



Chapter 1

Introduction

June 2022

Background

The City of Alameda is a low-lying island community of approximately 80,000 people in the San Francisco Bay that is highly vulnerable to inundation from rising seas and rising groundwater. Alameda is also highly vulnerable to earthquakes as a result of its older building stock and proximity to two major faults, as well as other hazards. That a disaster will strike Alameda in its future is a certainty; what is not certain is the extent to which the hazards will damage buildings and infrastructure and disrupt life for Alameda's residents and businesses. Climate change has ensured that our future will be riskier than our past. By understanding our risks and taking proactive action now to mitigate risks and reduce our greenhouse gas emissions, Alameda can be prepared for future disasters and reduce their impact.

The Alameda Climate Adaptation and Hazard Mitigation Plan (Plan) serves as an update to the 2016 Local Hazard Mitigation Plan. It aligns with and builds on adaptation chapter of the Climate Action and Resilience Plan (CARP). Some of the information contained in CARP is directly translated into this Plan, and some of it is updated and adapted for this Plan. The Plan is also aligned with the General Plan Safety Element.

The CARP identifies 12 priority flooding locations where assets or areas are exposed to flooding risk soonest and with greatest consequence. Locations with significant flooding at a total water level of 24 or 36 inches (above today's high tide) were identified as at risk of sea level rise flooding "soon." Since the CARP adoption in 2019, Alameda has developed a deeper understanding of the implications of sea level rise for our island community, global greenhouse gas emissions have continued to increase at alarming rates, and the federal government has not provided the financial and technical support that we need to meet our greenhouse gas reduction and adaptation goals. Furthermore, the city conducted a study in 2020 on emergent groundwater issues that showed sea level rise as elevating the water table, which is expected to cause more flooding, liquefaction and soil contamination issues in every neighborhood in Alameda. With six to seven feet of sea level rise expected in 80 years, 25 miles of shoreline to improve at a cost of \$10 to \$20 million per mile, and needed conveyance and storm drain pump station upgrades, the City must immediately focus on short term strategies to delay the most severe impacts of sea level rise and buy time to improve our community's understanding and capabilities to implement local and regional long term solutions for the next generation of Alamedans.

Purpose

The purpose of the Plan is to help Alameda adapt to climate change, reduce the impact of future disasters and help us recover more quickly when disasters do occur. The Plan:

- Meets the requirements established by the Federal Disaster Mitigation Act of 2000 (DMA 2000) and maintains eligibility for Federal Emergency Management Agency (FEMA) assistance grant programs, including:
 - Hazard Mitigation Grant Program (HMGP)
 - Building Resilient Infrastructure and Communities (BRIC)
 - Flood Mitigation Assistance (FMA)
- Aligns with other plans, including the CARP, General Plan and the City's Emergency Management Plan;

- Increases education and awareness of natural and climate-induced hazards and community vulnerabilities;
- Establishes a basis for coordination and collaboration among community entities such as private and public agencies, key stakeholders, and residents; and,
- Identifies and prioritizes future mitigation and adaptation projects.

Key Terms

The Plan addresses the risk the City of Alameda faces from natural and climate induced hazards and describes mitigation and adaptation actions that can be taken to reduce the risk we face and enhance the community's resilience to hazards.

Risk is the consequence of the interaction between a hazard and the characteristics that make people, and places vulnerable and exposed (UNDRR Terminology, 2017).

A **hazard** is an event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, damage to the environment, interruption of business, or other types of harm or loss.

Exposure refers to the people, infrastructure, housing, and other assets located in hazard prone-areas.

Vulnerability is the physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.

Hazard mitigation and **climate adaptation** refers to the actions taken to reduce or eliminate risk to human life and property from natural and climate change-induced hazards.

Resilience refers to the ability of a city's systems, businesses, institutions, communities, and individuals to survive, adapt, and grow no matter what kinds of acute shocks and chronic stresses they experience.

Relationship to Other Plans

The Plan is different from the Emergency Response Plan which prepares the City to respond when a disaster occurs, and may include such actions as providing emergency response, equipment, food, shelter, and medicine. However, climate adaptation and hazard mitigation planning support emergency response planning by minimizing the community disruption, loss of life, and property damage resulting from disasters.

