

## CHAPTER 14

# NEXT STEPS

The earth and its inhabitants are facing a climate emergency. Even as we work to mitigate our contributions to global heating, we are aware that we are already facing many climate-related impacts: prolonged drought, extreme heat, massive wildfires, hazardous air quality, flooding, and severe weather. Combined with new, more severe weather patterns like coastal storms, SLR presents a daunting challenge for waterfront cities like San Francisco.

Following the SLR Action Plan framework, this Assessment lays out detailed information on the City's vulnerabilities to SLR over time, and the consequences of those vulnerabilities. City agencies, decision makers, and the public can use this information to plan, fund, prioritize, and implement adaptation strategies for our shoreline and individual buildings and infrastructure assets.

San Francisco's efforts to adapt to SLR, coastal flooding, and other climate impacts will continue for decades. Major adaptation projects that involve significant changes to the City's shoreline infrastructure will take many years to plan, fund, and build. These projects will involve phasing plans that identify near-term, high-priority actions that address the most imminent flooding concerns. Smaller fixes to individual buildings or other infrastructure may be built into ongoing capital improvement plans and built quickly.

Some areas of the City are already affected by coastal flooding and require near-term solutions. Other areas may be affected within 10 years. Infrastructure solutions and capital investments will take years or decades to plan, engineer, and fund. The City is developing and implementing plans and projects to protect people, buildings, infrastructure, and open space (Table 14.1).

Table 14.1 Sea Level Rise Action Plan Next Steps

Next Step	Status
<b>Review Science &amp; Pursue SLR Research Priorities</b>	<b>Ongoing.</b> Ongoing activities include state science update and extreme precipitation study. Other identified needs include research on the overlay of groundwater, contamination, and liquefaction in bay fill areas.
<b>Complete Citywide Vulnerability &amp; Risk Assessments</b>	<b>Complete.</b> This report completes this step.
<b>Conduct Comprehensive Economic Risk Analysis</b>	<b>Ongoing.</b> Qualitative analysis was performed as part of the consequences assessment in this report. The USACE/Port Flood Study and the Embarcadero Seawall Program multi-hazard risk assessment will include economic impacts.
<b>Develop SLR-Specific Community Education &amp; Engagement Strategy</b>	<b>Ongoing.</b> This next step has been integrated into the engagement strategy for the Hazards and Climate Resilience Plan. Individual projects such as Embarcadero Seawall Program and Islais Creek Southeast Mobility Adaptation Strategy include robust community outreach and engagement programs.
<b>Develop Training Program for Capacity Building</b>	<b>Ongoing.</b> The City has held individual agency vulnerability workshops, and a multi-agency consequences workshop in 2018. The City is also planning training for agency staff on use of the SLR Capital Planning Guidance
<b>Launch and Complete Bay Area Resilient by Design Challenge</b>	<b>Complete.</b> See Resilient by Design <sup>1</sup> .
<b>Review Potential Policy and Financing Tools</b>	<b>Not started.</b> This work is included in next steps for overall climate resilience planning, scope TBD. Seawall Finance Work Group Report completed as part of Embarcadero Seawall Program (Port of SF). Finance strategies included as part of on-going efforts such as Port/U.S.Army Corps Flood Study and Islais Creek Adaptation Strategy.
<b>Complete Comprehensive Citywide Sea Level Rise Adaptation Plan</b>	<b>Not Started.</b> This work is included in next steps for overall climate resilience planning, scope TBD.
<b>Develop Near-Term Adaptation Plans for High-Risk Areas and Assets</b>	<b>Ongoing.</b> Adaptation plans are underway through the USACE/Port Flood Study, Embarcadero Seawall Program, Islais Creek Southeast Mobility Adaptation Strategy, Ocean Beach Master Plan implementation, wastewater assets. New shoreline developments and area plans in SLR. zone have built SLR adaptation and funding mechanisms into their approved plans.
<b>Monitor and Investigate Backflow Prevention</b>	<b>Ongoing.</b> This work is underway through the Sewer System Improvement Plan (SFPUC)
<b>Develop Interim and Long-Term Airport Shoreline Protection</b>	<b>Ongoing.</b> Conceptual designs and cost estimates are complete. Environmental review and permitting are underway.
<b>Coordinate Monitoring and Tracking of Storm Events</b>	<b>Not Started.</b>

<sup>1</sup> <http://www.resilientbayarea.org/>

As the City continues to build, operate, and maintain its infrastructure systems, and as we plan for longer-term SLR impacts, we are already taking future SLR into account in our everyday actions, moving forward with long-range multi-phase adaptation plans, and implementing near-term strategies that address our most imminent vulnerabilities.

