa Ana River in what is now the Olive community in the city of Orange, but earthquakes undoubtedly have shaken the area for millennia. Other more recent earthquakes occurred in 1812, 1857, 1933 (Long Beach), 1987 (Whittier Narrows), 1994 (Northridge), and 2019 (Ridgecrest). The Northridge 1994 earthquake (M 6.7) dramatically affected Santa Monica and is to date the most expensive earthquake in United States history due to its proximity to the Los Angeles area and extensive damage to structures. The earthquake caused a total of 57 deaths, 1,500 injuries, and damaged approximately 12,500 structures, with the city of Santa Monica hit particularly hard.

Given that paleoseismological research indicates that great earthquakes (i.e., M >7.6) occur on the San Andreas fault at intervals between 45 and 332 years, with an average interval of 140 years, another similar earthquake on the San Andreas fault is considered likely in the not-too-distant future (if not already overdue). This fact alone should encourage local governments to strengthen their infrastructure and prepare for "the Big One." Moreover, as discussed in Section 6, there are other faults closer to Santa Monica, including the Santa Monica fault, that have the potential to cause more damage to the city than the more-distant San Andreas fault. The earthquake hazard to the Los Angeles basin and the cities therein, including the city of Santa Monica, is thus considered severe.

COMMUNITY HISTORY

The first known inhabitants of the Los Angeles Basin, including the Santa Monica area, were Native Americans from the Gabrielino/Tongva (or Tobikhar) nation. Together with the Chumash to the north, in the Santa Barbara region, and the Kymeyaay nation to the south, in what is now San Diego County, these groups occupied a 4,000-square-mile area that extended from the Mojave Desert in the east to the Channel Islands offshore (which they reached with sea-worthy plank-built canoes). When Spanish explorer Juan Cabrillo sailed past southern California in 1542, the first Europeans to sight the California coastline, the Tongva are thought to have numbered between 5,000 and 10,000 individuals.[2]

Intense contact between the Spanish and the Tongva only began more than 200 years later, when the first land expedition by Europeans into what is now Los Angeles County was led by Gaspar de Portolá in 1769. This was followed in 1771 with the founding of the Mission of San Gabriel Arcángel by Junípero Serra. Many Tongva were forcibly relocated to the mission grounds and surrounding areas, generally as enslaved laborers forced to learn the European style of farming and livestock husbandry, to tend to the mission's orchards, fields and animals. Old World diseases brought by the Spanish led to the rapid collapse of the Tongva people in the late 18th century.

In 1839, the governor of Alta California, Don Juan Bautista Alvarado, awarded a Mexican land grant to Francisco Sepúlveda II, a soldier and citizen of Los Angeles. The 33,000-acre land grant, referred to as Rancho San Vicente y Santa Mónica, included what is today Brentwood, Mandeville Canyon,

[2] Lepowsky, M., 2004, Indian revolts and cargo cults: Ritual violence and revitalization in California and New Guinea, in Harkin, M. E. (editor), Reassessing revitalization movements: Perspectives from North America and the Pacific Island: University of Nebraska Press, Lincoln, NE, pp. 1–61, ISBN 9780803224063.

and parts of Bel Air, West Los Angeles, and Santa Monica. Ownership of these land grants by Spanish families was honored by the 1848 Treaty of Guadalupe Hidalgo following the Mexican-American War. Don Francisco died in 1853, and his heirs sold their San Vicente y Santa Monica property to the American businessman Robert S. Baker in 1872, who bought it to extend his cattle and sheep business holdings in southern California. In 1874, Mr. Baker sold a three-quarter interest to the property to Nevada Senator John Percival Jones, and in April 1875, Mr. Baker married Arcadia Bandini de Stearns, a wealthy California landowner in her own right, and a well-known socialite. Also in 1875, the Bakers and Senator Jones decided to subdivide a part of the property they jointly owned and create the town of Santa Monica. As part of the process, they filed a Platt map for the first subdivision in Santa Monica. Residential lots 150 feet deep and 50 feet wide were planned between Ocean Avenue on the west, 26th Street on the east, and between Montana Avenue on the north and Colorado Avenue on the south. Arcadia de Stearns Baker is credited for creating or helping create[3] the original map of the city, and in the process designating lots for businesses, schools, churches, and other community structures. The lots set aside for schools and parks she ceded to the city. Stearns Baker also donated the land for Pacific Palisades Park to Santa Monica, and the property where the Veteran's Administration is located. The City of Santa Monica was incorporated in 1886, and became a sea-side resort, with railway connection between the Los Angeles area and Santa Monica provided by the Pacific Electric Railway. Hotels, bathhouses and amusement piers catered to the beachgoers and provided employment opportunities.

In 1922, Donald Will Douglas Sr. built a plant at Clover Field (the site of the Santa Monica Airport), establishing the Douglas Aircraft Company (later known as McDonnell Douglas). The factory provided jobs and in 1924 placed the region on the world map when two of four Douglas-built planes landed on the field after flying more than 27,500 miles in 175 days, as part of their effort to circumnavigate the globe.[4] Population in the Santa Monica area more than doubled during this period, from 15,252 in 1920 to 37,146 in 1930. During the Great Depression (1929-1939), however, Santa Monica's businesses, especially those in the hospitality industry, suffered greatly, with many going bankrupt. A positive that came out of that period is that several important buildings in Santa Monica were built with funding provided by the Work Projects Administration (WPA), part of Franklin D. Roosevelt's New Deal program to provide jobs to millions of unemployed people, mostly building public works and infrastructure projects. Buildings in Santa Monica built with WPA's funding include City Hall, the main Post Office and the Santa Monica High School auditorium (Barnum Hall). Population between 1930 and 1940 increased by 44%, to about 53,500 residents in 1940.

Employment prospects in the region improved when the United States declared war during World War II. Military personnel and defense workers arrived in southern California to fill the logistical needs created by the war effort. In Santa Monica, the Douglas Aircraft Company was commissioned to build aircraft for various branches of the U.S military. By 1943, reportedly more than 44,000 people were employed by the company. The population in the region increased dramatically, and residential developments and shopping centers sprung throughout the Los Angeles region; within a few decades, the Los Angeles Basin was virtually built out. In Santa Monica, population between 1940 and 1950 increased nearly 34%, with nearly 71,600 residents reported in 1950. Immediately

[3] https://en.wikipedia.org/wiki/Arcadia_Bandini_de_Stearns_Baker and https://smmirror.com/2010/11/arcadia-bandini-santa-monica-shaper-hometown-hero/m, both accessed in July 2024.

[4] https://en.wikipedia.org/wiki/Santa_Monica,_California, accessed on July 23, 2024.

after the war, construction began on the freeway system, and the face of southern California was forever changed. Although Santa Monica's population increased further between the 1950s and the 1970s (83,249 residents in 1960 and 88,289 residents in 1970), some residential communities in the city were uprooted by the construction of two projects. These are the Santa Monica Civic Auditorium, completed in 1958, which was built where Belmar Triangle, the first African American neighborhood in the city used to be located, and the Santa Monica Freeway, completed in 1966. The freeway project impacted the Pico neighborhood, another significant African American enclave[5], and home also to Latinos and low-income residents, with many properties seized under eminent domain laws[6].

Today, Santa Monica is home to many businesses in a wide variety of industries, including technology, digital media and content, television and film, banking, real-estate, apparel, music, gaming, fitness, food, entertainment and hospitality. The City is also home to Santa Monica College and two hospitals (UCLA Santa Monica Medical Center and Providence Saint John's Health Center); combined, these institutions provide thousands of jobs. To support its residential and commercial bases, the City has three main shopping districts, in addition to hundreds of boutiques, restaurants and small businesses.

POPULATION AND DEMOGRAPHICS

The city's small area and existing housing stock largely control the number of people that can call Santa Monica home. As a result, population counts for Santa Monica have not varied significantly between 1970 and 2020 (Table 2-5). According to U.S. Census data, population remained fairly stable between 1970 and 2010, and in fact decreased by 4,230 people between 1980 and 2000. While some population growth occurred after 2000, with an increase of 6.7% between 2000 and 2010 and 3.7% between 2010 and 2020, population estimates for 2023 indicate that the city's population has since slightly decreased. Nevertheless, Santa Monica is one of the most densely populated cities in California, and in the United States as a whole, with around 10,800 people per square mile (still considerably shy of the 74,870 people per square mile in Manhattan, New York, according to the 2010 Census).

Table 2-5: Historical Population Counts for the City of Santa Monica

Year	Population
1970	88,289
1980	88,314
1990	86,905
2000	84,084
2010	89,736
2020	93,706
2023 (estimated)	89,922

Source: United States Census Bureau Decennial Census of Population and Housing (https://data.census.gov/, accessed June 1, 2024).

5 Ibid.

6 https://www.kcrw.com/news/shows/greater-la/toxins-santa-ana-edu/santa-monica-displaced-black-families-housing, accessed July 24, 2024.

Santa Monica's generally consistent population counts over the past 50 years are most likely the result of limited housing development (which is constrained by the city's geography and the fact that it is already densely built up). For example, while in California there has been a 13.9% increase in occupied housing units between 2000 and 2020, Santa Monica has only experienced a 2.7% increase in housing stock during the same period. Families in Santa Monica are, on average, smaller, with 2.82 members compared to the State's average family size of 3.39. The average household size in Santa Monica has slightly increased in the past two decades, from 1.84 in 2000 to 1.95 in 2020, while the State-wide average has remained stable, at 2.87 in 2000 and 2.89 in 2020. According to the Santa Monica Housing Element Needs Assessment, the City's housing stock grew by 1,717 units between 2010 and 2020, while population during that same time period grew by 2,621 individuals. This suggests that Santa Monica's slight increase in population during that time period was accommodated by slight increases in both household size and number of housing units. In 2020, the City's housing stock consisted of approximately 52,629 total units, 11,572 (22%) of which were single units, and 40,853 (78%) which were multi-units.

Densely populated areas pose a special challenge because of the large number of people potentially exposed to a natural hazard event, such as an earthquake, at the same time. Essentially, high population densities increase risk. Furthermore, high-density housing increases the chances of structure fires spreading from one building to the next, especially in older structures. Narrow residential streets and narrow passageways between buildings can also make it more difficult for emergency response vehicles and personnel to reach those in need, and the high ratio of residents to emergency responders can affect response times.

History shows that the impacts of natural hazards in terms of exposure, vulnerability and the ability to recover vary greatly among different segments of the population. Disasters pose particular risk to older populations[7] and children, women, racial and ethnic minorities (especially indigenous and African American people in the United States), disabled people, and low-income populations.[8] For example, an analysis of flooding in Houston, Texas after Hurricane Harvey (2017) demonstrated greater flooding extent in neighborhoods with higher proportions of Black and socioeconomically deprived people[9], highlighting inequities to exposure. Another example comes from Christchurch, New Zealand and the fatal Canterbury earthquake sequence that occurred between 2010 and 2011. Efforts to rebuild the city have been slow and unequal, especially impacting low-income residents and renters. Despite a third of Christchurch's population being renters, rebuilding housing infrastructure has not been prioritized, causing dramatic rent increases. Instead of focusing on multi-household structures, there is a perceived priority of the local government in rebuilding higher

7 Being older than 60 was the "single most important factor in determining who died in Hurricane Katrina" (Peek, L., 2013, Peek, Lori., Age; *in* Thomas, D.S.K., Phillips, B.D., Lovekamp, W.E., and Fothergill, A. (editors), Social Vulnerability to Disasters, 2nd Edition: CRC Press, Boca Raton, FL, pp. 167-198.

8 Ryder, S.S., 2017, A Bridge to Challenging Environmental Inequality: Intersectionality, Environmental Justice, and Disaster Vulnerability: Social Thought & Research, Vol. 34, pp. 85-115; available at https://www.jstor.org/stable/44807699.

9 Chakraborty, J. et al., 2019, Exploring the Environmental Justice Implications of Hurricane Harvey Flooding in Greater Houston, Texas: American Journal of Public Health, Vol. 109, No. 2, pp. 244-250; DOI: 10.2105/AJPH.2018.304846.

income parts of the city first.[10]

Addressing inequities and being proactive about mitigating disasters is known as environmental justice. Specifically, the Environmental Protection Agency (EPA) defines environmental justice as the "just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation, or disability, in agency decision-making and other Federal activities that affect human health and the environment."[11] Discussions about natural hazards that include local citizen groups, insurance companies, and other public and private sector organizations, including small-business owners and residents, can help ensure that all members of the community are part of the decision-making processes.

As the paragraphs and tables below illustrate, Santa Monica's residents include a large proportion of single-adult households, including especially women-led households, older people, disabled people, and minorities. All of these groups have the potential to be significantly impacted by a natural disaster. Furthermore, a very large proportion of Santa Monica's residents rent rather than own the buildings that they live in. Renters and landlords are generally less likely to take on mitigation actions that will make their structures more hazard resistant. Furthermore, landlords are typically not eligible for FEMA funding following a disaster, a situation that can significantly delay the repair of rental units so that they can be re-occupied. All of these conditions can hinder the processes of disaster preparedness and recovery, unless a concerted effort is made to educate the entire population on the hazards likely to impact the community, and on mitigation actions that can be implemented by individual households and small businesses to reduce the impacts from these hazards. Renters in particular, should be aware that FEMA typically does offer limited help to eligible renters impacted by a disaster in the form of free referral services to find alternate housing, and in some instances, money to rent a different place to live for a limited period of time.

The U.S. Census Community Survey for Santa Monica in 2022 shows that a large proportion of households in the city are headed by women.[12] Specifically, 37.5% of households are occupied by women with no spouse present, compared to 20.0% of households occupied by men with no spouse present, and 33.9% of households being occupied by married couples. These statistics differ greatly from those for the entire state. In California, nearly half (48.1%) of households are occupied by married couples, 26.2% are occupied by female householders, and 18.0% are occupied by male householders.

Santa Monica has a relatively older population than California. The median age in Santa Monica is 43.3 years, which is around 5 years older than the median age for the State (37.9 years). Figure 2-3 shows the estimated age distribution for Santa Monica's residents based on the 2018-2022 American Community Survey 5-Year Estimates data. Compared to State averages, households in Santa Monica include fewer children and young adults. There is a spike in the population of people in their late

[10] Sovacool, B.K. et al., 2018, Bloated bodies and broken bricks: Power, ecology, and inequality in the political economy of natural disaster recovery: World Development, Vol. 110, pp. 243-255; https://doi.org/10.1016/j.worlddev.2018.05.028.

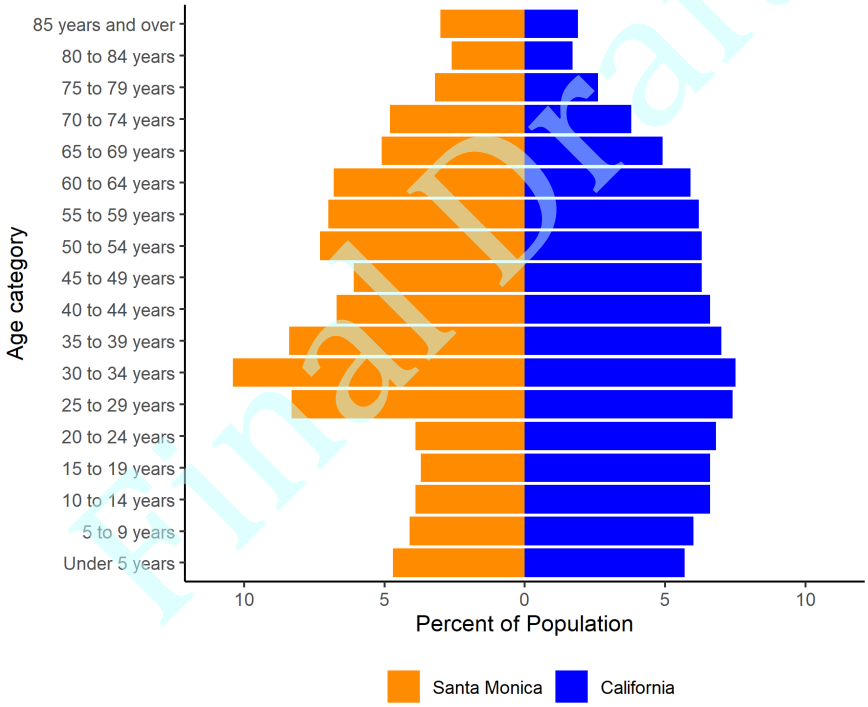
[11] https://www.epa.gov/environmentaljustice

[12] The person designated as the householder is the "reference person" to whom the relationship of all other household members, if any, is recorded. Typically, women-headed households are households where either no adult men are present, due to divorce, separation, migration, non-marriage or widowhood; or where men, although present, do not contribute to the household income because of illness, disability, old age or other similar situation.

twenties and thirties, and in general Santa Monica has a high proportion of elderly people: 21.1% of people in Santa Monica are 65 years and older, compared to 15.8% in the State as a whole.

As the data presented in Tables 2-5 and 2-6 show, almost a quarter (22.6%) of Santa Monica's population is foreign born. Of the foreign-born population in the city, 61.8% are naturalized U.S. citizens and thus 38.2% are not U.S. citizens. Of all foreign-born residents in Santa Monica, 37.3% originate from Asia, 27.4% originate from Europe, 23.9% originate from Latin America, and the remaining 11.4% originate from other regions. Relatedly, English is the primary language spoken in Santa Monica, with 72.2% of residents speaking only English, compared to the State average of 56.1%. The second most common language in Santa Monica is Spanish, which 11.1% of residents speak as their primary language. This is important to consider and plan for in hazard reduction, emergency preparedness, and mitigation actions: all emergency and disaster preparedness communications should be sent out in both English and Spanish to reach the largest possible percentage of the city's population.