The General Plan is a statement of goals, objectives, policies and actions that describe the community's priorities for the next 20 years. The 2040 General Plan provides a long-term strategy for how Alameda will address climate change, affordable housing, equity and inclusiveness, safe streets, open space and park funding priorities, and disaster preparation. As this plan must be updated every five years, it provides the near-term actions Alameda will take to achieve our long-term goals and is adopted as an appendix to the General Plan Safety Element.

The Plan lays out Alameda's strategy for mitigating natural hazards and adapting to a changing climate. The success of this plan rests not only on our ability to implement the strategies laid out in this plan, but also on our ability to implement the City's Climate Action and Resiliency Plan (CARP). The goal of CARP is to reduce our greenhouse gas emissions (GHG) by 50% below 2005 levels by 2030 and become carbon neutral soon as possible. In 2019, the City of Alameda declared a climate emergency and called for an urgent and just citywide climate mobilization effort to reverse global warming and adapt as rapidly as possible to the growing global and local effects of climate change. By taking strong actions to reduce our GHG emissions, Alameda will do our part to achieve a climate safe path and avoid some of the extreme climate effects we face. Of course, this City of Alameda cannot avert global warming on its own. It will take an immediate and concerted effort on the part of community members, businesses, other cities and counties, the state, federal government and the world to come together and reduce our global emissions. Here in Alameda, we will do our part to reduce our emissions and prepare for the impacts that we will face.

Focus on Equity

Alameda recognizes that some members of the community will be more significantly impacted by natural disasters and may have a more difficult time recovering than others due to lack of stable housing, financial resources, and by zoning laws that have disproportionately places people of color and community members with the fewest resources into areas of the city that are more vulnerable to natural hazards. Natural disasters disproportionately impact low-income residents, people of color, the young, the old, and the disabled. The goal of this plan is to identify and mitigate those needs to reduce the impact of future disasters on all Alameda residents and speed recovery when disasters do occur.

Social equity is critical to promoting healthy, resilient communities. Equity is the idea that one's race, ethnicity, gender, age, disability, sexual orientation should not determine their outcomes and should not have an effect on the distribution resources, including housing, access to jobs and education, food, and environmental exposure.

By explicitly addressing the needs of most impacted populations, the City seeks to undo historic and structural racism and contribute to building a healthy and diverse community, where everyone truly belongs.

Given the interconnectedness of our ecosystems and the shared watershed of San Leandro Bay and the Oakland-Alameda Estuary, the City must work collaboratively to address equity not only for Alamedans but also for priority equity communities in adjacent jurisdictions such as Oakland and San Leandro. Working collaboratively with key stakeholders will help ensure more uniform protections exist for all, especially for under resourced communities, and will help establish a unified voice to expedite hazard mitigation and climate adaptation.

The Plan's equity goal aligns with the Alameda 2040 General Plan equity goal to:

"...promote equity, environmental justice, and a high quality of life for everyone irrespective of income, race, gender, sexual orientation, cultural background or ability by recognizing and changing local policies, programs, ordinances, and practices that serve to perpetuate injustices suffered by under-served and underrepresented populations and proactively engaging these populations in all City decision making."

The General Plan includes several policies designed specifically to “prioritize the needs of the most vulnerable communities when prioritizing public investments and improvements to address climate change” (General Plan, CC-2).

- **Equity.** Ensure opportunities for leadership and actions to involve and benefit Alameda’s low-income individuals, seniors, youth, people of color, unhoused, individuals with disabilities, and socio-economically disadvantaged communities from environmental and climate change impacts.
- **Environmental Justice.** Ensure the equitable treatment and full involvement of all people when considering actions to reduce the adverse impacts of climate change on residents regardless of age, culture, ethnicity, gender, race, socioeconomic status, or geographic location. Prioritize actions that will reverse historic policies of racial discrimination and exclusion.
- **Assessments.** Utilize Alameda’s Social Vulnerability Assessment in the Climate Action and Resiliency Plan or similar tool to identify neighborhoods and specific groups with high levels of social vulnerability in order to prioritize locations for action and improvements.

The CARP included a social vulnerability assessment that informed the consequences and strategies in this plan. Each strategy also includes an equity consideration to help guide equitable implementation of the strategy.