The City is developing several plans, policies, and projects that help adapt the City to SLR, including:

1. SLR Capital Planning Guidance
2. Ocean Beach Master Plan implementation
3. Embarcadero Seawall Program
4. USACE/Port Flood Study
5. Islais Creek Southeast Mobility Adaptation Strategy
6. SFO Shoreline Protection Program
7. Hazards and Climate Resilience Plan
8. New Shoreline Development and Open Spaces

## 14.1 SEA LEVEL RISE ACTION PLAN NEXT STEPS

The Sea Level Rise Action Plan identified several next steps for the City to take to adapt to SLR. The City is actively moving forward with several of these. Others are currently being scoped and developed and will follow these initial steps. Some steps will be integrated into a larger climate resilience framework that comprehensively considers how the City will adapt to multiple climate-related impacts.

## 14.2 ADAPTATION PRINCIPLES

As the City advances adaptation planning efforts, we have identified key considerations to guide adaptation planning and ensure that adaptation strategies are effective, efficient, equitable, and environmentally appropriate.

Successful adaptation planning should:

- Begin with robust community engagement to ensure strategies will meet local needs and build public and political support for action
- Prioritize and include vulnerable neighborhoods that already bear disproportionate environmental burdens and will be most impacted by future flooding
- Include natural solutions where possible to improve the City's environment and provide open space recreation opportunities
- Create a decision-making framework for when and where to implement facility-specific floodproofing versus neighborhood-scale shoreline strategies
- Identify strategies that could be implemented by multiple actors, including individual agencies, private landowners, and the City as a whole
- Adopt adaptation policy for private development and public investment in addition to implementing physical strategies
- Identify potential funding sources and appropriate lead agencies for adaptation projects that cross agency jurisdictions
- Balance uncertainty in long-term climate projections with the need for urgent action
- Integrate SLR and coastal flooding programs with other City resilience efforts

## 14.3 CURRENT ADAPTATION EFFORTS

### GUIDANCE FOR INCORPORATING SEA LEVEL RISE INTO CAPITAL PLANNING

ASSESSING VULNERABILITY AND RISK TO SUPPORT ADAPTATION



#### 14.3.1 Sea Level Rise Capital Planning Guidance

In 2014, the Office of Resilience and Capital Planning created SLR planning guidelines for public projects in the SLR Vulnerability Zone, revised in 2015. This guidance helps the City apply a consistent and comprehensive review, planning, and implementation process to projects with costs of \$5 million or more, and ensures that infrastructure projects consider SLR in their planning and design. The SLR capital planning checklist (a portion of the CPC guidance) was updated in 2019 based on updated State science projections.

### HAZARDS AND CLIMATE RESILIENCE PLAN



#### 14.3.2 Hazards and Climate Resilience Plan

The Hazards and Climate Resilience Plan is serving as the 2019 update to the Hazard Mitigation Plan and will underpin the City's next Climate Action Strategy and Community Safety Element update. The Office of Resilience and Capital Planning is leading this effort in partnership with Department of Emergency Management, Department of Public Health, Department of the Environment, and Planning.

This plan incorporates climate change vulnerability analysis and near-, mid- and longer-range resilience actions for SLR and other natural hazards. The draft Plan will be published in 2019 and submitted to the California Governor's Office of Emergency Services and FEMA for review before final adoption.



#### 14.3.3 Ocean Beach Implementation

City and federal agencies are working together to implement short- and long-term adaptation measures at South Ocean Beach, following the recommendations of the Ocean Beach Master Plan<sup>1</sup>. These projects include road narrowing and realignment, an improved recreation trail, and the Ocean Beach Long-Term Improvements Project.