Figure 2-3: Age Distribution of the Population in Santa Monica Compared to California



Source: United States Census Bureau American Community Survey, 2018-2022 (https://data.census.gov/, accessed June 3, 2024)

Table 2-5: Place of Birth Statistics for Santa Monica Residents Compared with California (2020 American Community Survey)

	Santa Monica	California
Born in United States	**77.4%**	**73.4%**
Born in California	39.0%	56.0%
Born in Different State	36.1%	16.0%
Born in Puerto Rico, U.S. Islands, or Abroad, to American Parents	2.3%	1.4%
Foreign Born	**22.6%**	**26.6%**

Table 2-6: Population Breakdown, by Race, in the City of Santa Monica (2020)

Race	% of Santa Monica's Population
American Indian / Alaska Native	0.7
Asian	8.8
Black or African American	5.3
Native Hawaiian or Other Pacific Native	0.1
White	69.0
Some other race	4.0
Two or more races	12.1
Population by Hispanic or Latino Origin (of any race)	
Persons of Hispanic or Latino origin	17.2%
Persons not of Hispanic or Latino origin	82.8%

According to the U.S. Census data, the median household income (2018-2022) in Santa Monica was $106,797 (compared to $91,905 in California and $75,149 in the entire United States). The poverty threshold varies depending on household make-up, the number persons in the household and number of children. The percentage of individuals living in poverty in the city of Santa Monica is 10.1%, which is lower than the California rate of 12.6%. On average, Santa Monica families have lower rates of poverty than California. However, as shown in Table 2-7, families with female householders and children under 5 years old, and people over 65 years old are at particular risk of poverty in Santa Monica. Specifically, for 2018-2022, 33% of the households in Santa Monica headed by women with no partner present and with related children less than 5 years old were deemed to be below the poverty level. This amounts to approximately 203 families. In the same time period, about 17.3% of the seniors more than 65 years old in Santa Monica were considered to be living below the poverty level, compared to 11.0% of the seniors in all of California.

Table 2-7: Percentage of Families and People in Santa Monica and California whose Income in the Prior 12 Months Was Below Poverty Levels (2018-2022, 5-Year Estimates)

	Santa Monica	California
All Families	6.7%	8.5%
With related children under 18 years	7.5%	12.5%
With related children under 5 years	6.7%	9.7%
Married Couple Families	5.1%	5.1%
With related children under 18 years	4.6%	6.7%
With related children under 5 years	3.4%	4.3%
Families with Female Householder, no spouse present	12.9%	20.3%
With related children under 18 years	13.6%	29.2%
With related children under 5 years	33.0%	30.3%
All People	11.6%	12.1%
Under 18 years	6.8%	16.8%
65 years and over	17.3%	11.0%

Source: Selected Characteristics of People at Specified Levels of Poverty in the Past 12 Months, using the 2022 American Community Survey 5-Year Estimates Subject Tables, from data.census.gov. Note that the census tables provide margins of error; those are not included above for simplicity purposes.

Santa Monica's population has slightly higher disability rates compared to the California average. According to the 2022 1-Year American Community Survey, 12.3% of people in Santa Monica are disabled, compared to 11.7% in California. Ambulatory difficulties are the most common disability, affecting 7.8% of Santa Monica residents, whereas 6.3% of Santa Monica residents have supported living needs and 5.8% have cognitive disabilities. Disabled populations are at high risk during natural hazards, especially those with mobility issues. It should therefore be a priority to have contingency plans and support systems for these people during such emergencies.

Examining the reach of hazard mitigation policies to special needs populations may assist in increasing access to services and programs. FEMA's Office of Equal Rights addresses this need by suggesting that agencies and organizations planning for natural disasters identify special needs populations, make recovery centers more accessible, and review practices and procedures to remedy discrimination in relief application or assistance.

HOUSING AND COMMUNITY DEVELOPMENT

As mentioned in the introduction, the city of Santa Monica is built out; there are only a few vacant parcels and a few lots with large backyards that could be re-developed into higher-density buildings. Therefore, in the last few years there has been little development (see Table 2-8). This also means that structures in Santa Monica tend to be older: over 75% of the housing structures in Santa Monica were built more than 40 years ago. This poses concerns for the integrity of these structures, especially in response to natural disasters.

Table 2-8: Year Housing Structures in Santa Monica Were Built (and Comparison with California)

Year Housing Structure was Built	Santa Monica, Total Number, (Percent of Total)	California, Percent of Total
2014 or later	847, (1.9%)	2.2%
2010 to 2013	678, (1.5%)	1.8%
2000 to 2009	2,319, (5.1%)	10.9%
1980 to 1999	6,824, (14.9%)	26.1%
1960 to 1979	17,483, (38.3%)	30.8%
1940 to 1959	11,094, (24.3%)	19.3%
1939 or earlier	6,461, (14.1%)	8.9%

Source: U.S. Census Bureau, Selected Housing Characteristics, 2018-2022 American Community Survey 5-Year Estimates, accessed on June 5, 2024.
Total Estimated Housing Units in California: 13,103,114; Total Estimated Housing Units in Santa Monica: 45,706

Thus, a large regional earthquake has the potential to result in a large percentage of Santa Monica households and residents to be displaced, in numbers likely to be too large for the City to respond to effectively (see Section 6). Displaced households may need alternative short-term shelter, provided by family, friends, temporary rentals, or public shelters established by the City, County or by relief organizations such as the American Red Cross. Long-term alternative housing may require import of mobile homes, net emigration from the impacted area, and/or, the eventual repair or reconstruction of new public and private housing. Given that a large percentage of the housing units in Santa Monica are rental properties (see Table 2-9), a damaging natural hazard event has the

potential to not only significantly impact Santa Monica's residents, but the City's makeup, as many residents may choose to find alternate housing elsewhere, in other cities. The number of people seeking short-term public shelter is of most concern to emergency response organizations. The longer-term impacts on the housing stock are of great concern to local governments, such as cities and counties.

Table 2-9: Selected Housing Characteristics in Santa Monica and California

	Santa Monica	California
Total Housing Units	52,389	14,277,867
Occupied housing units	44,495 (84.9%)	13,072,122 (91.6%)
Vacant housing units	7,894 (15.1%)	1,205,745 (8.4%)
Owner-occupied	27.9%	55.3%
Renter-occupied	72.1%	44.7%
Home-ownership rate	31.8%	55.8%
Units in Structure		
1-unit, detached	8,414 (18.4%)	58.3%
1-unit, attached	1,780 (3.9%)	7.2%
2 units	622 (1.4%)	2.3%
3 or 4 units	3,922 (8.6%)	5.4%
5 to 9 units	10,235 (22.4%)	5.9%
10 or more	20,658 (45.2%)	17.4%
Mobile homes	75 (0.2%)	3.5%
Housing Statistics		
Average household size	1.97	2.94
Rate of single-person households	46.9%	23.8%
Median value of owner-occupied units	$1,507,400	$557,100
Median monthly rent / Monthly housing costs for renter-occupied units	$1,900	$1,586

Source: U.S. Census Bureau, Selected Housing Characteristics, 2018-2022 American Community Survey 5-Year Estimates, accessed on June 5, 2024.

Housing stock is in many direct and indirect ways one of the most important commodities in a city. As mentioned above, if a natural disaster, such as an earthquake, damages several houses in the city, this has a significant impact not only on the residents of those structures, but on the City itself. An extreme, but real, example of this is New Orleans following Hurricane Katrina. After this catastrophic event, New Orleans lost more than half of its population due to permanent relocation and more than two years later entire neighborhoods were vacant, the houses still in ruins. Many past residents of these communities started new lives in other cities and states and have not come back. In 2020, there were still around 100,000 fewer people in New Orleans than in 2005, substantially diminishing New Orleans' tax base. New Orleans is rebuilding and recovering, but it has taken time.

Many Santa Monica residents live in apartments or condominiums that have multiple units per structure (Table 2-9). In fact, a little less than 50% of Santa Monica residents live in structures with

10 or more units, compared to the state average of 17.4%. Similarly, only 18.4% of Santa Monica residents live in a detached one-unit house, while the California average is much higher at 58.3%. As discussed previously, living in close quarters can put people at increased risk during some disasters or emergencies, such as structural fires that can spread from one housing unit to another, and congested exits. Structures with multiple stories can pose risks if elevators stop functioning or stairways get blocked. Mitigation measures that can be undertaken by households to protect themselves from the impacts of some of these disasters are discussed in each appropriate section of this report.

Santa Monica's residents are well educated. Of the population aged 25 years and older, only 3.9% did not complete high-school, and 7.6% only completed high-school but did not go to college. 22% of this age group completed some college or obtained an associates' degree, whereas 66.5% completed college, with 30.4% having completed graduate school or obtained a professional degree. This is reflected in the occupations and industries that Santa Monica workers are most commonly engaged in, with 68.5% of the work force involved in management, business, science or the arts (see Table 2-10). Of the city's population 16 years old and over, an estimated 70.1% participate in the labor force, with an employment to population ratio of about 66.6%. These numbers are higher than for California overall, where the labor force participation for the same age group is estimated at 63.9%, with an employment to population ratio of 60%.

Table 2-10: Employment and Industry in Santa Monica Compared to California

Principal Employment Activities	Santa Monica	California
Management, Business, Science, and Arts occupations	68.3%	40.3%
Service occupations	10.3%	18.1%
Sales and Office occupations	16.4%	20.9%
Natural resources, Construction, and Maintenance occupations	2.1%	8.8%
Production, Transportation, and Material moving occupations	3.0%	11.9%
Major Industries		
Manufacturing	3.8%	9.0%
Retail trade	6.9%	10.4%
Educational services, and Health care and Social assistance	20.5%	21.2%
Transportation, and Warehousing and Utilities	2.3%	4.7%
Arts, Entertainment and Recreation, and Accommodation and Food Services	11.3%	10.2%
Professional, Scientific, and Management, and Administrative and Waste Management	25.3%	13.8%

Source: U.S. Census Bureau, 2018-2022 American Community Survey 5-Year Estimates, accessed on June 5, 2024.

TRANSPORTATION, COMMUTING PATTERNS AND ESSENTIAL SERVICES

A moderate to large percentage of Santa Monica residents either work in the city, or close to it. Specifically, 34.6% of Santa Monica's residents work in the city, with 9.3% working from home (based on data from the ACS 5-Year estimates for 2018-2022). The State average for people working from home is 6%. Southern Californian's love for their private automobiles is well known, with automobiles being the historically dominant means of transportation in the region. This is true of

Santa Monica also, with 63.3% of the city's residents in the workforce commuting alone via car, truck or van (according to the ACS 5-year estimates for 2018-2022). This percentage is lower than the State average of 72.5%, however. The census data also indicate that 5.1% of Santa Monica residents in the labor force carpool to work, compared to 10.0% statewide. Public transportation is used by 3.6% of the Santa Monica labor force, and another 6.5% walk to work (compared to 4.6 and 2.2%, respectively, for California overall). Additionally, 3.4% of Santa Monica residents bike to work, compared to only 0.8% for the State average.

Of the 65.4% of Santa Monica residents that commute to work outside the city, 63.7% commute less than 30 minutes, and 31.6% commute between 30 and 59 minutes. Only 4.7% of residents that work have a commute longer than one hour. The mean travel time to work (commute) for Santa Monica residents is 24.6 minutes. The mean travel time for commuters in California is estimated at 30.2 minutes.

Although the preferred and most common means of transportation in southern California is by automobile, Santa Monica can also be accessed from downtown Los Angeles (LA) by train and bus. Bus service within the city is provided by Santa Monica's own Big Blue Bus, and connections to LA are provided by the Los Angeles County's Metro. The Big Blue Bus is operated by the City of Santa Monica's Department of Transportation, governed by the Santa Monica City Council and services more than 58 square miles of the Los Angeles metropolitan region. Rides cost $1.10 (as of 2024) for a one-way trip with free transfers within a 2-hour time limit.

The Metro provides several bus lines between Santa Monica and the LA area as follows: Line 4 bus travels between Downtown LA. and Santa Monica via Santa Monica Boulevard, Line 20 travels between Downtown LA and Westwood/Santa Monica via Wilshire Boulevard, Line 33 travels between Downtown LA and Santa Monica via Venice Boulevard, Line 134 travels between the Downtown Santa Monica Station and Malibu, and Line 720 travels between Santa Monica and Downtown LA via Wilshire Boulevard. Santa Monica residents can also travel between Downtown Santa Monica and Downtown LA using the Metro Expo Light Rail Line train (E Line). The Metro Expo Light Rail Line connects the downtowns of both cities, with the most westerly station in Santa Monica located on the corner of Fourth Street and Colorado Avenue. Metro fares cost $1.75 for a one-way ride (as of 2024).

In terms of commuting patterns, the city is bisected by the western terminus of the Interstate 10 (I-10) Freeway, and can be accessed from the east by several major roads including, from north to south, San Vicente Boulevard, Montana Avenue, Wilshire Boulevard, Santa Monica Boulevard, Olympic Boulevard, Pico Boulevard, and Ocean Park Boulevard. Pacific Coast Highway (PCH) connects the western portion of the city with Malibu and other communities to the north, and to Venice, Marina del Rey, Playa Vista, and other communities to the south (Figure 2-4). Most streets in the city are oriented in a northeast to southwest, and northwest to southeast grid, with a few winding roads present locally in areas with topographic relief (Figure 2-4).

Within the city itself, residents and visitors can bike and walk. Santa Monica has an extensive system of bike-designated lanes and most streets also have sidewalks, typically tree-shaded, for pedestrian use. Several shared mobility companies service the Santa Monica region, with bikes, electric bikes

and electric scooters available for rental through the providers' websites or mobile apps.

Several of the hazards discussed in this document have the potential to disrupt automobile traffic and shut down the local and regional transit systems. For example, an earthquake could damage the freeway overpasses so that they are unsafe to cross. Localized urban flooding occasionally impacts sections of the I-10 freeway, the McClure Tunnel, and PCH. Earthquake- and/or storm-induced slope failures can render sections of these roads temporarily unpassable. Even strong Santa Ana winds can make driving hazardous, especially for high-profile vehicles such as trailer trucks.

Figure 2-4: Major Roads In and Near Santa Monica
(for a larger, scaled-version of this map refer to Map H-2 in Appendix H)

In terms of essential services, the City has its own Police and Fire Departments. The Police Department provides traffic control, law enforcement, domestic violence, drug abuse and youth services, among others, for the City and its residents. Information on the Police Department, including contact information, can be obtained here. The Santa Monica Fire Department has five stations across the city and provides full-time services such as fire-fighting, paramedics, fire prevention, search and rescue, hazardous material response, and airport firefighting. Their website is https://www.santamonica.gov/departments/fire, and information on the fire hazards in Santa Monica is discussed in Section 10. The City's Public Works Department provides essential services

to the Santa Monica community that includes water supply production, treatment, and collection; collection and proper management of recoverable materials; tree trimming and street maintenance. Public education services for the school-aged children in the city of Santa Monica are provided by the Santa Monica–Malibu Unified School District (https://www.smmusd.org/domain/2913).

SECTION 3: RISK ASSESSMENT

WHAT IS A RISK ASSESSMENT?

Risk assessment is the process of estimating or calculating the potential losses (in terms of life, injuries, and property and economic damage) resulting from a hazard event. To conduct this analysis, it is necessary to identify and understand the hazards that can impact the community (hazard identification and hazard profiling), assess the vulnerability of the people, buildings and infrastructure that can be impacted by each hazard identified (vulnerability assessment and asset inventory), and estimate the potential losses (risk analysis). Each of these tasks or steps in the process, as it pertains to the city of Santa Monica, is described further below:

Hazard Identification

This is the description of the geographic extent, potential intensity and the probability of occurrence of a given hazard. To assess the perceived impact that various hazards can have on the city of Santa Monica, Resilience Planning Committee members were asked at the kick-off meeting to fill in a spreadsheet provided to them that listed a variety of natural and human-made hazards. A copy of the unfilled hazards matrix is included here as Table 3-1. Individuals were asked to weigh in on (1) the geographic extent of the hazard (widespread, moderate, or small), (2) whether or not, to their knowledge, the hazard has previously impacted the city of Santa Monica, (3) the probability (high, medium, low) of the hazard occurring in the Santa Monica area; and (4) the potential risk (high, medium, low) that each hazard poses to Santa Monica and its residents. Respondents were also encouraged to add other hazards to the list as they saw fit.

The 18 filled-in spreadsheets were collected and the data provided therein were compiled and weighted to develop a score for each hazard based on the answers provided. Points assigned to each hazard were calculated by summing the geographic extent, probability of occurrence and potential risk, as follows: widespread geographic extent, high probability of occurrence and high potential risk were each assigned 3 points; moderate geographic extent, medium probability of occurrence and medium potential risk were each assigned 2 points; and small geographic extent, low probability of occurrence and low potential risk were each assigned 1 point. The number of points earned by each hazard were summed together and the total was then divided by 18, the total number of respondents. If all respondents had identified a hazard as having a widespread geographic extent, high probability of occurrence and posing a high risk to the community, that hazard would have the maximum possible score of 9. Note, however, that some individuals did not assign a value to all hazards, and in a few instances, individual respondents assigned more than one value (such as moderate and small geographic extent) to the same hazard; as a result, not all row groups add to 18. The final scores for each hazard were ranked from highest to lowest, with the hazard receiving the highest score assigned a rank of 1. The results of this analysis are shown in Table 3-2.

Based on these results, the top-ten ranked hazards in the city of Santa Monica, listed from highest (1) to lowest (10) are: earthquake-induced ground shaking, sea-level rise, Santa Ana winds, high to excessive heat, drought, coastal flooding, surface rupture or surface fault deformation, tsunami, thunderstorms, and liquefaction. These hazards are identified in Table 3-2 with their assigned ranks shown in red text.