Vision Statement and Hazard Mitigation and Adaptation Goals

According to Alameda’s 2040 General Plan Safety Element to which is Plan is aligned,

“Alameda aspires to be a resilient city that is able to adapt to a changing climate and reduce the loss of life, property damage, and environmental degradation from disasters while accelerating economic recovery from those disasters. Alameda enhances community resilience by improving the buildings and infrastructure we all rely on, responding to disasters quickly and effectively, helping owners rebuild damaged buildings quickly, protecting tenants, and keeping businesses open during recovery.”

Vision

The Plan’s vision is that the City of Alameda will be better prepared for future hazards and climate impacts by reducing the impact of climate change and disasters on our community and by ensuring equitable recovery from disasters when they do occur.

Hazard Mitigation and Adaptation Goals

In addition to the vision statement, nine mitigation and adaptation goals were identified. These mitigation goals were developed in the 2016 Local Hazard Mitigation Plan (LHMP) and remain unchanged. The mitigation goals are broad statements that are achieved through implementation of the more specific mitigation actions. The mitigation goals are as follows:

- Reduce exposure to hazards, where possible.

- Protect the health, safety, and welfare of City of Alameda residents, workers, and visitors.
- Minimize damage of public and private property.
- Minimize damage of the natural environment.
- Minimize disruption of essential services, facilities, and infrastructure.
- Ensure timely and complete recovery.
- Increase understanding and awareness of hazards and hazard mitigation by City employees and the public.
- Participate in mitigation and resiliency by all stakeholders, as appropriate.
- Protect the City's physical and social character and diversity.

Hazard Specific Goals

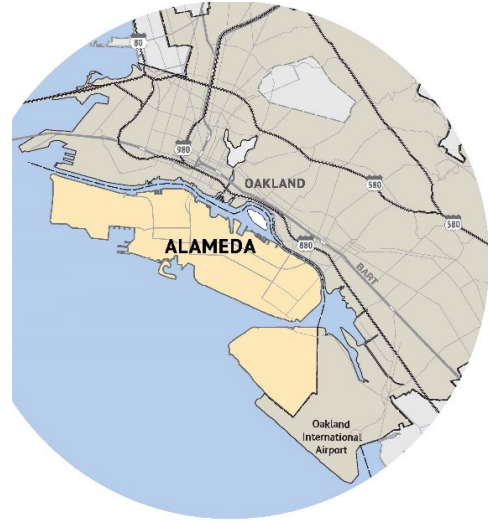
The Climate Action and Resiliency Plan (CARP) identified hazard specific goals, which have also been updated and adopted for this Plan. The hazard specific goals are as follows:

- **Sea level rise and storm surges:** Protect assets from sea level rise and storm surges, including community vitality and recreational opportunities, plan future land use to avoid impacts, and enhance natural shoreline habitat to mitigate impacts.
- **Inland flooding:** Increase the resilience and capacity of the stormwater system to prevent flooding of assets during extreme precipitation events.
- **Drought:** Reduce water consumption and increase drought-resistant landscaping.
- **Extreme heat:** Reduce the heat island effect and protect vulnerable populations from heat impacts during heat waves.
- **Wildfires:** Protect public health from smoke impacts during wildfire events, especially among vulnerable populations.
- **Earthquakes:** Minimize loss of life, community disruption, and property damage in an earthquake, especially for areas at risk of liquefaction, and prepare for a timely and equitable restoration of community functionality.
- **Tsunamis:** Reduce property damage and loss of life in a tsunami and prepare for the safe evacuation of people from the tsunami zone.
- **Effective implementation and capacity building:** Develop financial and human resources and increase transparency, community engagement, social resilience, and support for effective implementation of climate adaptation and hazard mitigation strategies.

The History of Alameda

The City of Alameda, located seven miles east of San Francisco and just west of Oakland, is made up of Alameda Island and Bay Farm Island. The City includes 10.61 square miles of land. Alameda is a charter city founded in 1854 and incorporated in 1872. The City of Alameda provides a full range of municipal services, including public safety, public works, community development, and community services. The City also provides electric utility services through Alameda Municipal Power.

At the time of the arrival of the Spanish, Alameda was a peninsula of land covered by a dense forest of coastal live oak and inhabited by the Confederated Villages of Lisjan, an Ohlone people who spoke Chochenyo and sustained themselves through hunting, fishing and gathering. Settlement of Alameda by Europeans and other non-natives began in 1820, when Luis Peralta divided Rancho San Antonio among his four sons. Alameda derived its original name, “the Encinal,” from the large stands of native oaks (“encino” means “oak” in Spanish) on the Main Island. The name “Alameda,” meaning “grove of poplar trees,” was given to the City as a poetic gesture upon popular vote in 1853.