The Long-Term Improvement Project includes managed retreat (i.e., recontouring the bluffs and removing the Great Highway between Sloat Boulevard and California State Route 35), removal of rubble and rock from the beach and bluffs, continued beach nourishment, and installation of a low-profile wall to protect the Lake Merced Tunnel.

This project will protect vital public wastewater infrastructure and improve access, recreation, and habitat at South Ocean Beach. The Ocean Beach Long-Term Improvements Project, being implemented by SFPUC, is expected to begin construction in 2022.

<sup>1</sup> [https://www.spur.org/featured-project/ocean-beach-master-plan?utm\\_medium=redirect&utm\\_source=oceanbeach](https://www.spur.org/featured-project/ocean-beach-master-plan?utm_medium=redirect&utm_source=oceanbeach)

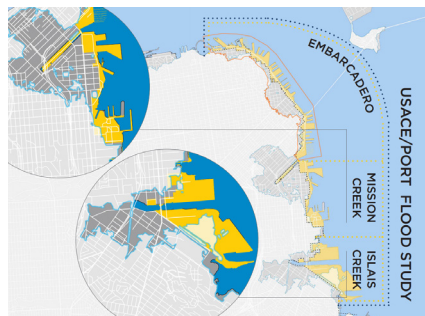


#### 14.3.4 Embarcadero Seawall Program

The Port is leading the Embarcadero Seawall Program, a Citywide effort to strengthen the Embarcadero Seawall and create a more sustainable and resilient waterfront.

San Francisco voters passed a \$425-million General Obligation Bond for the Program in November 2018. To date, the Port has secured \$440 million for urgently needed immediate life safety improvements, and is currently pursuing local, state, federal, and private funding sources to fully subsidize infrastructure improvements anticipated to cost up to \$5 billion.

Immediate seismic and flood protection upgrades are targeted for completion by 2026. The Program is currently in the early stages of planning, following an extensive Vulnerability Study.



#### 14.3.4 Port of San Francisco and Army Corps of Engineers Flood Study

USACE and the Port are partnering to study flood risk along San Francisco's bayside shoreline. The approximately three- to five-year Flood Study will identify vulnerabilities and recommend strategies to reduce current and future flood risks for consideration by the Assistant Secretary of the Army and the U.S. Congress for federal investment and implementation.

The goals of the Flood Study are to better understand current and future flood risk along San Francisco's bayside shoreline, identify alternatives to reduce flood risk, engage the public and other stakeholders to identify priorities for the Flood Study, and create opportunities for funding for flood risk reduction projects.

The study area includes the Port's entire shoreline ownership from Aquatic Park to Heron's Head Park. The study will result in potential flood risk mitigation projects to protect against flooding through 2080 and consideration of flood risks through 2130.



#### 14.3.5 Islais Creek Southeast Mobility Adaptation Strategy

The Planning Department, in partnership with SFMTA and the Port, is leading the Islais Creek Southeast Mobility Adaptation Strategy. With funding through a Caltrans grant, this 2-year community planning process in the Islais Creek area that will develop actionable strategies that address SLR and coastal flood risk through a robust public engagement process.

Building on the Resilient by Design proposal in coordination with the USACE/Port Flood Study (13.5.2), the Islais Creek Southeast Mobility Adaptation Strategy will develop a long-range vision for the Islais Creek shoreline, asset-specific solutions for public infrastructure, and a prioritized funding and implementation strategy that increases the resilience of the community and provides improved transportation networks and new open space.

The 2-year planning project will begin in early 2019 and conclude in early 2021.



#### 14.3.6 SFO Shoreline Protection Program

SFO is developing a new Shoreline Protection Program to address potential flood risks to address both 100-year storm and SLR out to 2085. Conceptual designs and cost estimates have been developed. Environmental review and permitting are underway in 2020. Early build-out is expected to start in 2025. Project designs are based on the Shoreline Protection Program - Conceptual Design Study.