Table 3-1: Blank Spreadsheet Listing Hazards with the Potential to Impact the City of Santa Monica

Hazard	Geographic Extent			Historical Occurrence in Santa Monica	Probability of Occurrence			Potential Risk		
	Widespread	Moderate	Small		High	Med.	Low	High	Med.	Low
Earthquake										
Strong ground shaking										
Surface fault rupture or surface deformation										
Liquefaction										
Flooding										
Riverine flooding due to storm										
Coastal flooding										
Inundation due to reservoir failure										
Tsunami										
Sea-level rise										
Wildfires										
Geologic Hazards										
Landslides										
Mudflows										
Erosion										
Land subsidence										
Volcanic eruptions										
Windstorms										
Santa Ana winds										
Thunderstorms										
Tornadoes										
Hurricanes										
Other Climate Change & Severe Weather Hazards										
High to excessive heat										
Extreme cold										
Drought										
Hailstorms										
Lightning										
Other Human-Made Hazards										
Aircraft accidents										
Hazardous materials releases										
Urban fires										
Noise pollution										
Other										

Name: _____
Department/Agency: _____

Table 3-2: List of Hazards Identified as Likely to Impact the City of Santa Monica, Compiled and Ranked

Hazard	Geographic Extent			Historical Occurrence in Santa Monica	Probability of Occurrence			Potential Risk			Score*	Rank
	Widespread	Moderate	Small		High	Med.	Low	High	Med.	Low		
Earthquake												
Strong ground shaking	16	2	2	17	11	6	2	14	5	0	8.50	1
Surface fault rupture or surface deformation	6	7	7	3	5	9	6	8	8	3	6.72	7
Liquefaction	5	6	7	2	2	8	8	8	8	3	5.94	10
Flooding												
Riverine flooding due to storm	0	6	13	2	2	8	8	3	4	10	4.56	21
Coastal flooding	3	13	4	6	11	7	3	4	9	3	6.78	6
Inundation due to reservoir failure	1	7	11	0	0	5	12	5	6	7	4.67	20
Tsunami	5	12	3	3	3	7	8	6	11	2	6.39	8
Sea-level rise	8	11	1	3	7	11	1	9	9	3	7.72	2
Wildfires	2	4	3	3	4	2	4	4	2	4	3.17	28
Geologic Hazards												
Landslides	1	8	10	10	6	7	4	6	8	4	5.72	11
Mudflows	2	4	12	3	3	8	7	3	6	8	4.83	18
Erosion	4	6	8	8	9	6	2	4	6	6	5.72	11
Land subsidence	1	3	13	2	3	6	8	2	7	9	4.44	22
Volcanic eruptions	2	0	13	0	0	1	16	5	2	11	3.72	27
Windstorms												
Santa Ana winds	11	6	2	15	15	4	1	5	3	10	7.33	3
Thunderstorms	7	7	5	11	6	12	1	2	6	10	6.17	9
Tornadoes	2	3	4	0	0	2	17	6	1	11	3.78	26
Hurricanes	4	7	7	11	0	6	13	6	5	6	5.11	16
Other Climate Change & Severe Weather Hazards												
High to excessive heat	12	2	3	11	13	3	1	8	6	2	7.06	4
Extreme cold	7	3	7	0	0	3	14	1	3	12	4.17	24
Drought	13	2	2	9	11	5	2	5	8	3	6.89	5
Hailstorms	6	5	6	5	1	5	11	1	4	11	4.44	22
Lightning	8	3	7	7	3	8	5	1	7	8	5.11	16
Other Human-Made Hazards												
Aircraft accidents	0	3	16	11	2	10	8	3	5	10	4.72	19
Hazardous materials releases	1	6	12	4	1	11	6	5	9	3	5.22	15
Urban fires	1	8	12	5	7	4	6	6	7	4	5.67	13
Noise pollution	6	7	7	7	9	5	3	1	4	11	5.61	14
Terrorism, active shooter, civil unrest, riots, protests, human violence, mobs	6	1	4	7	5	3	2	5	6	0	4.11	25
Pandemic	2	0	0	2	1	2	0	2	0	0	1.06	29
Other	0	3	0	3	0	3	0	0	3	0	1.00	30
Cyberattack infrastructure	1	0	0	0	0	1	0	0	1	0	0.39	31

Based on input received at the kick-off meeting, and research conducted for this and previous versions of this Plan, the city of Santa Monica can be impacted by several natural hazards, including:

1) earthquakes (and secondary hazards triggered by earthquakes, such as surface fault rupture, liquefaction, slope failures, releases of hazardous materials, after-earthquake fires, and dam and water reservoir failures);
2) tsunamis caused by both near-source and long-distance earthquake sources;
3) storm flooding resulting both from coastal and pluvial processes;
4) slope failures;
5) fires, including urban (structure) fires, wildland fires, and after-earthquake fires; and
6) strong windstorms and severe weather, especially hazards exacerbated by climate change (such as sea-level rise, extreme heat events, drought, and hurricanes).

Human-related hazards that can also impact the Santa Monica area include:

7) non-earthquake related releases of hazardous materials;
8) aviation accidents and other airport-related hazards such as noise pollution;
9) terrorist acts (including active shooters, cyberattacks on infrastructure, releases of harmful chemical or biological agents);
10) acts of civil unrest (protests and mobs); and
11) pandemics.

At this time, and for this document, the City chose to address only the natural hazards identified in items 1 through 6 above, and the risks posed by the human-caused releases of hazardous materials and aviation hazards (items 7 and 8). These were the natural and human-caused hazards deemed to have the greatest potential to cause the damage, in terms of casualties and losses, in Santa Monica. These are also the hazards highlighted in the recently completed and approved Safety Element of the General Plan, a companion document to the Local Hazard Mitigation Plan.

The decision to not include items 9 through 11 from the list above was also informed by City staff indicating that in the past decade a variety of response plans specific to addressing terrorist acts, civil unrest, and pandemics have been developed and are available for City agencies and staff to implement as needed should the need arise. When work on this 2025 update to the Local Hazards Mitigation Plan began, the United States had just recently declared the end of the COVID-19 pandemic, and the City of Santa Monica, like most communities, had extensive experience in the implementation of the pandemic playbooks developed to respond to this crisis. Thus, for example, the COVID-19 playbook developed by the California Department of Public Health provided detailed strategies specific to various sectors of the work force and other populations, including farm and construction workers, school children, Native Americans, immigrants, and the LGBTQ+ community. Given this recent past experience and the wealth of available resources that can be tailored as needed should a new pandemic impact the region, the City of Santa Monica chose to not include pandemics in the list of hazards addressed here. Some of these hazards, such as cybersecurity threats to critical facilities and pandemics may be addressed in future versions of the Plan.

Each of the hazards selected to be addressed in this 2025 Plan is described in detail in the following sections. Where possible, the geographic extent of each of the identified hazards in Santa Monica is displayed on a map of Santa Monica, although several of the hazards have a regional extent that exceeds the boundaries of the city. The maps that show the estimated geographic reach of these

hazards are an important element of this document, and are thus included within the section that describes the hazard being considered (e.g., maps of regional and local faults, expected ground accelerations, and zones susceptible to liquefaction or earthquake-induced slope failure are included in Section 6: Earthquake Hazards). Some of the city-specific hazard maps are also presented together in Appendix H in 11x17 format (see list of maps in Table 3-3 below).

Profiling Hazard Events

This process describes the causes and characteristics of each hazard, how each specific hazard has affected the southern California area and the city of Santa Monica in the past, and what parts of Santa Monica's population, infrastructure, and environment have historically been vulnerable to each specific hazard. A profile of each hazard discussed in this Plan is provided in Sections 6 through 13. Therefore, for a description of the history of hazard-specific events, please see the appropriate hazard section.

Table 3-3: List of Maps that are Part of This Plan (Plates are in Appendix H)

Figure / Plate	Map Title	Section of the Plan
1-1	City of Santa Monica (with dark blue lines showing City boundaries)	Section 1
2-1, 9-1 / H-1	Physiographic Map of Santa Monica and Surrounding Areas	Section 2 Section 9
2-4 / H-2	Major Roads In and Near Santa Monica	Section 2
3-1 / H-3	Critical Facilities In and Near Santa Monica, California	Section 3
6-1	Regional Map Showing Select Faults, Physiographic Provinces and Landforms Mentioned in the Text	Section 6
6-2	Earthquake Shaking Levels Anticipated in California	Section 6
6-4	Notable Regional Earthquakes	Section 6
6-5	ShakeMap for a Magnitude 7.4 Earthquake Scenario on the Malibu Coast-Santa Monica-Hollywood Fault System	Section 6
6-6	ShakeMap for a Magnitude 7.2 Earthquake Scenario on the Newport-Inglewood Fault	Section 6
6-7	ShakeMap for a Magnitude 7.5 Earthquake Scenario on the Compton Thrust Fault	Section 6
6-8	Scenario for a M7.1 Earthquake on the Puente Hills Fault Showing Estimated Intensity Values in the Region Resulting from this Event	Section 6
6-9	Estimated Percent Building Losses as a Result of a Mw 7.5 Earthquake on the Puente Hills Thrust Fault	Section 6
6-10	ShakeMap for a Magnitude 7.8 Earthquake Scenario on the San Andreas Fault (Repeat of the 1857 Fort Tejon Earthquake)	Section 6
6-11	ShakeMap for a Magnitude 7.8 Earthquake Scenario (Shakeout) on the Southern San Andreas Fault	Section 6
6-12	Faults Mapped and Inferred Through, Near and Below Santa Monica	Section 6
6-13 / H-4	Earthquake Fault Zones of Required Investigation In and Near Santa Monica, California	Section 6
6-14 / H-5	Seismic Hazard Zones Map, Santa Monica, California	Section 6
6-15 / H-6	Census Tracts used in the HazUS Analyses	Section 6
6-16 / H-7	Total Residential Building Related Losses as a Percentage of Total Residential Exposure	Section 6

Figure / Plate	Map Title	Section of the Plan
6-17 / H-8	Total Commercial Building Related Losses as a Percentage of Total Commercial Building Exposure	Section 6
7-1	Bathymetric Map of Santa Monica Bay Showing Continental Slope and Offshore Canyons that Could be Source or Tsunami-Generating Landslides	Section 7
7-3	World Map Showing Approximate Location of Ring of Fire, Subduction Trenches, Active Volcanoes, and Large Earthquakes Between 1900 and 2013	Section 7
7-4 / H-9	Tsunami Hazards Map, Santa Monica, California	Section 7
8-2 / H-10	Flood Hazards Map, Santa Monica, California	Section 8
8-3 / H-11	Dam Inundation Map, Santa Monica, California	Section 8
8-4 / H-12	Anticipated Damage in Santa Monica as a Result of a Stone Canyon Dam Failure Scenario	Section 8
9-1 / H-1	Physiographic Map of Santa Monica and Surrounding Areas	Section 9
9-2 / H-13a & H-13b	Geologic Map of Santa Monica and Vicinity (H-13a) with Unit Descriptions (H-13b)	Section 9
9-3 / H-1	Bathymetric Map of Santa Monica Bay Showing Offshore Canyons	Section 9
9-4 / H-14	Slope Distribution Map for Santa Monica and Adjoining Areas	Section 9
9-5 / H-15	Areas in Santa Monica Susceptible to Slope Failure	Section 9
10-1 / H-16	Historical (1930-2025) Wildfires Near Santa Monica	Section 10
10-2 / H-17	Fire Hazard Zones in and Near Santa Monica	Section 10
11-7 / H-18	Flood Extent Along the Santa Monica Coastline Through the Year 2100 Using Three Sea-Level Rise Scenarios	Section 11
12-2 / H-19	Hazardous Materials Site Map, Santa Monica, California	Section 12
13-1	Airport Location Map	Section 13
13-2	Land Use Around Santa Monica Airport	Section 13
13-3	Airport Influence Zones, Santa Monica Airport	Section 13
13-4	Airport Noise Contours, Santa Monica Airport	Section 13

Note: Most of these maps were derived from publicly available sources. Care was taken in the creation of these maps, but the maps are provided "as is." Neither the City of Santa Monica nor Earth Consultants International can accept any responsibility for errors, omissions or positional accuracy, and therefore, there are no warranties that accompany these maps. Although information from land surveys may have been used in the creation of these maps, this does not mean that the maps represent or constitute a land survey. Users are cautioned to field verify the information on these products before making any decisions.

Vulnerability Assessment/Inventorying Assets

This is a combination of hazard identification with an inventory of the existing property development(s) and population(s) exposed to a hazard. The city of Santa Monica is built out, so new development, if and when it occurs, is in the form of infill or replacement of existing structures. Re-development provides an opportunity to build more seismically resistant structures, potentially with sustainable design components that make better use of existing resources, and that incorporate some of the new technologies aimed at reducing the impacts of ground shaking, wildfires, and climate change.

During the vulnerability assessment it is especially important to assess the expected performance of critical facilities. Critical facilities provide essential products and services to the general public that are necessary to preserve the welfare and quality of life, and fulfill important public safety, emergency response, and/or disaster recovery functions (additional information on critical facilities

is provided in a subsection below). The critical facilities in and near Santa Monica have been identified and are illustrated on Figure 3-1 and Plate H-3 (Appendix H).

It is important to realize that in the urban setting that defines Santa Monica and the surrounding Los Angeles metropolitan area, a large-scale disaster, such as an earthquake, reservoir failure or pandemic, will not be confined to corporate boundaries. Differences in the magnitude of the disaster, however, will be defined, potentially in great part, by how each city in the impacted area has prepared for, responds to, and recovers from the event. Thus, having a detailed plan (or plans) in place that addresses the specific vulnerabilities of the City, and provides mitigation measures that are implemented to reduce the hazard to critical facilities and other public and private properties, can make the community significantly more disaster-resistant. That is the main goal of this Plan.

Risk Analysis

The purpose of this task is to estimate the potential losses in a geographic area over a given period of time by assessing the damage, injuries, and financial costs likely to be sustained should a disaster occur. This level of analysis involves using mathematical models. The two measurable components of risk analysis are magnitude of the harm that may result and the likelihood of the harm occurring. Describing vulnerability in terms of dollar losses provides the community and the State with a common framework by which to measure the potential effects of a given hazard on the assets in the area.

Loss estimates for the city of Santa Monica were conducted for the hazards of earthquakes (Section 6), tsunami (Section 7), and floods (Section 8). Four earthquake scenarios, two tsunami scenarios, and two flooding scenarios were considered. These estimates were done using HazUS, a standardized methodology for earthquake loss estimation based on a geographic information system (GIS). HazUS was created as a project of the National Institute of Building Sciences, funded by the Federal Emergency Management Agency (FEMA), and it is based on guidelines and procedures developed to make standardized loss estimates at a regional scale (allowing estimates to be compared from region to region). HazUS is designed for use by State, regional and local governments in planning for loss mitigation, emergency preparedness, response and recovery. HazUS addresses nearly all aspects of the built environment, and many different types of losses. These HazUS components have been tested against the experience of several past disasters, and against the judgment of experts.

The other hazards addressed in this Plan were assessed either quantitatively where data were available, or lacking any data at all, qualitatively. For example, to estimate the costs associated with a windstorm event, the City researched and compiled costs incurred during previous recent past windstorm events, with an emphasis on the costs borne by the City to respond to and cleanup debris. These figures were incorporated into the report. A similar approach was used for the sections on landslides and hazardous materials, and to some extent for the coastal flooding section, as the City has been impacted in the past by these events. As part of its Local Coastal Program Land Use Plan, the City had previously estimated the costs of sea-level rise; those figures informed the sea-level vulnerability assessment presented in this Plan. Estimates of the current cost of the properties likely to be impacted by some hazards were also conducted using Crisis Track®, a GIS-based disaster management software that uses tax data to estimate the cost of structural damage in a disaster.

Costs associated with some regional hazards such as extreme heat events and drought are far more difficult to estimate. In these cases, the Plan discusses the impact that these hazards may have on

the community, and more significantly, on vulnerable populations, but does not provide dollar loss amounts.

Assessing Vulnerability/ Analyzing Development Trends

This task provides a general description of land uses and development trends within the community so that mitigation options can be considered in land use planning and future land use decisions. This Plan provides comprehensive description of the character of Santa Monica in the Community Profile section (see Section 2). This description includes the geography and environment, population and demographics, land use and development, housing and community development, employment and industry, and transportation and commuting patterns. Changes to the region that have occurred since the 2016 Plan was completed (and the 2010 Census considered in the 2016 Plan) are emphasized. Analyzing these components in Santa Monica can help identify areas where progress has been reported in the past decade, and potential problem areas that still need to be addressed and mitigated. The end results is that this analysis can guide the selection and prioritization of the action items considered for this five-year Plan, and their implementation and incorporation into other community development plans.

Hazard assessments are subject to the availability of hazard-specific data. Gathering data for a hazard assessment requires a commitment of resources on the part of the community being analyzed, in addition to participating organizations and agencies. Each hazard-specific section of the Plan includes a section on hazard identification using data and information obtained from City, County or State agency sources.

There are numerous strategies that Santa Monica can take to reduce risk. These strategies are described in the action items presented in Section 4, classified by hazard type and priority. Action items that address two or more hazards simultaneously are also presented in Section 4. Mitigation strategies can help reduce disruption to critical services, reduce the risk to human life, and alleviate damage to personal and public property and infrastructure.