In 1849, the California Gold Rush brought Americans and Northern Europeans to the San Francisco Bay. Many made their fortunes in supplying goods and services to the region’s burgeoning population. Among these were two young entrepreneurs, William Worthington Chipman and Gideon Aughinbaugh, who purchased the Encinal from Antonio Maria Peralta for \$14,000 in 1851, the year after California became a state. They subdivided the land and sold tracts for residences and orchards. By 1872, three separate settlements, the Town of Alameda, Encinal, and Woodstock, were established in the east, central and western sections of the peninsula. The Town of Alameda was granted a charter by the State Legislature in 1854; incorporation of all peninsula settlements under one local government occurred in 1872.

Early growth of residential, commercial and industrial areas depended upon water and rail transportation and an excellent climate. The City’s industrial waterfront and small commercial districts (“the stations”) were developed in conjunction with rail improvements, while neighborhoods of Victorian homes and beach resorts were built attracting tens of thousands of weekend visitors. Major shipyards and Neptune Beach (the “Coney Island of the West”) were established along the northern and southern shores to take advantage of the island’s coastal assets. In 1902, the Tidal Canal was completed and Alameda became an island.

In the decades between 1920 and 1970 the City witnessed cycles of boom and bust. Following an enlightened era of civic building during the 1920s, Alameda endured difficult years of political scandal and corruption through the 1930s. The entry of the United States into World War II focused the City’s attention on the war effort. During World War II, shifts ran around the clock at the Alameda Naval Air Station (commissioned in 1940) and in the City’s shipyards. The City’s population reached an all-time high of 89,000

By 1973 concern about replacement of Victorian homes by boxy apartment buildings and the prospect of all-apartment development on Bay Farm Island led to passage of initiative Measure A, which prohibits residential structures having more than two units. Despite this restriction, an average of 300 homes per

year were built between 1970 and 1990, mainly on Bay Farm Island. Bay Area growth pressure has facilitated redevelopment of unused shipyards on the Northern Waterfront as business park, homes, and marinas. The City is currently redeveloping the former Alameda Naval Air Station into mixed use residential, commercial, and industrial use called Alameda Point. Master planning and environmental documents that were developed in 2014 envision a cumulative build out by 2035 of 1,425 housing units and 5.5 million square feet of office, retail and manufacturing, with a significant portion of the buildout during the first 10 years (by 2025).¹