#### 14.3.7 New Shoreline Development and Open Spaces

In recent years, the City has approved several significant mixed-use development projects along the East Bay shoreline of San Francisco, including Treasure Island, Mission Rock, Pier 70, India Basin, and Candlestick/Hunters Point Shipyard. Other projects are currently under review, including Potrero Power Station. These projects have built SLR adaptation and funding mechanisms into their approved plans. The City has built and planned for new parks along the East Bay shoreline, including Crane Cove Park and India Basin Park, that incorporate SLR adaptation into their designs. See Chapter 13, *A Changing Shoreline*.



## 14.4 REGIONAL COORDINATION

All nine counties that surround San Francisco Bay are vulnerable to SLR and coastal flooding and are engaged in assessing SLR vulnerabilities and risks or moving forward with SLR adaptation efforts. Several groups are supporting regional coordination and encouraging information sharing as adaptation projects are planned and/or implemented. Regional coordination can help all Bay Area communities become more resilient by sharing lessons learned, discovering and closing data gaps, and developing cross-jurisdictional projects since SLR does not follow traditional jurisdictional boundaries.

San Francisco is currently participating in the following regional groups:



San Francisco Bay Conservation and Development Commission's (BCDC) **Adapting to Rising Tides (ART) Program** has released SLR and coastal flooding inundation layers for the entire Bay Area and developed a portfolio of planning guidance, tools, engagement exercises, and information to support climate change assessments and adaptation. As cities, counties, agencies or localized areas complete assessments using the ART approach, the assessments are typically posted on the ART website to foster lessons learned and transparency across the region. BCDC also hosts Regional Working Groups on a regular basis to encourage regional conversations on adaptation planning and implementation.



**The Bay Area Climate Adaptation Network (BayCAN)** is a collaborative network of local government staff and partners to help the Bay Area region respond effectively and equitably to the impacts of climate change on human health, infrastructure, and natural systems. BayCAN covers the 9-county San Francisco Bay Area and primarily exists to facilitate connections, information sharing, and best practices development among local governments, develop opportunities for multi-jurisdictional collaboration and program implementation, and help secure greater levels of adaptation funding and resources.



**San Francisco Bay Regional Coastal Hazards Adaptation Resiliency Group (CHARG)** is an organization of flood control managers and scientists responsible for reducing flood risk in the Bay Area. As a strategic initiative of the Bay Area Flood Protection Agencies Association (BAFPAA), CHARG's goal is to advance the technical, scientific and engineering analysis needed for the region to implement adaptation projects and build resilience to SLR and climate change. CHARG hosts regional workshops, meetings, and presentations to share their findings and encourage collaboration.

## 14.5 CITYWIDE CLIMATE RESILIENCE PLANNING

As the City continues to study, plan for, and address SLR impacts, we are considering climate resilience comprehensively – both how we continue the City’s efforts to mitigate climate emissions and how we adapt our City to become more resilient to climate impacts. San Francisco continues to be a global leader in climate emission reduction. However, even with our best efforts locally, global emissions will continue to occur and we will continue to see climate impacts even if all climate emissions ended today. So, we must plan for climate adaptation as well as climate mitigation.

In addition to the ongoing efforts described in this chapter, the City is developing next steps for climate resilience planning, considering not only SLR but other climate-related hazards as well such as extreme precipitation, drought, poor air quality, extreme heat, and wildfire.

Deliverables for the climate resilience program include:

- **Comprehensive capital planning for climate adaptation**, including shoreline strategies for SLR adaptation
- **Climate resilient codes and standards** for new development that consider climate adaptation, including flood protection and weatherproofing, and climate mitigation such as Zero Net Energy and green roofs
- **General Plan policy updates** to ensure the City’s policy integrates and aligns with the need to address climate change and its impacts
- **Funding, legislative, and governance strategies** to reduce our climate emissions and adapting San Francisco to the impacts of climate change.

We are facing a climate emergency. San Francisco is one actor on a global scale. But we can be a leader in working to address the climate crisis and adapting our City to the coming impacts of climate change to improve the lives of people who live and work in San Francisco.

This Assessment provides essential information to help us understand our vulnerabilities to SLR and coastal flooding. It lays the groundwork for the City to work with communities to develop strategies to adapt San Francisco to SLR.









CITY AND COUNTY  
OF SAN FRANCISCO