CRITICAL FACILITIES AND INFRASTRUCTURE

Critical facilities are those parts of a community's infrastructure that must remain operational after a disaster. Critical facilities include hospitals, fire and police stations, emergency operation centers, communication centers, and schools, especially if used as shelters. A vulnerability assessment for these facilities involves comparing the locations of these facilities to the hazardous areas identified in the city. Critical facilities can be subdivided into several categories; those often considered in risk assessments include:

- **High-risk facilities**, if severely damaged, may result in a disaster far beyond the facilities themselves. Examples include power plants, dams and flood control structures, freeway interchanges, bridges, and industrial plants that use or store explosives, toxic materials or petroleum products. Although not located in the city of Santa Monica, catastrophic failure of Stone Canyon Dam would impact the eastern portion of the city, as discussed in Section 8.
- Facilities critical to **government response and recovery** activities (i.e., life safety and property and environmental protection) include: 911 (or public safety communications) centers, emergency operations centers, police and fire stations, public works facilities, sewer and

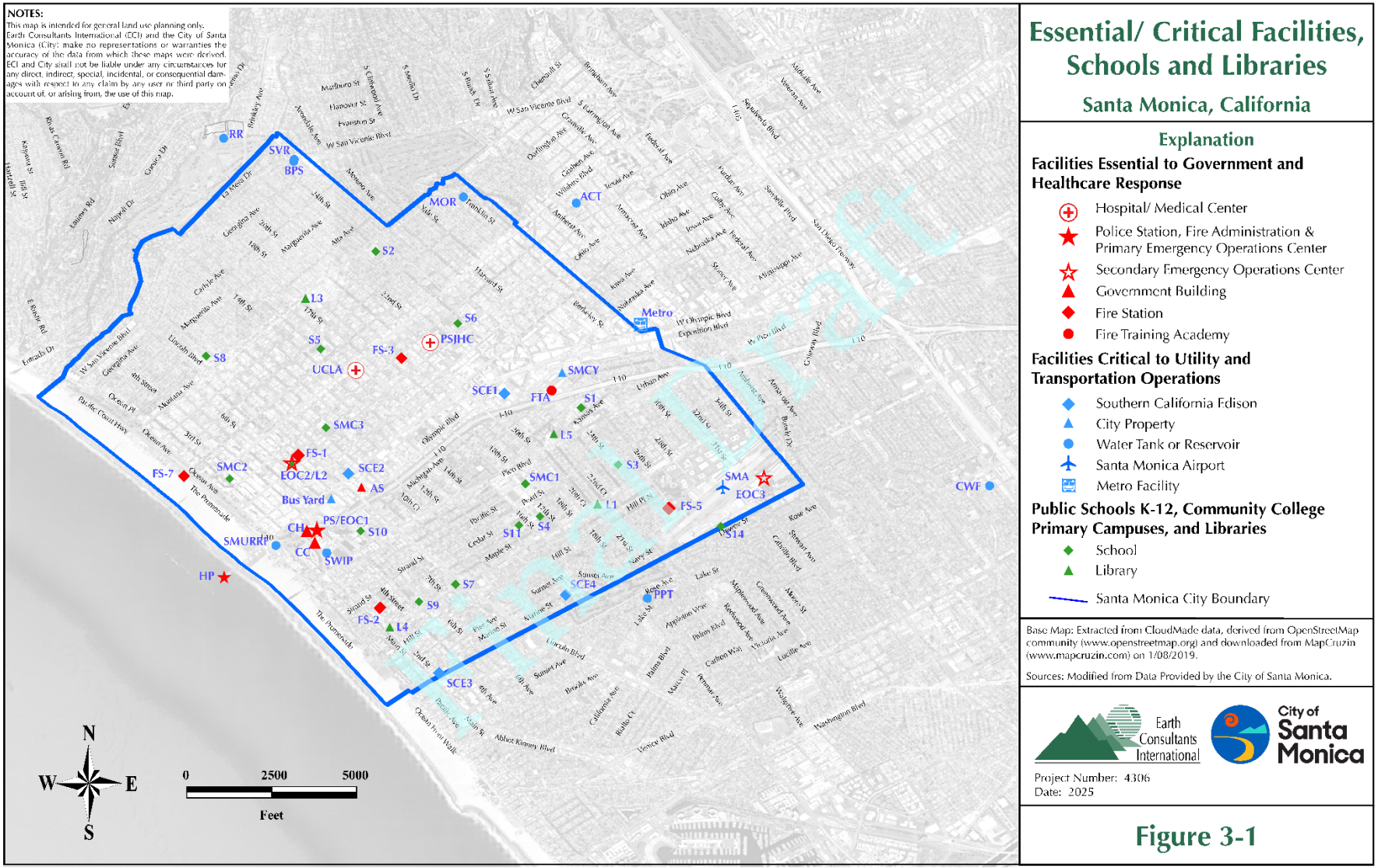
water facilities, hospitals, bridges and roads, and shelters. In the city of Santa Monica this category includes City Hall and City Hall East, Santa Monica Fire Department (SMFD) stations, the Santa Monica Public Safety Facility and Emergency Operations Center (EOC), Providence Saint John's Health Center, and Santa Monica UCLA Medical Center. Public schools and libraries in the city also play an essential role in the event of an emergency or natural disaster event as they can serve as temporary shelters, mobile command centers, public information hubs, family reunification centers, etc.

- **Lifelines** are those services that are critical to the health, safety and functioning of the community. They are particularly essential for emergency response and recovery after a disaster. Furthermore, certain critical facilities designed to remain functional during and immediately after a disaster, such as an earthquake, may be able to provide only limited services if the lifelines they depend on are disrupted. Lifeline systems include water, sewage, electrical power, communication, transportation (highways, bridges, railroads, and airports), natural gas, and liquid fuel systems. In Santa Monica, this would include the bridges and interchanges along Interstate 10 (I-10), the McClure Tunnel, Pacific Coast Highway, and the Moomat Ahiko Way. If any of these structures collapsed as a result of earthquake-induced strong ground shaking, or were obstructed by a large slope failure, traffic between the different areas of the city connected by these structures would be affected, if not completely cut-off, which would hinder access by emergency response vehicles. Casualties could also be expected if these structures collapsed. Other facilities in Santa Monica that also fall in this category include the Santa Monica Airport, the City Yards, the Arcadia Treatment Plant, the Big Blue Bus Yards, the City's water reservoirs, the Santa Monica Urban Runoff Recycling Facility, and the Sustainable Water Infrastructure Project.

Most of the critical and essential facilities listed above that are in or near the city of Santa Monica are shown on Figure 3-1. Other facilities that ideally also remain functional during and following a disaster, such as an earthquake, because of their potential impact on the community are listed below. These facilities are not included on Figure 3-1.

- **High-occupancy facilities** have the potential of resulting in a large number of casualties or crowd-control problems. This category includes high-rise buildings, large assembly facilities, and large multifamily residential complexes.
- **Dependent-care facilities**, such as preschools and schools, rehabilitation centers, prisons, group care homes, and nursing homes, house populations with special evacuation considerations.
- **Economic facilities** are those facilities that should remain operational to avoid severe economic impacts. These facilities include banks, archiving and vital record-keeping facilities, airports, and large industrial or commercial centers.

Figure 3-1: Essential / Critical Facilities In and Near Santa Monica (also refer to Plate H-3 in Appendix H)



FEDERAL REQUIREMENTS FOR RISK ASSESSMENT

Federal regulations for hazard mitigation plans outlined in 44 CFR Part 201 include a requirement for risk assessment. This requirement is intended to provide information that will help communities identify and prioritize mitigation activities that will reduce losses from the identified hazards. There are seven top-level natural hazards profiled in this Plan, including earthquakes (Section 6), tsunami (Section 7), floods (Section 8), landslides (Section 9), fires (Section 10), and severe weather and climate change (both addressed in Section 11). This Plan also addresses two human-caused possible hazards, namely hazardous materials releases (Section 12), and airport hazards (Section 13). Several of these hazards can occur simultaneously or consequentially, in what is referred to as a cascade (or cascading) event. Thus, for example, an earthquake could result in the accidental release of hazardous materials from damaged pipelines or overturned containers, and/or trigger several structure fires, and an intense precipitation event, such as that associated with an atmospheric river, could trigger the failure of a water retention structure that in turn would result in inundation of areas down-gradient.

The Federal criteria for risk assessment and information on how Santa Monica's Natural Hazard Mitigation Plan meets those criteria are outlined in Table 3-4 below.

Table 3-4 - Federal Criteria for Risk Assessment

Section 322 Plan Requirement	How is this addressed?
Identifying Hazards	The hazard sections (Sections 6 through 13) provide a description of the natural or human-caused events that could affect the Santa Monica area, and their potential impact on the city of Santa Monica. To the extent GIS data are available for these hazards, maps that identify the areas most likely to be impacted by each hazard have been developed for the City of Santa Monica. These Hazard Maps are listed in Table 3-1 and are included in Appendix H. Note that some potential hazards, such as windstorms, are not geographic-specific and thus cannot be mapped.
Profiling Hazard Events	Each hazard section (Sections 6 through 13) includes documentation on the history of past hazard events, and the causes and characteristics of the hazard in the city of Santa Monica and/or in the Los Angeles region.
Assessing Vulnerability: Identifying Assets	Where data are available, the vulnerability assessment for each hazard addressed in the mitigation plan includes an inventory of critical facilities within hazardous areas. Each hazard section provides information on vulnerable areas in the city and the impact that the hazard may have on vulnerable populations. Prioritized mitigation actions for these hazards are provided in Section 4.
Assessing Vulnerability: Estimating Potential Losses	The Risk Assessment Section of this Plan (Section 3) identifies key critical facilities and lifelines in the city and includes a map of these facilities. Vulnerability assessments have been completed for the hazards addressed in the plan. HazUS-based quantitative estimates were conducted for the earthquake (Section 6), tsunami (Section 7) and flood (Section 8) hazards. Estimates of the potential losses and costs to respond and/or recover from the remaining hazards (Sections 9 through 13) are based on quantitative data collected by the City for past events, or qualitative data if figures were not available.

Section 322 Plan Requirement	How is this addressed?
Assessing Vulnerability: Analyzing Development Trends	The Community Profile Section of this Plan (Section 2) provides a description of the city's geography and environment, and historical trends in the City's population and demographics, land use, housing and community development, employment and industry, and transportation and commuting patterns.

SUMMARY OF RISK ASSESSMENT FOR THE CITY OF SANTA MONICA

Local Disaster (or Hazard) Mitigation Plans such as this one are to evaluate the hazards that are most likely to impact the community for which the Plan is being prepared. There are many types of natural hazards, but not all apply to a given area. Earthquakes typically pose the greatest challenge because they occur with little or no warning, and can set into motion linked, cascading events that disrupt other natural and man-made hazards that also have the potential to cause damage to a community. Analysis conducted for this report shows that an earthquake on the section of the Santa Monica fault that extends through the city, combined with fault sections to the east and west, would cause significant damage to Santa Monica and the northern Los Angeles region. In most parts of the city, shaking will be severe, whereas in those areas within about ½ mile from the fault zone, ground shaking is expected to be violent. If the Santa Monica fault ruptures to the ground surface, the ground deformation will damage structures, streets, and utilities that straddle the fault traces.

An earthquake on the offshore section of the Palos Verdes fault in the Santa Monica Bay could also be a worst-case earthquake scenario for Santa Monica because, in addition to strong ground shaking, the earthquake could trigger a locally generated tsunami that could cause extensive loss of life along the beach. If this earthquake and tsunami event occur at a time when the beach is crowded with day visitors, the loss of life could be in the thousands. Both the Santa Monica and Palos Verdes fault earthquake scenarios discussed here, in addition to earthquakes on other nearby seismic sources, could trigger a sequence of events, including the unintentional release of hazardous materials, structure fires, and the catastrophic failure of water storage facilities.

Santa Monica is susceptible to several hazards other than seismic, although the consequences of these other hazards will be less regionally extensive. The risk that several of the hazards pose to critical facilities in and near Santa Monica are summarized in Table 3-5, below. Some of these hazards, like liquefaction, only occur in response to seismic shaking. Other hazards can be triggered by seismic shaking, but can also happen in response to some other causes, as described further below:

- Slope instability – which can occur in response to storms, human activities, or ground shaking
- Hazardous materials release – which can occur due to an accident on the I-10 or major roadways through the city, an intentional or unintentional release at one of the industrial or commercial facilities using or storing hazardous materials, or as a result of a flood event, inundation due to catastrophic failure of a water storage facility, seismic shaking, or earthquake-induced ground deformation (such as fault rupture, liquefaction, or landsliding), and

- Flooding – due to coastal storms, El Niño-related storms, atmospheric rivers, or the catastrophic failure of a water storage facility or debris basin.

Wildfires historically have not occurred in Santa Monica proper, but have occurred in the Santa Monica Mountains to the north, most recently within about 1/2 mile of the city. Some of the water storage facilities that supply water to Santa Monica are located in or near areas that could be impacted by wildfires. These facilities are identified in Table 3-5. Structure fires are not included in Table 3-5 because these can occur anywhere in the city, and typically can be contained to the structure of origin with prompt response from the SMFD. However, it is important to remember that an earthquake can be followed by structure fires ignited by fallen and arcing electric lines, gas leaks, chemical reactions, and toppled water heaters and other appliances. If several structure fires following an earthquake occur simultaneously throughout the city, these could quickly overwhelm the local fire department, especially if emergency response personnel are at the time engaged in their post-earthquake immediate assessment of critical facility damage. The SMFD's second priority following an earthquake is to respond to structural fires, and their third priority is to conduct search and rescue operations. Thus, search and rescue operations in the first few hours after a significant earthquake are usually conducted by neighbors and family members. Structure fires are particularly dangerous in heavily developed, older areas where buildings are most often not constructed of fire-resistant materials and are located close together.

Table 3-5 lists the following natural and man-made hazards: Ground shaking, surface fault rupture, liquefaction, tsunami, coastal flooding, dam inundation, slope instability, wildfire susceptibility, sea-level rise, potential exposure to hazardous materials, and exposure to airport hazards.

Table 3-5 does not include severe weather (e.g., strong Santa Ana winds) or hazards related to climate change as these are either regional in nature (e.g., drought, extreme heat, etc.) or localized in their impact but difficult to predict where they will strike (e.g., tornadoes). Strong winds, unlike earthquakes and flooding, occur often. Although high winds are regional in extent, damage as a result of high winds tends to be localized. The costs associated with wind damage are, on a per event basis, fairly small, but given their frequency of occurrence, over the long-term, costs associated with wind damage can add up. Similarly, the severe weather hazards of extreme temperatures and drought are regional in extent, but the damages tend to be localized.

As mentioned before, the costs associated with extreme temperature and drought events are hard to quantify. Given the regional impact of these events, communities may feel powerless to mitigate them. However, there are a variety of strategies that communities can implement to reduce or the impact that high or excessive heat and drought events may pose on their residents. Some of these potential mitigation actions are discussed in Section 11; specific actions that Santa Monica has chosen to implement in the next five-year cycle are listed in Section 4.

Natural hazard mitigation strategies can reduce the impacts concentrated at critical facilities and public infrastructure, in addition to large employment and industrial centers that provide the economic core of the region. Natural hazard mitigation for industries and employers may include developing relationships with emergency management services and their employees before disaster strikes, and establishing mitigation strategies together. Collaboration among the public and private sector to create mitigation plans and actions can reduce the impacts of natural hazards.

Explanation for abbreviations used in Table 3-5:

Y = Yes; N = No
S = Severe; **M** = Moderate; **m** = Minor

The entire Santa Monica area can experience ground shaking as a result of an earthquake on any of several regional faults; however, sites within ½ mile of the Santa Monica fault will experience severe ground shaking. These sites are identified with an "**S**" for Severe.

For reference to the various hazards included in this Table, refer to the hazards sections in Volume II and the figures therein. The regional extent of several of the hazards as it pertains to the city of Santa Monica is also highlighted in some of the plates included in Appendix H. Refer to Table 3-1 for a list of these figures and plates.

A site marked "**Y**" for Hazardous Materials is located within about ¼ mile of a facility that is listed as a Toxic Release Inventory (TRI) site or a large generator of hazardous materials, or is located within ¼ mile of the crude oil pipeline that extends through the city (see Section 12). Sites that have reported a leak (typically of fuel) from an underground storage tank are not considered a potential source of contamination to nearby facilities because the leak is confined to the underlying soil (and maybe groundwater) and as a result, is not expected to pose an inhalation or skin-contact hazard.

Sites marked with a "**Y**" for Airport Hazards are located in or within about ¼ mile of the runway protection zone, airport influence zone, or inner safety zone.

Some of the critical facilities are not located directly in an area susceptible to a given hazard, but are located nearby, and access to/from the facility could be hindered. For example, surface fault rupture, landslides, and dam inundation all have the potential to impact traffic patterns and hinder access to the hospitals that serve Santa Monica.

All properties and facilities in Santa Monica are susceptible to the effects of severe weather, including strong winds, extreme heat, and drought. The damages resulting from severe weather are expected to be significantly less than those resulting from an earthquake, however.