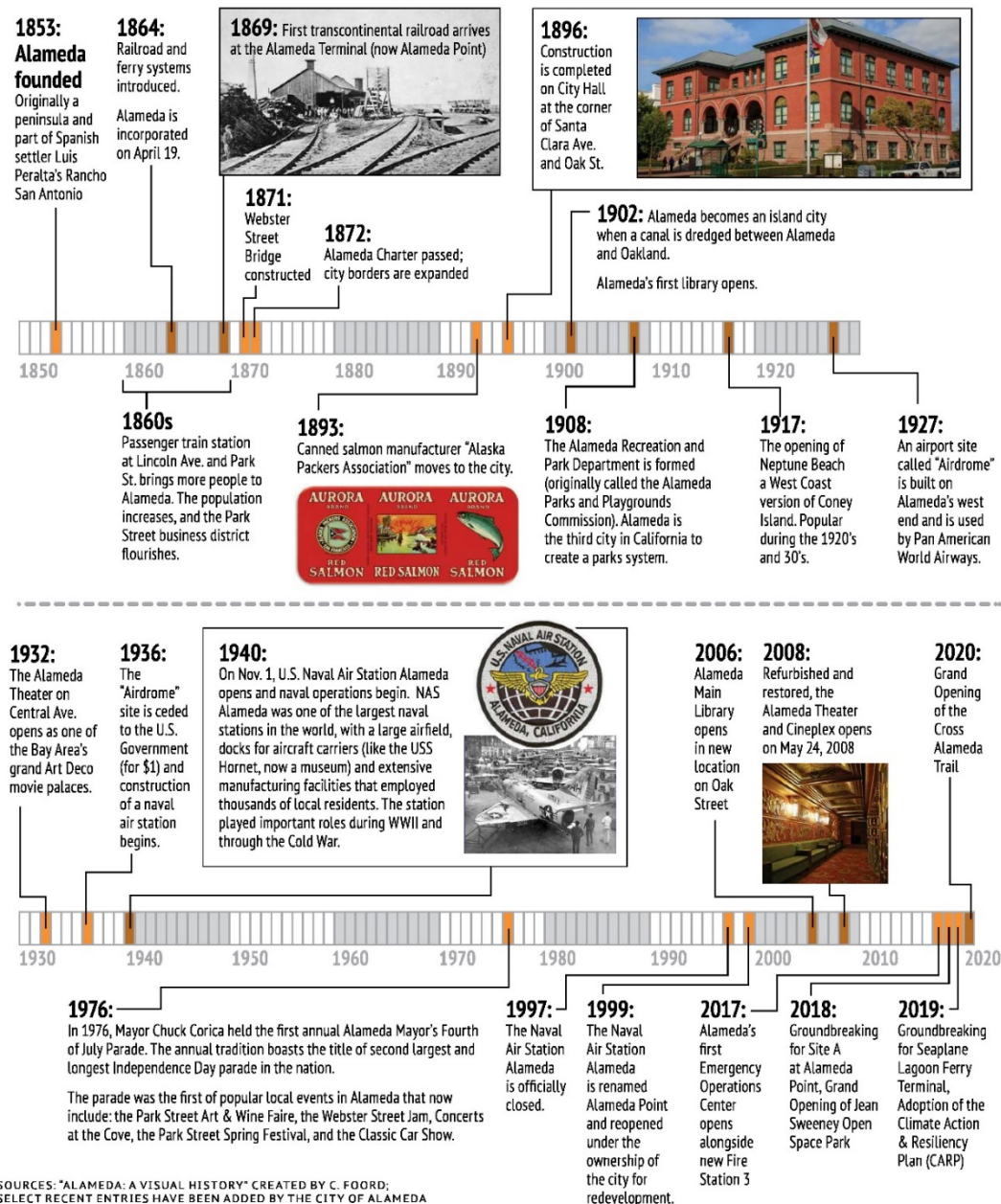


Figure 1-1 Timeline of Alameda History

¹ Alameda Point Transportation Demand Management Plan, 2014

What Has Changed Since the Last Plan

Since the 2016 Local Hazard Mitigation Plan was adopted, several significant things have occurred. Alameda has updated its General Plan, which includes a Safety Element and new Conservation and Climate Change Element. Alameda also adopted a Climate Action and Resiliency Plan (CARP) in 2019, which laid out the first comprehensive strategy for the city to adapt to the effects of climate change. In 2020, [The Response of the Shallow Groundwater Layer and Contaminants to Sea Level Rise in Alameda](#) report was published which provided additional information about the issue of rising groundwater and soil contamination associated with sea level rise.

In light of these developments, the Plan was significantly revised and reorganized to better meet the needs of Alameda today and to align with the updated General Plan and CARP. The Plan more fully considers climate change impacts and serves as an update to the adaptation chapter in CARP.

The Plan considers two new hazards:

- Wildfire-related hazards we now regularly face of smoky air and power shut-offs
- Dam failure hazard resulting from the very unlikely failure of Chabot and New Upper San Leandro Dams.

In light of recent hazard events and climatic changes, significant updates were also made regarding the hazards of drought, heat, and the future flooding assessment, which were incorporated from CARP. The flooding section also includes more detailed information about the hazard of groundwater rise, as well as associated strategies to address the issue.

Detailed risk assessments were developed for the two most significant hazards facing Alameda: flooding and earthquakes. These risk assessments can be found in **Appendix E and F**.

The plan also has a focus on equity as a priority and includes equity considerations for the mitigation and adaptation strategies.

Scope and Content

The Climate Adaptation and Hazard Mitigation Plan presents recommendations and strategies for implementing climate change adaptation and mitigation actions in Alameda. **Chapter 2** describes the process used to update the plan. **Chapter 3** describes the assets within Alameda, including the people, economy, buildings, and infrastructure at risk in natural disasters. **Chapter 4** describes the hazards we face and consequences of those hazards for Alameda. **Chapter 5** describes the actions the City will take to reduce our risk from natural and climate-related hazards. Finally, **Chapter 6** describes how the City will implement and maintain the Plan over time. Appendices provide additional detail and supporting information for the Plan's chapters.