Table 3-4: Critical Facilities In and Near Santa Monica at Potential Risk from the Hazards Discussed in this Plan

Map Identifier	Critical Facilities, Schools and Libraries	Ground Shaking	Surface Fault Rupture	Liquefaction	Tsunami	Coastal Flooding	Dam Inundation	Slope Instability	Wildfire Susceptibility	Flooding due to Sea-Level Rise	Near Hazmat Site or Oil Pipeline	Airport Hazard
Facilities Essential to Government and Healthcare Response												
PS/EOC1	Police Station/Public Safety Facility/ Emergency Operations Center, 333 Olympic Drive	**Y**	N	N	N	N	N	**Y, m**	N	N	**Y**	N
EOC2/L2	Alternate Emergency Operations Center 2 at Main Library, 601 Santa Monica Boulevard	**Y**	N	N	N	N	N	N	N	N	**Y**	N
EOC3	Alternate Emergency Operations Center at SM Airport, 3223 Donald Douglas Loop South	**Y**	N	N	N	N	N	N	N	N	**Y**	**Y**
CH	City Hall & City Hall East, 1685 Main Street	**Y**	N	N	N	N	N	**Y, m**	N	N	**Y**	N
FS-1	Fire Station #1, 1337 7th Street	**Y**	N	N	N	N	N	N	N	N	**Y**	N
FS-2	Fire Station #2, 222 Hollister Avenue	**Y**	N	N	N	N	N	N	N	N	**Y**	N
FS-3	Fire Station #3, 1302 19th Street	**Y**	N	N	N	N	N	N	N	N	**Y**	N
FS-5	Fire Station #5, 2450 Ashland Avenue	**Y**	N	N	N	N	N	N	N	N	**Y**	**Y**
FS-7	Fire Station #7, 1100 Palisades Beach Rd	**Y**	N	**Y**	**Y**	**Y**	N	**Y**	N	**Y**	N	N
FTA	Fire Training Academy, 2500 Michigan Avenue	**Y**	N	N	N	N	N	N	N	N	**Y**	N
HP	Police Harbor Patrol, 402 Santa Monica Pier	**Y**	N	**Y**	**Y**	**Y**	N	N	N	**Y**	N	N
CC	Los Angeles County Court House, 1725 Main Street W	**Y**	N	N	N	N	N	N	N	N	**Y**	N
PSJHC	Providence Saint John's Health Center, 2121 Santa Monica Blvd.	**Y, S**	N	N	N	N	N	N	N	N	**Y**	N
UCLA	UCLA Santa Monica Medical Center, 1250 16th Street	**Y, S**	N	N	N	N	N	N	N	N	**Y**	N
AS	Santa Monica Animal Shelter, 1649 9th Street	**Y**	N	N				N	N	N	**Y**	N
Facilities Critical to Utility and Transportation Operations												
SMCY	Santa Monica City Yard, 2500 Michigan Avenue	**Y**	N	N	N	N	N	N	N	N	**Y**	N
ACT	Arcadia Treatment Plant, 1228 South Bundy Dr., Los Angeles	**Y, S**	**Y**	**Y, m**	N	N	N	N	N	N	**Y**	N
MOR	Mt. Olivette Reservoir, 924 Franklin Street	**Y, S**	**Y**	N	N	N	N	**Y**	**Y, m**	N	N	N
RR	Riviera Reservoir, 1252 Capri Drive, Pacific Palisades	**Y, S**	N	**Y**	N	N	**Y**	**Y**	**Y**	N	**Y**	N
SVR	San Vicente Reservoir, San Vicente Blvd. and 26th Street	**Y, S**	N	N	N	N	N	N	**Y, M**	N	**Y**	N
BPS	Booster Pump Station, San Vicente Blvd. and 25th Street	**Y, S**	N	N	N	N	N	N	**Y, M**	N	**Y**	N
CWF	Charnock Well Field/Treatment Plant, 11375 Westminster Avenue, Los Angeles	**Y**	N	N	N	N	Y	N	N	N	N	N
PPT	Penmar Park Tank, 1341 Lake St, Venice	**Y**	N	N	N	N	**Y, m**	N	**Y, m**	N	N	**Y**
SWIP	Sustainable Water Infrastructure Project 1771 Main Street (includes Advanced Water Treatment Facility)	**Y**	N	N	N	N	N	N	N	N	**Y**	N
SMURRF	Santa Monica Urban Runoff Recycling Facility, 1623 Appian Way	**Y**	N	N	N	N	N	**Y**	N	N	**Y**	N

Map Identifier	Critical Facilities, Schools and Libraries	Ground Shaking	Surface Fault Rupture	Liquefaction	Tsunami	Coastal Flooding	Dam Inundation	Slope Instability	Wildfire Susceptibility	Flooding due to Sea-Level Rise	Near Hazmat Site or Oil Pipeline	Airport Hazard
SCE1	Southern California Edison (SCE) Colorado Substation, 1721 22nd Street	**Y**	N	N	N	N	N	N	N	N	**Y**	N
SCE2	SCE Santa Monica Substation, 853 Colorado Avenue	**Y**	N	N	N	N	N	N	N	N	**Y**	N
SCE3	SCE Ocean Park Substation at 3110 2nd Street	**Y**	N	N	N	N	N	N	N	N	N	N
SCE4	SCE Facility at 1425 Marine Street	**Y**	N	N	N	N	N	N	N	N	N	**Y**
SMA	Santa Monica Airport, 3223 Donald Douglas Loop S	**Y**	N	N	N	N	N	**Y, m**	N	N	**Y**	**Y**
Bus Yard	Big Blue Bus Yards, 1620 6th Street & 612 Colorado Ave.	**Y**	N	N	N	N	N	N	N	N	**Y**	N
Metro	LA Metro Division 14 Facility, 1955 Centinela Avenue, Los Angeles	**Y**	N	**Y**	N	N	**Y**	N	N	N	**Y**	N
Public Schools K-12, Community College Primary Campuses, and Libraries												
S1	Edison Language Academy, 2402 Virginia Avenue	**Y**	N	N	N	N	N	N	N	N	**Y**	N
S2	Franklin Elementary, 2400 Montana Avenue	**Y, S**	Y	N	N	N	N	N	N	N	N	N
S3	Grant Elementary, 2368 Pearl Street	**Y**	N	N	N	N	N	N	N	N	N	N
S4	John Adams Middle, 2425 16th Street	**Y**	N	N	N	N	N	N	N	N	N	N
S5	Lincoln Middle, 1501 California Avenue	**Y, S**	N	N	N	N	N	N	N	N	**Y**	N
S6	McKinley Elementary, 2401 Santa Monica Blvd.	**Y, S**	N	N	N	N	N	N	N	N	**Y**	N
S7	Olympic High School, 1900 Pico Blvd.	**Y**	N	N	N	N	N	N	N	N	**Y**	N
S8	Roosevelt Elementary, 801 Montana Avenue	**Y, S**	N	N	N	N	N	N	N	N	**Y**	N
S9	Santa Monica Alternative School House (SMASH), 721 Ocean Park Blvd.	**Y**	N	N	N	N	N	N	N	N	**Y**	N
S10	Santa Monica High School, 601 Pico Blvd.	**Y**	N	N	N	N	N	N	N	N	**Y**	N
S11	Will Rogers Elementary, 2401 14th Street	**Y**	N	N	N	N	N	N	N	N	N	N
SMC1	Santa Monica College (SMC), Main Campus, 1900 Pico Blvd.	**Y**	N	N	N	N	N	N	N	N	**Y**	N
SMC2	SMC Bundy Campus, 3171 S. Bundy Drive, Los Angeles	**Y**	N	N	N	N	N	N	N	N	**Y**	N
SMC3	SMC Performing Arts Center, 1310 11th Street	**Y**	N	N	N	N	N	N	N	N	**Y**	N
L1	Fairview Branch Library, 2101 Ocean Park Blvd.	**Y**	N	N	N	N	N	N	N	N	**Y**	N
L2	Main Library, 601 Santa Monica Blvd.	**Y**	N	N	N	N	N	N	N	N	**Y**	N
L3	Montana Branch Library, 1704 Montana Ave	**Y, S**	N	N	N	N	N	N	N	N	**Y**	N
L4	Ocean Park Branch Library, 2601 Main Street	**Y**	N	N	N	N	N	N	N	N	**Y**	N
L5	Pico Branch Library, 2201 Pico Blvd.	**Y**	N	N	N	N	N	N	N	N	**Y**	N

SECTION 4: GOALS and MITIGATION ACTIONS

INTRODUCTION

The ultimate goal of Local Hazard Mitigation Plans is hazard mitigation. For the purposes of this study, this means a risk-based approach to reduce or eliminate, if possible, the long-term risk to life, property and infrastructure from natural and human-made hazards. Thus, a successful hazard mitigation strategy provides a mechanism by which, during the process of preparing for, responding to, and recovering from natural hazards, the community reduces its vulnerability to future hazard events. Historically, communities impacted by a natural or human-caused hazard will repair the damage and reconstruct to similar pre-disaster conditions. Such efforts may expedite the return to normalcy, but in the process engender a cycle of damage, reconstruction, and repeated damage. Hazard mitigation involves the implementation of actions that enable the community to not only respond effectively to a disaster, but to recover in such a way that the post-disaster repairs and reconstruction truly strengthen it. This Local Hazards Mitigation Plan Update outlines opportunities that the City of Santa Monica can use to increase the community's resiliency to future hazard events.

This section also provides information on the process used to develop the specific goals and action items aimed at reducing the impact of several hazards on the city of Santa Monica. The action items were developed after an in-depth review of the City's vulnerabilities and capabilities as described in Sections 2, and 6 through 13, and round-table discussions with the Resiliency Planning Committee.

HAZARD MITIGATION OVERVIEW

Many Federal, State and local programs have been implemented over the years to reduce losses created by natural and human-made hazards in the city of Santa Monica. Several of these programs are described in detail in the appropriate sections of the Plan–the reader is referred to Sections 6 through 13 for additional information. The following sub-sections refer to some of the most significant programs and regulations that have been developed to encourage or require communities to manage and reduce some of the most common and costliest natural hazards. Each sub-section also describes how these programs are being implemented in Santa Monica.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) was created by the U.S. Congress in 1968. Although a community's participation in the NFIP is voluntary, in order to receive assistance and funding from FEMA following a flood, the community must participate in the program. The City of Santa Monica has participated in the NFIP since 1983 (City ID No. 060159). Development in the flood prone areas of the city is regulated in accordance with Chapter 7.68 – Floodplain Management Regulations of the City's Municipal Code.

The Community Rating System (CRS), implemented in 1990, is a voluntary part of the National Flood Insurance Program (NFIP) that seeks to coordinate all flood-related activities, reduce flood losses, facilitate accurate insurance rating, and promote public awareness of flood insurance by creating incentives for a community to pursue beyond the minimum requirements of the NFIP. CRS ratings

are assigned on a nine-point scale, from 1 to 9, with 1 being the best rating. Residents who live within FEMA's Special Flood Hazard Areas (SFHAs) receive a 5% reduction in flood insurance rates for every one-point improvement in the community's CRS class. As a community engages in additional mitigation activities, its residents become eligible for increased NFIP policy premium discounts. The 2025 CRS Eligible Communities list includes Los Angeles County with a rating of 6 and City of Los Angeles with a rating of 7.

Beginning on April 1, 2022, FEMA began calculating NFIP flood insurance premiums using what they refer to as Risk Rating 2.0. This rating methodology calculates premiums for individual properties based on the property's specific flood risk rather than being assigned a general risk category. Premiums are now calculated based on specific features of an individual property, including distance from water, type of flooding, flood frequency, structure foundation type, height of the lowest floor relative to BFE, prior claims, and the structure's replacement cost value. An analysis of the impacts of the new premiums on properties in Santa Monica shows that approximately 286 properties saw no increase or a very small increase in their 2025 flood insurance premiums compared to 2024, 37 properties saw a decrease in their monthly premiums of between $10 and about $100, and about 12 properties saw an increase of between $10 and $60 in their monthly premiums.

A property is considered a repetitive loss (RL) property if it has incurred two or more flood-related claims exceeding $1,000 each, paid by the National Flood Insurance Program (NFIP) within any ten-year rolling period since 1978. As of December 9, 2024, FEMA's records of repetitive loss properties[1] in the city of Santa Monica suggest one single-family residence built in 1937 that is located in census block 060377014023 and SFHA VE has filed two claims of more than $1,000 each within a ten-year period, with the most recent claim dating from March 2, 1983. Based on these data, there are no properties in Santa Monica that have had a flood-related claim with FEMA in more than 50 years.

Senate Bill 1241 and Assembly Bill 38

At the State level, and to address the increasing losses associated with wildfires at the wildland-urban interface, Senate Bill 1241 (2012 Kehoe Statutes) requires that cities revising their Housing Element of the General Plan on or after January 1, 2014 also review and update their Safety Element to address the risk of fire in State Responsibility Areas and in very high (VH) fire hazard severity zones (FHSZs).

Santa Monica's 2021-2029 Housing Element was adopted by City Council on October 2022, with the adoption prompting the update of the City's Safety Element. The revised Safety Element was completed in August 2024, and adopted in February 2025. In January 2025, the region was impacted by the devastating Palisades fire, which burned to within about 350 feet of the city's northern boundary. Prior to this fire, the entire city of Santa Monica was not considered susceptible to wildfire hazards. In March 2025, CAL FIRE issued its Phase 4 maps reclassifying southern California's fire hazard severity. The new map for the Malibu-Santa Monica region places the northernmost portion of Santa Monica, generally north of Georgina Avenue, within a VHFHSZ, and another approximately 600-foot-wide swath parallel to the southern boundary of the VHFHSZ within a high FHSZ. The next about 600 feet south of that zone is now mapped as within a moderate FHSZ. These changes are

[1] Based on a review of the csv file from https://www.fema.gov/openfema-data-page/nfip-multiple-loss-properties-v1, accessed May 5, 2025.

discussed in Section 10, and the new mapping is shown both as Plate H-17 in Appendix H, and as Figure 10-4 in Section 10.

As a result of this new map, the provisions of Senate Bill (SB) 1241 (2012) and Assembly Bill (AB) 38 (2019) now apply to the northernmost portion of the city of Santa Monica. This means that the City now needs to address wildfire hazards and risks, adopt policies designed to address and reduce the risks associated with wildfires, and require disclosures during real-estate transactions. This is addressed in this Plan update (see Section 10 and the Action Items in this Section 4 that address fires in the very high FHSZ. The 2025 Safety Element update, in accordance with California Government Code (GC) § 65302.15, also identifies evacuation routes from the northern reaches of the city that local residents are encouraged to use in the event of a wildfire in that area.

Assembly Bill 2140

AB 2140 (2006) provides a financial incentive for local agencies to adopt a Local Hazard Mitigation Plan as a component of the Safety Element of their General Plan. The City of Santa Monica adopted its latest Safety Element of the General Plan in February 2025. The City will link this Local Hazard Mitigation Plan by reference to their 2025 Safety Element, especially since several of the policies in the Safety Element are included as action items in this document.

California Public Resources Code Chapter 7.5, Sections 7.5 and 7.8

These sections are also known as the Alquist-Priolo Earthquake Fault Zoning Act (Section 7.5) and Seismic Hazards Mapping Act (Section 7.8). The Alquist-Priolo Earthquake Fault Zoning Act (APEFZA) prohibits the placement of developments and structures for human occupancy (with certain exceptions) across the trace of Holocene-active[2] faults. The Seismic Hazards Mapping Act (SHMA) requires the identification and mapping of areas subject to the effects of strong ground shaking, liquefaction, landslides or other earthquake-related ground failure so that cities and counties can encourage land use management policies and regulations aimed to reduce or mitigate these hazards. The SHMA also indicates that the State Geologist may include information on the potential effects of tsunami and seiche for use by local governments if the data are available from other sources. Both acts require that the transferor or the agent for a transferor of real property located in either one or both zones disclose this fact to prospective buyers.

The City of Santa Monica requires fault investigations for all developments or re-developments of habitable structures, even of single-family residences if more than two-stories high, located within the State-mapped APEFZ. The City also requires that geotechnical studies of properties located within a State-mapped seismic hazard zone include an analysis for liquefaction or slope stability, as appropriate, with the report providing engineering solutions to mitigate these hazards. These hazards and requirements are discussed in more detail in Sections 6 (fault rupture, liquefaction) and 9 (landslides). Tsunamis are covered in Section 7.

Plan Components

Mission

The mission of the city of Santa Monica's Local Hazards Mitigation Plan is "to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the

[2] Holocene-active faults are faults that have moved at least once in the past 11,700 years.

environment from natural and human-made hazards."

This is being achieved by increasing public awareness, documenting the resources available for risk reduction and loss prevention, and identifying and implementing activities that will help the city of Santa Monica become a safer, more disaster-resilient and sustainable community.

Goals

The goals are stepping-stones between the broad direction of the mission statement and the action items. The Plan Goals help guide the direction of future activities aimed at reducing risk and preventing loss from natural hazards. Essentially, the goals provide a framework by which to promote sound public policy designed to protect the city's residents and visitors, the city's critical facilities and infrastructure, private property and the environment from the natural and human-made hazards recognized as most likely to impact the area. The goals listed here serve as checklist items that City staff, Council members and the public can refer back as City departments and other organizations begin implementing the action items. These goals have been prioritized by City staff, with the most important goal (protect life and property) listed first. Other goals include emergency services, public awareness, public participation, partnerships and implementation, and natural systems. Elements of each of these goals are described further below.

Protect Life and Property

- Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to natural and human-caused hazards.

- Reduce losses and repetitive damages from chronic (frequently recurring) hazard events while promoting insurance coverage for catastrophic hazards.

Emergency Services

- Establish policy to ensure that mitigation projects to strengthen critical and essential facilities, services, and infrastructure, where needed, are considered and prioritized.

- Coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations, plans and procedures.

- Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, businesses, industry, and residents.

Public Awareness

- Develop and implement educational and outreach programs that increase public awareness of the risks associated with natural and human-made hazards.

- Keep the public informed of hazard mitigation initiatives and activities through community meetings, local newspapers, the City's website, newsletters, utility bill inserts, and other similar media.

- Provide information on tools, partnership opportunities, and funding resources that can help

in the implementation of mitigation activities.

Public Participation

- Obtain input from City staff and the public when updating the Local Hazard Mitigation Plan and other similar efforts, including during the process of developing and prioritizing the Plan goals and action items and the assignment of responsibilities, taking into consideration the expected efficacy of the proposed action items and the proposed timelines.

Partnerships and Implementation

- Continue to foster communication and coordination among and within City departments, other agencies, residents, non-profit organizations, businesses, and industry so that there is a mutual, vested interest in participating in the implementation of the action items.

- Encourage leadership within public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.

Natural Systems

- Continue to balance the need to protect and manage the natural resources and areas in the city (such as the beach, sand dunes and the bluffs) with the need for hazard mitigation to protect lives and property, by reducing conflict that may arise between these two objectives.

- Whenever possible, preserve, rehabilitate, and enhance the natural systems in ways that also provide natural hazard mitigation functions.

Components of the Plan's Actions

The Actions are activities that City departments, in some cases in coordination with other organizations, businesses and residents, can implement to reduce risk. Each action item includes an estimate of the length of time it will take to implement. All action items identified by Santa Monica's multi-sector Resilience Planning Committee (RPC) are short-term, meaning that City staff hope to implement them within the next two to five years. Although optimistic, this aggressive schedule illustrates the City's strong desire to reduce several of its identified hazard vulnerabilities as soon as possible.

As discussed above, there are several mitigation activities mandated or recommended by Federal, State or local statutes that the City conducts on an on-going basis as part of its permitting and development processing. Those activities will continue to be implemented as they are an important component in the City's efforts to reduce its vulnerability to natural and human-made disasters. The action items identified for this 2025-2030 Plan that were identified by the RPC as being high priority, are discussed further below.

The action items are listed together to make this document as user-friendly as possible, with the goal of providing the reader and City staff in particular, with a concise document that clearly establishes the path the City has chosen to reduce its vulnerability to specific natural and human-made hazards over the next five-year period. It also allows the City departments and organizations identified as responsible for the implementation of the action items to see and manage their charges more effectively.

Note that several of the action items identified address several hazards at once, and thus fall under the Multi-Hazard (MH) umbrella. Because cities typically have limited funding and staffing resources that constrain the effective implementation and management of mitigation actions, MH action items are typically more attractive than those that only address one hazard, with MH action items more likely to be implemented first. Limited financial resources often also force jurisdictions and agencies to review and select the most cost-effective mitigation projects first, in essence prioritizing mitigation projects by their return on investment. The challenge is to maintain a balance between mitigating projects that can be implemented readily and for a relatively small amount of money, with longer-term projects that cost more but have the potential to more significantly reduce the City's vulnerability to natural hazards. These realities should be kept in mind as the City works through its planned implementation of the action items identified.

LHMP activities may be considered for funding through Federal, State and private grant programs, and when other funds are made available through the City. To help ensure activity implementation, each action item includes information on the City department(s) or division(s) responsible for developing, implementing, and managing that activity. Upon implementation, the implementing department or division may look to partner with other organizations for resources and technical assistance. A description of possible partner organizations is provided in Appendix A, the Resource Directory of this Plan.

Many of the action items included here mirror or complement the policies in the City's 2025 Safety Element of the General Plan and the City's Municipal Code, but wherever possible, have been written to be more specific in that they identify the coordinating organization, timeline for implementation, goal(s) being addressed, and potential constraints, in accordance with FEMA's requirements. 2025 Safety Element policies mirrored in the LHMP action items are also identified. In the Safety Element, the policies are not prioritized, and are typically not assigned to a specific department. Other action items herein were developed by the RPC in response to the data collection and research process whereby specific concerns were identified, as a result of input from City departments during meetings of the RPC, or in response to input from the public during the public participation process. Mitigation actions specific to wildland fire were developed in response to the 2025 Palisades fire and input received at that time from residents and other stakeholders in the city.

Coordinating Organization

The coordinating organization is the City department, division, or other agency that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Coordinating organizations may include City departments, and/or other local or regional agencies, and private entities that are capable of, or responsible for, implementing activities and programs.

Timeline

Action items typically include both short- and long-term activities. The City of Santa Monica has identified mostly short-term actions to be implemented in the next five years, through 2030. Each action item includes an estimate of the timeline for implementation as provided by members of the Plan's RPC.

Plan Goals Addressed

The Plan goals addressed by each action item are included as a way to monitor and evaluate how well the Hazards Mitigation Plan is achieving its goals once implementation begins.

Constraints

Constraints to the immediate implementation of the action items are typical, usually because of limited resources, as described further below. Constraints may include a lack of City staff to do the work, lack of funds, vested property rights that might expose the City to legal action as a result of adverse impacts on private property, or as a result of other similar economic, political, social or legal reasons.

It is important to note that the City of Santa Monica's General Fund has funding limitations based on existing constraints, existing City liabilities, and reductions in travel tax revenue. Currently, there is greater uncertainty on Federal grant funding and the organization of agencies that administer funding. Funding sources may be reduced, withheld, or eliminated. Projects are also dependent on City staff's availability to work on these projects, which can be strained during periods of staffing turnover or when emergencies or unexpected events occur and staff time and resources are refocused on preparation, response and recovery activities (as an example, the COVID-19 pandemic or recent Palisades fire). City staff who primarily oversee hazard mitigation projects are also expected to take on a large amount of work to safely execute major special events in the next five (5) years, including the 2026 FIFA World Cup and the 2028 Olympics.

PRIORITIZATION PROCESS

After the consultant gave a presentation to the Resilience Planning Committee (RPC) describing the hazards, risks, and vulnerabilities that were identified as part of the LHMP preparation process[3], the committee members were asked to divide into several smaller groups. The groups were loosely formed based on area of expertise (i.e., firefighters together, engineers from building safety and public works together, environmental planners together, etc.). Each group was asked to identify potential mitigation actions that address the hazards that they most closely aligned with based on their background and role at the City, with the action items designed to specifically address the vulnerabilities identified during the risk assessment.

The members of the RPC were asked to keep in mind the following requirements as they prepared their proposed action items:

- The Plan must include a wide, comprehensive range of action items or projects, and the action items must cover a wide range of the Plan goals, as discussed above
- Every action item needs to identify who the responsible agency will be (no orphan actions allowed)
- Where possible, potential funding sources need to be identified
- Potential constraints to the funding and overall implementation of the action item need to identified and discussed

[3] The PowerPoint presentations and additional information regarding these workshops, meetings, and participants are all contained in Appendix B.

- Every action item should have generalized timeline of its implementation, either as ongoing, short- and long-term, or as the calendar year when ideally the action item has been deployed and/or completed
- Potential action items should include activities designed to alleviate the long-term risk from climate change, and should also be sensitive to or benefit underserved communities in the city
- To identify appropriate action items and establish their priority, the RPC members were asked to refer to the STAPLEE (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) process (see Tables 4-1 and 4-2). Although the specific grading scheme recommended by the STAPLEE process was not used, RPC members were encouraged to consider the criteria listed in Table 4-2 as they qualitatively weighted the action items proposed.

Table 4-1: Elements of the STAPLEE Process

SOCIAL	Community Acceptance			Effect on Segment of Population	
TECHNICAL	Technical Feasibility		Long-term Solution		Secondary Impacts
ADMINISTRATIVE	Staffing		Funding Allocated		Maintenance/Operations
POLITICAL	Political Support		Local Champion		Public Support
LEGAL	State Authority		Existing Local Authority		Potential Legal Challenge
ECONOMIC	Benefit of Action	Cost of Action	Contributes to Economic Goals		Outside Funding Required
ENVIRONMENTAL	Effects on Land/Water	Effect on Endangered Species	Effect on HAZMAT / Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws

Table 4-2: Criteria to Consider as part of the STAPLEE Process

CRITERIA	SPECIFIC IMPACT	Specific QUESTIONS to Consider for EACH IMPACT
Social	Acceptance	Is the action perceived as socially acceptable to a wide segment of the population?
	Effect on Segment of Population	Is the action item likely to impact (positively or negatively) a particular segment of the population?
Technical	Feasibility	Is the action feasible given our current knowledge or science?
	Long-Term Solution	Is implementation of this action going to reduce the hazard permanently?
Administrative	Staffing	Is there staff currently at the City doing this work? Does it involve 1 person, or more?
		Is there staff currently at the City doing this work? Does the City need to hire someone to get the work done?
	Funding allocated	Is there funding currently allocated? Is the funding available sufficient to do the work without cutting corners?
	Maintenance	Does this action require constant maintenance and upgrade?
Political	Public support	Is the action going to be popular with the public?
	Political support	Is the action going to be popular with the Mayor and City Council?
Legal	State authority	Is there a State mandate or a recommendation to have this done?
	Local authority	Is there a local mandate or recommendation to implement this action

CRITERIA	SPECIFIC IMPACT	Specific QUESTIONS to Consider for EACH IMPACT
	Possible legal action?	Is this action likely to get challenged in court?
Economic	Benefit	What are the economic benefits of implementing this action?
	Cost	What are the economic costs of implementing this action?
	Outside Funding	Is there outside funding available to implement this action?
Environmental	Impacts on Environment (Land, Water, Endangered Species, etc.)	Does this action have a positive or negative impact on the environment?
	Consistent with Community's Environmental Goals	Is the proposed action consistent with the City's environmental goals?

RPC members were also asked to consider and include if at all feasible, several requests made by members of the community who had participated in the public workshops and surveys. Items on this list included:

- Information and training on:
  - Insurance coverage and availability
  - Preparing neighborhoods help themselves
  - Disaster preparedness for earthquake, fire, airplane crash, cyberattack, terrorist attack, armed shooter, emergency kits
- Distribution of supplies (hazard kits, water, battery backups)
- Increased and recurrent communication on disaster preparedness
- Increased enforcement and assistance with seismic retrofits
- Upgrade / retrofit utilities, infrastructure
- Enact legislation making air conditioning mandatory in multi-residential buildings
- Invest on measures to help City be more extreme-heat resistant
- Improve street safety (more street lights, clear sidewalks, discourage loitering, manage crime)
- Food resiliency programs, such as community gardens

The potential action items identified by these breakout groups were compiled, and organized into major categories based on project type, as follows:

- Local Planning
- Local Assessment and Regulations
- Structure and Infrastructure
- Natural Systems Improvements
- Education and Awareness Programs, and
- City Readiness Initiatives

The potential action items identified by the RPC are summarized in Table 4-3 below.

Table 4-3: Complete List of Action Items Developed by the Resiliency Planning Committee

Category	Summarized Potential Action Item	Abbreviation
Local Planning	**Water deconfliction planning**: Identify strategies for immediate and long-term local potable water services during disaster events; identify strategies to prioritize water usage during emergencies.	**LP-1**
	Cooling/heating center plan: Develop plan and operational requirements to activate cooling/heating centers during extreme weather events.	**LP-2**
	Evacuation plan and route plans: Evaluate multi-modal citywide evacuation procedures and create a citywide evacuation plan to implement evacuation procedures during emergency events.	**LP-3**
	Santa Monica Airport (SMO) space design: In the planning of the SMO space, ensure that emergency preparedness, mitigation and response features are included.	**LP-4**
	Stone Canyon Dam (SCD) plan and outreach: Create Citywide response plan for inundation due to failure of SCD, including educating residents within inundation zone.	**LP-5**
Local Assessment and Regulations	**Resilient City facility design standards:** Implement and enhance design standards for City-owned and/or City/tenant-operated facilities to make them more disaster-resilient. Prioritize seismic retrofits.	**LAR-1**
	Targeted building code standards: Implement City building code requirements for critical and essential facilities to improve post-disaster operations.	**LAR-2**
	Wildfire assessment: Conduct further assessment on Santa Monica wildfire hazards and risk to determine if future building code or other regulations should be recommended.	**LAR-3**
	Building heating/cooling requirements: Explore health and safety standards for indoor and outdoor workers and residential properties to reduce injury/illness to residents during wildfire and extreme weather events.	**LAR-4**
	Evacuation route street standards: Examine/implement street standards for properties along evacuation routes and other evacuation requirements such as street parking restrictions, valet requirements, emergency vehicle access, etc.	**LAR-5**
	Santa Monica bluff and I-10 freeway slope mitigation: Continue to inspect and monitor bluff and I-10 freeway slope stability. Where necessary, implement actions to mitigate land instability, especially during rain and seismic events.	**LAR-6**
Structure and Infrastructure	**Back-up utilities:** Identify and create program to implement critical utility back-up systems at City facilities and essential/emergency community facilities, including microgrids, solar + storage, and other back-up sustainable utility resources.	**SI-1**
	Tsunami alarm system: Implement siren warning system to alert public to evacuate Santa Monica beaches, Pier and low-lying areas in the event of tsunami warning or imminent threat, such as coastal inundation or landslide.	**SI-2**
	Water infrastructure seismic assessment: Examine water system resistance to local seismic hazards, especially water infrastructure that crosses potential liquefaction zones and mapped traces of projections of the Santa Monica fault. Consider retrofitting older water pipelines and other strategies to address seismic vulnerabilities.	**SI-3**

Category	Summarized Potential Action Item	Abbreviation
	Traffic/street light improvements: Harden street and traffic light infrastructure to prevent copper theft and resulting power disruptions.	**SI-4**
Natural Systems Improvements	**Natural dune restoration:** Continue to expand Natural Dune Beach restoration project to protect beaches and beach-front properties from erosion, sea level rives, and coastal flooding.	**NSP-1**
	Food resilience through community gardening: Increase production of food grown and donated from City-owned community gardens to local organizations to increase food resilience of vulnerable Santa Monica residents.	**NSP-2**
Education and Awareness Programs	**Inclusive emergency communications:** Conduct emergency response, mitigation, and preparedness outreach in multiple languages to better reach diverse Santa Monica communities, including international tourists.	**EAP-1**
	School hazard mitigation education: Explore continuing or expanding SMMUSD's Project Based learning program on natural hazards at public school venues.	**EAP-2**
	Business and partner liaison program: Develop program/training for City emergency partners to serve as Emergency Operations Center liaisons or activate/organize a business operations center to address and communicate post-disaster needs.	**EAP-3**
City Readiness Initiatives	**Mitigation funding**: Explore and identify sustainable way to fund long-term City mitigation projects, including preventative maintenance programs.	**CRI-1**
	Grant process improvement: Expand Citywide staffing resources and capacity to identify potential grant funding and write/implement/monitor grant-funded projects.	**CRI-2**
	Expand critical emergency management technologies: Expand City GIS mapping, staffing, training, and tools to better facilitate emergency planning and response activities, including use of public education/communications.	**CRI-3**
	City department education: Implement regular education for City personnel on California Disaster Service Worker requirements and City department response plans.	**CRI-4**
	Cyberterrorism assessment: Conduct assessment to determine vulnerabilities and risk cyberterrorism impacting City critical infrastructure.	**CRI-5**

Following the workshop, the link to an online questionnaire including all identified potential actions was sent to all the members of the RPC. Each member was asked to rank the action items under each category based on perceived priority, with a value of one (1.0) indicating highest priority. The results of this effort were compiled, and the average priority value (and standard deviation from the average) for each action item was calculated. The results of this analysis are summarized in Table 4-4. The values used to classify the action items under each of the six categories as either high, medium or low priority are provided in Table 4-4, with the action items under each project type category with the lowest average values (closest to 1.0) were identified as top priorities. For the most part, all action items were identified as either high or medium priority. The relatively large standard deviations indicate that there were considerable differences in opinion among the RPC members as to which action items should be top priority, which is to say that all action items considered are deemed to have a high priority by a subset of the committee.

Table 4-4: Action Item Prioritization Results

Mitigation Action	Average (Standard Deviation)	Priority Ranking
Local Planning (High: 1.0-2.33; Medium: 2.34-3.63; Low: 3.64-5.0)		
Water deconfliction (LP-1)	1.61 (0.96)	High
Cooling/heating centers (LP-2)	3.07 (1.27)	Medium
Evacuation plans (LP-3)	2.11 (1.13)	High
SMO space design (LP-4)	3.25 (1.29)	Medium
SCD plan and outreach (LP-5)	3.28 (1.27)	Medium
Local Assessment and Regulations (High: 1.0-2.66; Medium: 2.67-4.33; Low: 4.34-6.0)		
Resilient City facility (LAR-1)	2.11 (1.03)	High
Targeted building code standards (LAR-2)	2.89 (1.42)	High
Wildfire assessment (LAR-3)	3.68 (1.70)	Medium
Building heating/cooling requirements (LAR-4)	3.68 (1.67)	Medium
Evacuation route street standards (LAR-5)	3.04 (1.71)	Medium
Santa Monica bluff and I-10 slope mitigation (LAR-6)	2.11 (1.29)	High
Structure and Infrastructure (High: 1.0-2.0; Medium: 2.0-3.0; Low: 3.0-4.0)		
Back-up utilities (SI-1)	1.68 (0.82)	High
Tsunami alarm system (SI-2)	2.71 (1.12)	Medium
Water infrastructure assessment (SI-3)	1.39 (0.5)	High
Traffic/street light improvements (SI-4)	2.68 (0.90)	Medium
Natural Systems Improvements (High: 1.0-1.3; Medium: 1.31-1.66; Low: 1.67-2.0)		
Natural dune restoration (NSP-1)	1.39 (0.5)	Medium
Food resilience through community gardening (NSP-2)	1.71 (0.46)	Low
Education and Awareness Programs (High: 1.0-1.66; Medium: 1.67-2.33; Low: 2.34-3.0)		
Inclusive emergency communications (EAP-1)	1.46 (0.58)	High
School hazard mitigation education (EAP-2)	2.14 (0.76)	Medium
Business and partner liaison program (EAP-3)	1.93 (0.77)	Medium
City Readiness Initiatives (High: 1.0-2.33; Medium: 2.34-3.63; Low: 3.64-5.0)		
Mitigation funding (CRI-1)	1.92 (0.90)	High
Grant process improvement (CRI-2)	3.14 (1.35)	Medium
Expand emergency management technologies (CRI-3)	1.82 (1.02)	High
City department education (CRI-4)	3.0 (1.47)	Medium
Cyberterrorism assessment (CRI-5)	2.54 (1.40)	Medium

Given these findings, generally those action items identified as top priorities under each category were selected as action items to be implemented in the next five (5)-year cycle, by 2030, and are included in the final list of action items in Table 4-5. In response to the Palisades fire and the new requirements from the State, some new action items not originally considered by the PRC that are specific to the management of wildfire hazards were added to the list also.

2025-2030 HAZARD MITIGATION ACTIONS

Table 4-5 lists the hazard mitigation actions that the City of Santa Monica has chosen to implement in the next five (5) years, through 2030. For each action item the City has identified the City division(s) responsible for implementation, and the main point of contact at that division. Potential funding sources are also identified, followed by the desired timeline for implementation. The last two columns in Table 4-4 identify which goals are being addressed by each specific action item, and the Safety Element policies that are being addressed, respectively. The following abbreviations, arranged in alphabetical order, are used to identify the City departments identified as responsible for implementation.

CDD	Community Development Department
CMO	City Manager's Office
DOT	Department of Transportation
ISD	Information Services Department
OEM	Office of Emergency Management
OSE	Office of Sustainability & the Environment
PW	Public Works
SMPD	Santa Monica Police Department
SMFD	Santa Monica Fire Department

Table 4-5: Hazard Mitigation Actions, City of Santa Monica

Action Item	Responsible Division and Division Point of Contact	Potential Funding Source(s) and Constraints	Timeline	Plan Goals Addressed	Complementary Safety Element Policies
Local Planning					
Water Deconfliction Planning Identify strategies for immediate and long-term local potable water services during disaster events, such as seismic events, wildfire or drought. Identify water deconfliction strategy to prioritize water usage during emergencies (i.e. recreational pools vs firefighting needs).	PW/ Water Resources Sunny Wang	Water fund	2026	Protect life and property Emergency services Public awareness	Policy 1.1 Policy 1.3 Policy 1.9
Evacuation and Route Planning Evaluate multi-modal citywide evacuation routes identified by the City's revised Safety Element and create a citywide evacuation plan for emergency events, such as a tsunami, dam inundation or wildfire. Plan to include evacuation considerations for persons with access and functional needs, including those without access to private transportation, and persons living in assisted living and high-rise buildings. Publicize to the community.	CMO / Office of Emergency Management (OEM), DOT, SMPD Lindsay Call	General fund Constrained by available staff capacity across departments for planning and implementation	2026	Protect life and property Emergency services Public awareness Partnerships and implementation	Policy 6.1 Policy 6.3
Santa Monica Airport Space Design In the planning of the Santa Monica Airport space, ensure that emergency preparedness, mitigation, and response features are included, such as the storage of disaster cache supplies and space for emergency operations (owned/operated and available for use by public safety departments).	PW / Architectural Services Amber Richane	General fund; park impact fees; future grant opportunities Constraints include limited available space; balancing community needs	2029	Emergency services Public awareness Partnerships and implementation	Policy 6.2 (Action 6.2.9)
Local Assessment and Regulation Projects					
Santa Monica Bluffs and I-10 Freeway Slope and Brush Fire Mitigation Continue to inspect and monitor Santa Monica bluffs and I-10 Freeway slope stability and brush overgrowth. Where necessary, implement actions needed to mitigate land instability, especially during rain and seismic events, and clear brush and other debris to mitigate brush fires.	PW/ Engineering, SMFD / Fire Prevention Alex Nazarchuk, Joe Cavin	General fund; Local return Constrained by available funding; available staff capacity for implementation	2030	Protect life and property Emergency services Partnerships and implementation Natural systems	Policy 1.6
Red Flag Warning Restrictions Implement policy that during any Red Flag Warning, restrictive measures will be implemented to reduce fire ignition opportunities and facilitate rapid first responder response activities. Restrictions to be considered include, but are not limited to, parking restrictions in very high hazard zones and evacuation routes, leaf blower bans, and construction activity bans.	SMFD / Fire Prevention, CMO / OEM Joe Cavin, Lindsay Call	Existing funds? Constrained by available staff capacity for policy development; available staff capacity for enforcement	2026	Protect life and property Emergency services Public awareness Public participation Partnerships and Implementation	Policy 2.1 Policy 2.2 Policy 6.3
Resilient City Facility Design Standards Implement and enhance a set of design standards for City-owned and/or City/tenant-operated facilities to make facilities more disaster-resilient, both to ensure their operability post-disaster and protect occupants. Prioritize seismic retrofits of public infrastructure and facilities to minimize potential damage, ensure protection of vulnerable populations, and continuity of government operations.	PW /Architectural Services Amelia Feichtner	General Fund; future grant opportunities Constrained by available funding; available staff capacity for implementation	2028	Protect life and property Emergency services Public awareness Partnerships and Implementation	Policy 1.1 Policy 1.2 Policy 1.3 Policy 1.9 Policy 6.1 Policy 6.2
Structure and Infrastructure Projects					
Water Infrastructure Seismic Assessment Examine water system resistance to local seismic hazards, especially water infrastructure that crosses potential liquefaction zones and areas where traces or projections of the Santa Monica fault have been mapped. Consider retrofitting older water pipelines and other strategies to address identified seismic vulnerabilities.	PW / Water Resources Sunny Wang	Water fund, future grant opportunities Constrained by available funding	2029	Protect life and property Emergency services Public awareness	Policy 1.1 Policy 1.9

Action Item	Responsible Division and Division Point of Contact	Potential Funding Source(s) and Constraints	Timeline	Plan Goals Addressed	Complementary Safety Element Policies
Back up Utilities Identify and create program to implement critical, utility back-up systems at City facilities and essential/emergency community facilities, including but not limited to microgrids, solar + storage, and other back-up, sustainable utility resources	PW / Architectural Services Amelia Feichtner	Future grant opportunities Constrained by lack of current funding	2030	Protect life and property Emergency services Partnerships and implementation	Policy 1.9 Policy 4.1 Policy 6.2
Tsunami Alerting System Implement overhead paging at Santa Monica Pier with ability to provide tsunami alerts and evacuation directions. Complete assessment of other communications tools, such as, but not limited to digital kiosks and siren systems, to widely distribute tsunami education and imminent threat alerts and warnings along Santa Monica's coastal areas. Regularly test communications systems during earthquake/tsunami preparedness events, like the annual California ShakeOut Drill, California Tsunami Awareness Week, and World Tsunami Awareness Day.	OEM, SMPD, CDD Lindsay Call	Future grant opportunities Constrained by staff availability and capacity for implementation; Coastal Commission and neighboring jurisdictions participation; available funding	2027	Protect life and property Emergency services Public awareness Public participation Partnerships and implementation	Policy 6.2 Policy 6.3
Natural Systems Improvement Projects					
Natural Dune Restoration Expansion To protect beaches and beach-front properties from erosion, sea level rise, and coastal flooding, continue to expand and maintain the Natural Dune Beach Restoration projects. By the end of 2029, the goal would be to have at least 50 acres of established beach dunes.	PW / OSE Shannon Parry	Grants awarded to partner agencies (Bay Foundation) Constrained by approvals from outside organizations (Coastal Commission, U.S. Fish & Wildlife); staff capacity for maintenance; community education	2029	Protect life and property Public awareness Public participation Partnerships and implementation Natural systems	Policy 4.1 (Action 4.1.7)
Food Resilience Through Community Gardening Increase production of food grown and donated from City-owned community gardens to local organizations to increase food resilience of vulnerable Santa Monica residents through the expansion of additional community garden space.	PW / OSE Shannon Parry	Grants, park impact fees, CDBG funds Finding suitable land available for the expansion of the Community Garden program; the need for additional staffing to properly manage the expanded program	2029	Public awareness Public participation Partnerships and implementation Natural systems	
Education and Awareness Programs					
Inclusive Emergency Communications Conduct emergency response, mitigation, and preparedness outreach in multiple languages to better reach diverse Santa Monica communities, including international tourists and persons with access and functional needs. Create standards for emergency response messaging to ensure it meets standards in City's Language Access Administrative Instruction.	CMO / OEM, Administration Lindsay Call	Private and state grant funding Available funding, grant instability, available staff capacity for implementation	2027	Emergency services Public awareness Public participation	Policy 6.3
Local Wildfire Safety Education Develop education campaign on mandatory wildfire safety practices, such as defensible space standards and wildland urban interface building codes, required for areas of Santa Monica within the 2025 State-identified Very High Fire Hazard Severity Zones.	SMFD/ Fire Prevention Joe Cavin	General fund, private/state grant funding Available funding, grant instability	2027	Public awareness Public participation	Policy 2.1 Policy 6.2 Policy 6.3
City Readiness Initiatives					
Expand Critical Emergency Management Technologies Expand City GIS mapping, staffing, training, and tools to better facilitate emergency planning and response activities, including use of public education/communications. Expand on cloud infrastructure, data servers, and staffing to support the implementation, execution, and maintenance of critical technologies to support first responders. Continue adopting evacuation mapping technology to improve awareness of city evacuation zones, hazard areas, and assist with the prompt implementation of evacuation and shelter-in-place directions during emergencies.	ISD, CMO, SMFD, SMPD, PW Lindsay Call. Prasanna Joshi	General fund Available funding, available staff capacity for implementation	2028	Emergency Services Public awareness Public participation Partnerships and implementation	Policy 6.1

ADDITIONAL RESOURCES HELPFUL DURING THE IMPLEMENTATION PROCESS

As the City begins to implement the action items selected, they can further evaluate the benefit-cost analysis (BCA) of a specific action using the FEMA-provided Project Evaluation Worksheet included at the end of this section (Table 4-6). This worksheet is based on the "STAPLEE" process, whereby the benefits of a given proposed action are weighed against the costs of implementing it (see Tables 4-1 and 4-2). The data on these worksheets can help the RPC determine the most cost-effective mitigation solutions for the community. Depending on the source of the funding used to implement these actions, some projects may need a more detailed BCA, but this worksheet provides a first-screening methodology.

FEMA also requires local governments to analyze the benefits and costs of a range of mitigation actions that can reduce the effects of each hazard within their community. BCA is used in hazard mitigation to evaluate whether the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting a BCA for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related losses later. The analysis is based on calculating the frequency and severity of a hazard, avoided future damage, and risk.

The BCA review must be comprehensive to the extent that it can evaluate the monetary and non-monetary benefits and costs associated with each action. Thus, the BCA should at least consider the following questions:

1. How many people will benefit from the action?
2. How large is the area that would be impacted?
3. How critical are the facilities that benefit from the action?
4. Are there any environmental constraints associated with the action, and if so, is the overall benefit to the community greater than the environmental costs?

Additional information regarding the BCA methodology and resources is provided in Appendix C.

Table 4-5: Project Evaluation Worksheet

Jurisdiction:				Contact:							
Project Title				Phone:							
Agency:				E-mail:							
Hazard(s):											
Flood Zone:		Base Flood Elevation:		Erosion Rate:							
Critical Facility/Population At Risk:											
Environmental Impact:						Historic Preservation Impact:					
High		Medium		Low		High		Medium		Low	
Importance to Protection of Life/Property and Disaster Recovery						Risk of Hazard Impact:					
High		Medium		Low		High		Medium		Low	
Estimated Cost:						Project Duration:					
Value of Facility:						Value of Contents:					
Source(s) of Financing:											
Project Objectives:											
Project Description:											
Proposal Date:											

Evaluation Category	Considerations	Comments
Social	Community Acceptance	
	Adversely Affects Segments of the Population	
Technical	Technical Feasibility	
	Long Term Solution	
	Secondary Impacts	
Administrative	Staffing	
	Funding Allocated	
	Maintenance / Operations	
Political	Political Support	
	Plan Proponent	
	Public Support	
Legal	Authority	
	Action Subject to Legal Challenge	
Economic	Benefit	
	Cost of Action	
	Contributes to Economic Goals	
	Outside Funding Required	
Environmental	Affects Land / Water Bodies	
	Affects Endangered Species	
	Affects Hazardous Materials and Waste Sites	
	Consistent with Community Environmental Goals	
	Consistent with Federal Laws	

SECTION 5: PLAN MAINTENANCE

The plan maintenance section of this document details the formal process that will ensure that this Hazards Mitigation Plan remains an active and relevant document. The plan maintenance process includes the following:

1. a schedule for monitoring and evaluating the Plan annually and producing a Plan revision every five years,
2. a description of how the City of Santa Monica will integrate public participation throughout the plan maintenance process, and
3. an explanation of how the City of Santa Monica intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms such as the City's General Plan, Capital Improvement Plans, and Building and Safety Codes.

MONITORING AND IMPLEMENTING THE PLAN

Plan Adoption

City Council is responsible for adopting Santa Monica's Local Hazards Mitigation Plan (Plan). This governing body has the authority to promote sound public policy regarding hazard mitigation. Once the Plan is adopted, the City's Chief Resilience Officer from the Office of Emergency Management will be responsible for submitting the Plan to the State Hazard Mitigation Officer at the Governor's Office of Emergency Services. The Governor's Office of Emergency Services will then submit the Plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, Santa Monica will gain eligibility for Hazard Mitigation Grant Program funds.

Coordinating Body

The Santa Monica Resilience Planning Committee will be responsible for coordinating implementation of the Plan's action items and undertaking the formal review process. The City Manager, or designee, will assign representatives from City agencies, including, but not limited to, the current Resilience Planning Committee members. At this time, the Resilience Planning Committee consists of representatives from the following departments:

- ✓ City of Santa Monica Manager's Office, Office of Emergency Management
- ✓ City of Santa Monica Fire Department, Fire Prevention
- ✓ City of Santa Monica Public Works Department, Administration
- ✓ City of Santa Monica Public Works, Engineering and Street Services
- ✓ City of Santa Monica Community Development Department, City Planning
- ✓ City of Santa Monica Information Services Department, GIS

The Resilience Planning Committee is supported by a larger body of advisors representing several other City departments, agencies and organizations that have a vested interest in managing or reducing the natural and human-made hazards in the city of Santa Monica. This larger body, referred to as the Hazard Mitigation Advisory Committee, has responsibility for reviewing the Plan and providing input on the action items proposed and their prioritization. The current Advisory Committee includes representatives from many local agencies and organizations in an effort to

make this group as diverse as possible, bringing together people with differing skills, experiences, perspectives, and ideas. This diversity hopefully translates into thoughtful and comprehensive action items and policies. The agencies and organizations that are part of the Advisory Committee are listed below:

City of Santa Monica Departments

- ✓ City of Santa Monica Attorney's Office
- ✓ City of Santa Monica Manager's Office, Office of Emergency Management
- ✓ City of Santa Monica Community Development Department, Building and Safety
- ✓ City of Santa Monica Community Development Department, City Planning
- ✓ City of Santa Monica Department of Transportation
- ✓ City of Santa Monica Finance Department
- ✓ Santa Monica Fire Department, Fire Administration
- ✓ Santa Monica Fire Department, Fire Prevention
- ✓ City of Santa Monica Housing and Human Services Department
- ✓ City of Santa Monica Information Services Department
- ✓ City of Santa Monica Police Department
- ✓ City of Santa Monica Public Works Department, Administrative Services
- ✓ City of Santa Monica Public Works Department, Engineering & Street Services
- ✓ City of Santa Monica Public Works Department, Office of Sustainability and the Environment
- ✓ City of Santa Monica Public Works Department, Santa Monica Airport
- ✓ City of Santa Monica Rent Control Department

Regional Government Partners

- ✓ City of Los Angeles, Emergency Management Department
- ✓ County of Los Angeles, Office of Emergency Management

Local Educational Institutions

- ✓ Santa Monica College (SMC)
- ✓ Santa Monica-Malibu Unified School District (SMMUSD)

Local Hospitals

- ✓ University of California, Los Angeles (UCLA) Health/Santa Monica Medical Center
- ✓ Providence Saint John's Health Center

Local Non-Profits

- ✓ American Red Cross
- ✓ Westside Food Bank

Local Business Organizations

- ✓ Downtown Santa Monica Business Improvement District
- ✓ Santa Monica Chamber of Commerce
- ✓ Santa Monica Travel and Tourism

The Resilience Planning Committee will meet no less than bi-annually. Meeting dates will be scheduled once the final Plan has been adopted by City Council and approved by the appropriate

FEMA office. These meetings will provide an opportunity to discuss the progress of the action items and maintain the partnerships that are essential for the sustainability of the Plan.

Convener

City Council will adopt Santa Monica's Local Hazard Mitigation Plan, and the Resilience Planning Committee will take responsibility for Plan implementation. The City Manager, or designee, will serve as a convener to facilitate the meetings of the Resilience Planning and and Advisory committees, and will assign tasks such as updating and presenting the Plan to the members of the committees. Plan implementation and evaluation will be a shared responsibility among all of the Resilience Planning Committee members. Future updates of the Plan will require participation of the Advisory Committee.

Implementation through Existing Programs

The City of Santa Monica addresses statewide planning goals and legislative requirements through its General Plan, Capital Improvement Plans, and City Building and Fire Codes. The Local Hazard Mitigation Plan provides a series of recommendations, many of which are closely related to the goals and objectives of existing planning programs. The City of Santa Monica will have the opportunity to implement recommended mitigation action items through existing programs and procedures.

The City of Santa Monica Building and Safety Department, the City of Santa Monica Fire Department, the City of Santa Monica Public Works Department, and the City of Santa Monica Police Department are responsible for administering the Building and Fire Safety Codes, and other regulations designed to improve safety of the community, such as the policies in the Safety Element of the General Plan. In addition, the Resilience Planning Committee will work with other agencies at the state level to review, develop and implement Building and Fire Safety Codes that are adequate to mitigate or reduce the damage posed by natural and human-made hazards, with an emphasis on life-safety criteria for new construction and re-development of existing construction.

The goals and action items in Section 4 of the Plan may be achieved through activities recommended in the City's Capital Improvement Plans (CIP). Various City departments develop CIP plans and review them on an annual basis. Upon annual review of the CIPs, the Resilience Planning Committee will work with City departments to identify the action items that are consistent with CIP planning goals and integrate them where appropriate.

Within six months of formal adoption of the Plan, the recommendations listed above will be incorporated into the process of existing planning mechanisms at the City level. The meetings of the Resilience Planning and Advisory Committees will provide an opportunity for committee members to report back on the progress made on the integration of mitigation planning elements into City planning documents and procedures.

Economic Analysis of Mitigation Projects

FEMA's approaches to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects, fall into two general categories: benefit/cost analysis and cost-effectiveness analysis. Conducting a benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid

disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards can provide decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Given federal funding, the Hazard Mitigation Advisory Committee will use a FEMA-approved benefit/cost analysis approach to identify and prioritize mitigation action items. A copy of a Project Evaluation Worksheet modeled after the STAPPLE cost benefit analysis process preferred by FEMA, is included at the end of Chapter 4. For other projects and funding sources, the Hazard Mitigation Advisory Committee may use other approaches to understand the costs and benefits of each action item and develop a prioritized list. For more information regarding economic analysis of mitigation action items, please see Appendix C of the Plan.

EVALUATING AND UPDATING THE PLAN

Formal Review Process

The City of Santa Monica Local Hazards Mitigation Plan will be evaluated on an annual basis to determine the effectiveness of the programs and action items, and to identify changes in land development or programs that may affect mitigation priorities. The evaluation process includes a firm schedule and time line, and identifies the local agencies and organizations participating in the evaluation of the Plan. The City's Chief Resilience Officer will be responsible for contacting the Resilience Planning Committee members and organizing the annual meeting. Committee members will be responsible for monitoring and evaluating the progress of the mitigation strategies in the Plan.

The Committee will review the goals and action items to determine their relevance to changing situations in the City, as well as changes in State or Federal policy, and to ensure they are addressing current and expected conditions. The Committee will also review the risk assessment portion of the Plan to determine if this information should be updated or modified given new available data. The coordinating organizations responsible for the various action items will report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised.

The convener will assign the duty of updating the Plan to one or more of the Resilience Planning Committee members. The designated committee members will have three months to make appropriate changes to the Plan before submitting it to the Hazard Mitigation Advisory Committee members, and presenting it to City Council. The Resilience Planning Committee will also notify all holders of the Plan when changes have been made. Every five years the updated Plan will be submitted to the State Hazard Mitigation Officer and the Federal Emergency Management Agency for review.

Continued Public Involvement

The City of Santa Monica is dedicated to involving the public directly in review and updates of the Local Hazard Mitigation Plan. The public will be encouraged to and provided with the opportunity to give feedback on the Plan. Copies of the Plan will be kept at the front desk of City Hall, and at City libraries. The Plan will also be placed on the City's website for review by the public, or alternatively, the existence and location of copies of the Plan will be publicized on the City's

website and newsletters. In addition, information on how to obtain copies of the Plan and any proposed changes will be posted on the City's website. This site will list an e-mail address and phone number to which people can direct their comments and concerns.

A public meeting will also be held after each annual evaluation or when deemed necessary by the Hazard Mitigation Advisory Committee. The meetings will provide the public with a forum at which they can express their concerns, opinions, or ideas about the Plan. The City's Public Information Officer will be responsible for using City resources to publicize the annual public meetings and maintain public involvement through the City's public access channel, web page, and newspapers or newsletters.

PROGRESS MADE SINCE ADOPTION OF THE 2016 PLAN

The Santa Monica is and has been committed to reducing the impact that natural and human-made hazards can have on its residents, businesses, infrastructure, and critical and essential facilities. With adoption of the City's 2016 Disaster Mitigation Plan, several goals and action items were identified and targeted for implementation. Those action items that were implemented and completed during the 2016-2024 timeframe, or that are currently being implemented are listed in Table 5-1 below. New item actions that were identified as part of this 2025 Plan Update are discussed and listed in Section 4.

Table 5-1: Status of Action Items Completed or Ongoing Since 2016

ACTION # IN 2016 PLAN	ACTION ITEM	STATUS
Action 1	Identify and pursue potential projects and funding sources to develop and implement local and county mitigation activities.	The City of Santa Monica has applied for and received several grants to improve hazard mitigation since 2016. Highlights include: • **Santa Monica Retrofit Funding:** Santa Monica was awarded a $6.7 million federal grant from FEMA to assist multi-family residential soft-story building owners with a portion of financial funding for seismic retrofit design and construction costs. santamonica.gov - Seismic Retrofit Program • **Zero Emission Backup Generators:** Santa Monica obtained funding for emergency backup generators for City facilities that have been identified as having a critical community-facing emergency response purpose, such as public shelters or family assistance centers. Cal OES Clean Power Resiliency grant funding provided $291,611 to this project. FY20 Community Power Resiliency Legislative Report • **Pier Bridge Replacement Project:** After several years, Santa Monica obtained grant funding to complete the retrofit of the Santa Monica Pier Bridge, the primary transportation access to Santa Monica Pier. The original bridge was built in 1939, and when structurally assessed, received an 8.2 out of 100 on a seismic sufficiency scale. As a result, renovation of this bridge is a major retrofit priority for the City. The City obtained over $25 million in federal Highway Bridge Program funding to complete renovations. The retrofit project is expected to commence in the of fall 2025. santamonica.gov - Pier Bridge Replacement Project • **Public Works Microgrid Feasibility Study:** Electric Program Investment Charge (EPIC) funding allowed for the Santa Monica Public Works Department to conduct a City Yards microgrid feasibility study. This study laid the foundation to determine the benefits of a microgrid to reduce energy demand and improve disaster resiliency during a power event. Final Project Report, Santa Monica City Yards Advanced Energy District • **Drought-Resiliency Water System Improvements:** The City obtained $10 million through Prop 1 Water Desalination Grant Program to upgrade the City's Arcadia Water Treatment Plant and construct a new Olympic Advanced Water Treatment Facility. These facilities will expand groundwater production and allow the City to continue to work towards self-sufficiency. santamonica.gov - New Water Project Takes Landmark Step Toward Water Self-Sufficiency
Action 2	Integrate the Local Hazard Mitigation Plan (LHMP) into existing programs, ordinances, building codes. Integrate the goals and action	Hazards identified in the 2016 LHMP have been addressed through city programs and ordinances to reduce hazard vulnerability in Santa Monica. Some key projects and plans include:

Table 5-1: Status of Action Items Completed or Ongoing Since 2016

<table>
<tr><th>ACTION # IN 2016 PLAN</th><th>ACTION ITEM</th><th>STATUS</th></tr>
<tr><td></td><td>items from the LHMP into existing regulatory documents and programs, including local ordinances and building codes, where appropriate.</td><td>

Seismic Retrofit Ordinance: Adopted in 2017 to implement a Seismic Retrofit Program for the City of Santa Monica. The program identified over 2,000 commercial and multi-family residential structures that were potentially seismically vulnerable and potentially requiring structural improvement. As of June 2025, 65% of all identified buildings had completed their retrofit or demonstrated compliance, with 67% of soft-story multi-family residential structures completed. santamonica.gov - Seismic Retrofit Program
<table>
<tr><th>Building Type</th><th>Qty. Noticed</th><th>Number Closed</th><th>Number Remaining Open</th><th>Retrofit Completion Due Date</th><th>Cases Sent to Code Enforcement</th></tr>
<tr><td>Tilt-Up</td><td>42</td><td>24 (57%)</td><td>18</td><td>Aug. 2020</td><td>14</td></tr>
<tr><td>URM</td><td>93</td><td>77 (83%)</td><td>16</td><td>Aug. 2019</td><td>17</td></tr>
<tr><td>Soft-Story</td><td>1,688</td><td>1127 (67%)</td><td>561</td><td>Sep. 2025 – July 2026</td><td>0</td></tr>
<tr><td>Non-Ductile Concrete</td><td>66</td><td>39 (59%)</td><td>27</td><td>Oct. 2027</td><td>17</td></tr>
<tr><td>Steel Moment Frame</td><td>80</td><td>15 (19%)</td><td>65</td><td>Oct. 2037</td><td>0</td></tr>
<tr><td>TOTALS</td><td>1,969</td><td>1,282 (65%)</td><td>687</td><td></td><td>48</td></tr>
</table>

Eco-Friendly Public Building Design & Implementation:

Santa Monica's new City Hall East building was completed in 2020. This is one of the greenest buildings in the world and the first municipal building to receive Living Building Challenge Certification from the International Living Future Institute, which means this building is Net Zero Water, Net Zero Energy Building, Net Zero Waste, and takes out 20 worst-in-class chemicals prevalent in the business industry. The building features robust solar panels, composting toilets, passive survivability design concepts and is the first building in California to convert rain-to potable water on site. Through the City's design and use of this building, Santa Monica hopes to set an environmentally responsible example for local architects and municipalities.

</td></tr>
</table>

Table 5-1: Status of Action Items Completed or Ongoing Since 2016

ACTION # IN 2016 PLAN	ACTION ITEM	STATUS
		○ The City Yards Modernization Project, which occurred mostly between 2019 and 2022, realizes the feasibility study conducted using grant funding. The project embeds sustainability, hazard mitigation, and operational resilience into public works infrastructure required to support daily City operations. The redesigned site includes a 609kW rooftop solar array integrated with two 803kW Tesla Megapack batteries forming a microgrid that provides energy back-up power to all new buildings, including the City's Fire Training facility. Portions of the site are built on a former landfill; as a result, extensive soil stabilization and methane mitigation measures were taken. Long-term foundation issues were addressed by supporting the roadways and buildings with concrete piles driven into bedrock beneath the landfill. Additionally, the new buildings take advantage of Santa Monica's purple pipe system, using reclaimed and treated water for toilet flushing, fleet vehicle washing, and irrigation to reduce potable water use. • **Coastal Bluffs Monitoring & Removal Work:** In 2023 and 2024, extensive geotechnical and monitoring activities were carried out along the Santa Monica Bluffs. The City's geotechnical consultant completed a detailed field mapping survey and conducted updated topographic and aerial photography surveys using unmanned aerial vehicles to document bluff features and compare them with past conditions. These efforts resulted in an updated geotechnical study and a comprehensive maintenance and monitoring report. ○ The geotechnical study focused on evaluating the overall surface conditions of the bluffs and developing a priority list and action plan for future maintenance. This work included reviewing historical reports, aerial imagery, and geologic data; conducting oblique aerial photography surveys; performing visual inspections of bluff features; and summarizing the condition of drains and monitoring wells, as well as analyzing slope instability mechanisms. ○ The maintenance report assessed the current condition of horizontal drains and monitoring wells, provided monitoring recommendations, and outlined maintenance procedures for both existing and future drains. ○ Based on monitoring of the condition of the Santa Monica bluffs, a stabilization project was undertaken in July 2023 to remove an unstable portion of the bluffs just above Pacific Coast Highway (PCH) between the California Incline and northbound on-ramp to Moomat Ahiko Way. The cracked block of sediment, which likely formed due to the intense rains that had occurred in December 2022-January 2023, was at risk of separating. Removal action was taken to ensure

Table 5-1: Status of Action Items Completed or Ongoing Since 2016

ACTION # IN 2016 PLAN	ACTION ITEM	STATUS

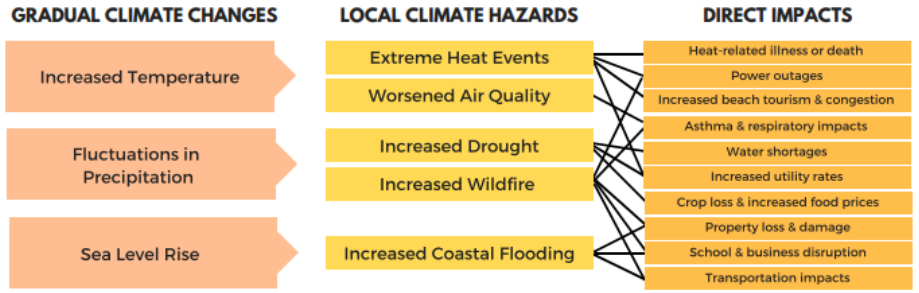
		vehicle traffic and safety on PCH.
		• **Climate Change Actions:** The City adopted several plans that further define its goals towards resiliency and sustainability, and of mitigating disaster impacts. These plans include:
		  ○ 2017 City's Water Neutrality Ordinance that caps water use for new developments to the historical five-year average for the site.
		  ○ 2019 Climate Action Plan that sets a goal for the city to reduce carbon emissions 80% by 2030. The plan enhances resilience to climate change by building a climate-ready community that aims to be water self-sufficient, prepared for coastal flooding, and focuses on low carbon food systems and ecosystems.
		  ○ 2020 Urban Water Management Plan that incorporates a water shortage contingency plan for multi-year drought conditions.
		• **Drought Mitigation & Water Sustainability:** In 2022-2023, Santa Monica implemented its Sustainable Water Infrastructure Project that provides a drought-resistant water supply for the city. The project produces up to 1,680 acre-feet per year of advanced treated recycled water for approximately 10% of the city's water supply. santamonica.gov - Sustainable Water Infrastructure Project (SWIP)
		• **Climate Change Prevention:** In 2024, Santa Monica passed a Low Carbon Concrete Ordinance (#2778) that reduces emissions from concrete poured in new buildings, spas, and swimming pools to reduce the greenhouse gas emissions from the construction project. Compliance with the ordinance is achieved by demonstrating that the concrete used meets the cement limit or the global warming potential limit. santamonica.gov - Low-Carbon Concrete Requirements
		 

Table 5-1: Status of Action Items Completed or Ongoing Since 2016

ACTION # IN 2016 PLAN	ACTION ITEM	STATUS
		• **Water and Wastewater Infrastructure Seismic Upgrades:** The City's Water Resources Division has been incorporating seismic upgrades to its water and wastewater infrastructure through its annual replacement programs. The annual water and wastewater main replacement program replaces, on average, 1-2 miles of pipelines each year. Restraint joints are included where necessary to enhance seismic resiliency and earthquake-resistant pipes are considered in areas where the pipeline may cross fault lines. The new Olympic Transmission Main uses earthquake resistant pipes over areas where it crosses fault lines to deliver groundwater to the Olympic Advanced Water Treatment Facility that is co-located at the Arcadia Water Treatment Plant. In addition, the Water Resources Division updates its water and wastewater master plans every 5 years where it updates/calibrates its hydraulic model and identifies vulnerable areas that may be impacted by seismic events. • **4th Street Overpass Seismic Upgrades:** Analysis of water and wastewater pipeline on 4th Street at the I-10 Freeway overpass determined the section of pipe in question would not cause service interruptions if it were to fail. Should the pipe along the overpass alignment fail, the City would be able to isolate it and continue to provide water and wastewater service, including max day and fire flow conditions, to its customers on either side of the overpass without any issues.
Action 3	Design and implement a protection program for the critical information systems infrastructure, including telephones, computers, radio, 911 services, information systems and backup systems.	• **Consolidated Public Safety Communications Center:** In 2015, Santa Monica launched a consolidated 911 dispatch center that handles all local Police, Fire, and Emergency Medical Services emergency call answering and radio dispatch services for Santa Monica. Multi-departmental incidents are managed by dispatchers who are cross-trained in multiple public safety dispatching skillsets. The Public Safety Communications Center is a part of the City's Office of Emergency Management (OEM), ensuring prompt notification of emergency managers during escalating incidents and the integration of dispatch leadership into the City's Emergency Operations Center. • **Dispatch Technology Improvements:** Since 2016, Santa Monica has adopted several public safety technology improvements. In 2017, Los Angeles County and the City of Santa Monica implemented "Text to 911" where mobile users can report emergencies and communicate with dispatchers using text messages. In 2024, Santa Monica OEM, Police and Fire implemented a new cloud-based computer-aided dispatch (CAD) system to improve emergency response operations and situational awareness. During the launch of CAD, Santa Monica launched technology to automatically update callers with Police service requests via text message.

Table 5-1: Status of Action Items Completed or Ongoing Since 2016

ACTION # IN 2016 PLAN	ACTION ITEM	STATUS
		• **Workplace and Emergency Response Flexibility:** In 2020, Santa Monica augmented its remote-based technology, allowing more employees to work from home or off-site locations. The City deployed laptops to personnel across the organization and implemented web-based collaboration and document storage tools. The shift to remote-based workspaces has greatly improved the ability for emergency response functions to occur in non-traditional or back-up locations. • **GIS Disaster Management Activities:** During the COVID-19 pandemic and Los Angeles Marathon, GIS surveying tools and dashboards were utilized heavily to collect field reports, create situational analysis tools for the Emergency Operations Center and leadership, and share data and resources with the general community. Community hazard and tsunami evacuation maps are created in ArcGIS and available for the public. • **Improved Map-Based Assessment Tools:** In 2023, Santa Monica implemented web-based software to collect and map damage and safety assessment data. This tool was tested during a 2024 full-scale disaster exercise with Cal OES Safety Assessment Program. The City of Santa Monica maintains a web-based incident management tool to maintain its disaster inventory and collect incident documentation. • **Future Technology Adoption Plans:** As of 2025, the City is in the early stages of fully adopting evacuation mapping technology, in alignment with LA County and other regional municipalities. The launch of this technology, in alignment with the adoption of a citywide evacuation plan, will improve awareness of city evacuation zones, hazard areas, and assist with prompt implementation of evacuation and shelter-in-place directions during emergencies.
Action 4	Design and implement a comprehensive campaign of public awareness and preparedness of local natural hazards, using media, print, radio, and the internet.	**Household Disaster Kit Education:** In 2016, the City launched a large public-education campaign on general disaster preparedness called "I've Got 7," in partnership with the local American Red Cross chapter. The campaign educated the community on the types of hazards that could impact Santa Monica and emphasized that the community needs seven-days of supplies in seven categories. After several years, the campaign concluded and updated disaster kit information is distributed at community events. • **OEM Public Education:** Santa Monica OEM continues to make the public aware of local hazards and preparedness needs. Santa Monica launched a new website with several emergency preparedness and hazard information webpages. OEM regularly shares preparedness and mitigation information using social media and in-person learning opportunities. In 2023, Santa Monica maintained its designation of a TsunamiReady® community, meeting public education requirements.

Table 5-1: Status of Action Items Completed or Ongoing Since 2016

ACTION # IN 2016 PLAN	ACTION ITEM	STATUS
		• **Community Emergency Response Team (CERT) Training:** The City's OEM has offered CERT training courses to local residents and business employees. CERT is a national, research-validated training program that trains participants in basic disaster response skills like fire safety, light search and rescue, and disaster medical operations. Since 2016, over 550 community members have received CERT training, with the City typically offering the course twice a year for 25 people.
Action 5	Continue to strengthen and develop evacuation plans, policies, and procedures for City facilities located throughout Santa Monica.	• **City Facility Evacuation Plans:** The City of Santa Monica has Emergency Action Plans for every employee worksite, with the most recently updated plans dating from 2022. The Emergency Action Plans include detailed facility evacuation plans and hazard-specific response procedures, such as those for earthquakes, tsunamis, and hazardous materials spills. Plans include directions for those with access and functional needs, such as those with visual or mobility disabilities. Evacuation drills are held regularly, overseen by the City's Safety Officer. • **Pier Emergency Plan:** In 2019, OEM worked with SMPD, SMFD, and Santa Monica City departments and Pier stakeholders to create the Pier Emergency Response Plan. The plan details emergency evacuation, repopulation, and crisis communications activities. The plan also provides checklists to Pier businesses to respond to emergency scenarios including thunderstorms, tsunami, and large-scale criminal incidents.
Action 6	Enhance capability of alert system of a public alert and notification system for disasters.	• **Non-Traditional Disaster Response Communications:** During the COVID-19 emergency, Santa Monica utilized non-conventional communication means to share information with the public, including postcards sent to every household and flyers distributed in grocery bags. • **Local Alert & Warning:** Santa Monica's mass notification system, SMAlerts, is a robust alerting platform that has the capability of alerting the community of emergency information. The system was upgraded in 2022 to include three levels of emergency alerting: 1. General public safety messages to users who enrolled via santamonica.gov/alerts 2. Emergency messages to residents and businesses within a geographic area using E911 data 3. Wireless Emergency Alerting (WEA) to all individuals within a geographic area • **City Crisis Communications Plan:** The City has also implemented a crisis communications plan that identifies other forms of emergency communications systems that can be used during a disaster, including multiple social media platforms, digital kiosk message boards, the City's website, and a disaster hotline.