Come Hell or High Water

Flood Management in a Changing Climate

June 11, 2024

CITY AND COUNTY OF SAN FRANCISCO

2023–2024 CIVIL GRAND JURY

About the San Francisco Civil Grand Jury

The San Francisco Civil Grand Jury (the "Jury") is a government oversight panel of volunteers who serve for one year. Each Jury determines which local government entities within San Francisco it will investigate. Private citizens also may submit written complaints to the Jury, for investigation at the Jury's discretion. The Jury cannot investigate disputes between private parties, criminal activity, or activities outside its jurisdiction, which is the government of the City and County of San Francisco and any other local governments within city limits.

In reports made available to the public, the Jury documents findings and recommendations based on its investigations. Reports do not generally identify individuals by name, and disclosure of the specific identity of anyone interviewed by the Jury is prohibited.

The San Francisco Civil Grand Jury consists of 19 city residents impaneled by a Superior Court Judge. By state law, a person is eligible for Civil Grand Jury service if the person is a U.S. citizen, 18 years of age or older, of ordinary intelligence and good character, and has a working knowledge of the English language.

2023–2024 Civil Grand Jurors

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Paul Dravis
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Roee Landesman
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Summary

Climate change has brought to San Francisco the triple threat of the sea rising along our shorelines, extreme storms dumping unprecedented volumes of water into our already strained sewer systems, and saturated surface soils preventing timely seepage into the aquifers. One result…increased flooding.

Given this unavoidable future, individual departments of the City and County of San Francisco have responded with plans to adapt to the increasingly extreme conditions.

Since 2012, the San Francisco Public Utilities Commission has been implementing the Sewer System Improvement Program, a 20-year, citywide investment to upgrade aging infrastructure and to address challenges including the impacts from climate change. 23,700 residents are forecasted to be adversely affected by inland flooding.

The Port of San Francisco's Waterfront Resilience Program, initiated in 2019, includes the ongoing Seawall Program, the Flood Resiliency Study, and related resilience planning and implementation efforts for the Port's entire 7.5 miles of waterfront property.

In 2021, the Mayor's Office created the Climate Resilience Program, also known as ClimateSF, to coordinate and oversee existing and future climate resilience projects. ClimateSF is a partnership of the SFPUC and the Port, along with the Planning Department, the San Francisco Environment Department, and the Office of Resilience and Capital Planning. The charter for that partnership has the objectives of "coordinated planning and performance management," as well as "aligned communications and engagement."

This report evaluates the city's progress towards these objectives, pointedly looking at flood management.

The Civil Grand Jury found that:

- ClimateSF assists in coordinating planning projects, yet lacks the authority to coordinate project implementation and management.
- Flood management lacks the necessary interdepartmental coordination.
- With no plan to fund the necessary adaptation infrastructure, the city is hampered by a self-imposed limit on the use of debt finance.
- The city is paying avoidable flood damage recovery costs.
- The city's activities for climate resilience are not transparent in the city's budget.
- The city is failing to communicate to residents the future impacts of climate change.

Our recommendations to address these findings entail:

- Reforming the process of decision making in the Climate Resilience Program
- Providing more transparency in planning for climate adaptation
- Reassessing the certain funding shortfalls needed to respond to the impacts from climate change
- Improving interdepartmental coordination by the city to address expected flooding
- Stepping up efforts to notify the public about flood insurance options and to inform the public about those areas most likely to be affected.

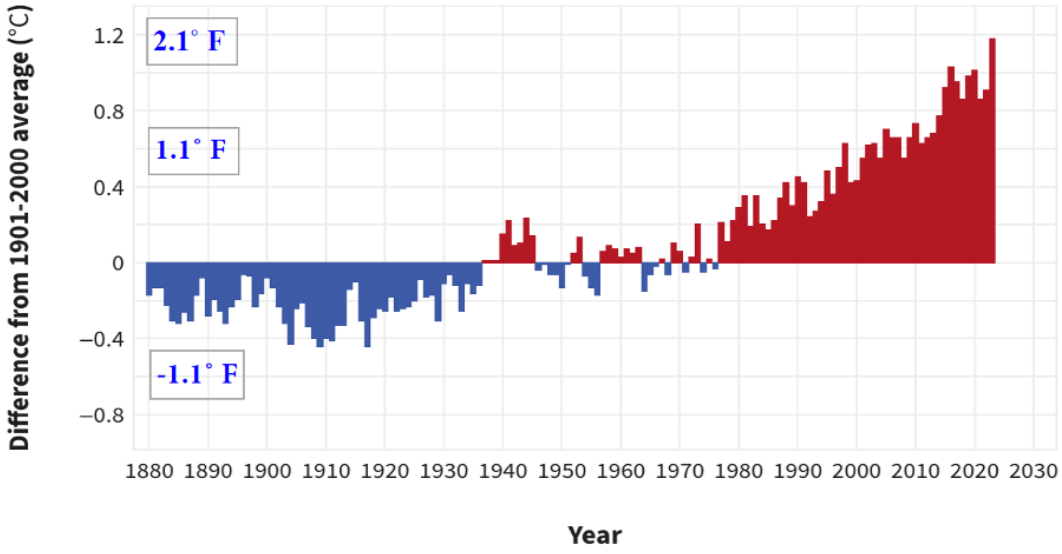
Contents

Background

The Science of Climate Change

Climate change refers to the increased warming of our planet and the downstream effects of that change, including rising sea levels, increasing frequency and intensity of precipitation, and drought. By a wide margin, 2023 was the warmest year for our planet since global record taking began in 1850. The 10 warmest years in the historical record have all occurred in the past decade (2014–2023).[1]

Figure 1: Global average surface temperature



Yearly surface temperature from 1880-2023 compared to the 20th century average (1901-2000). Blue bars indicate cooler than average years; red bars show warmer than average years. From NOAA Climate.gov.

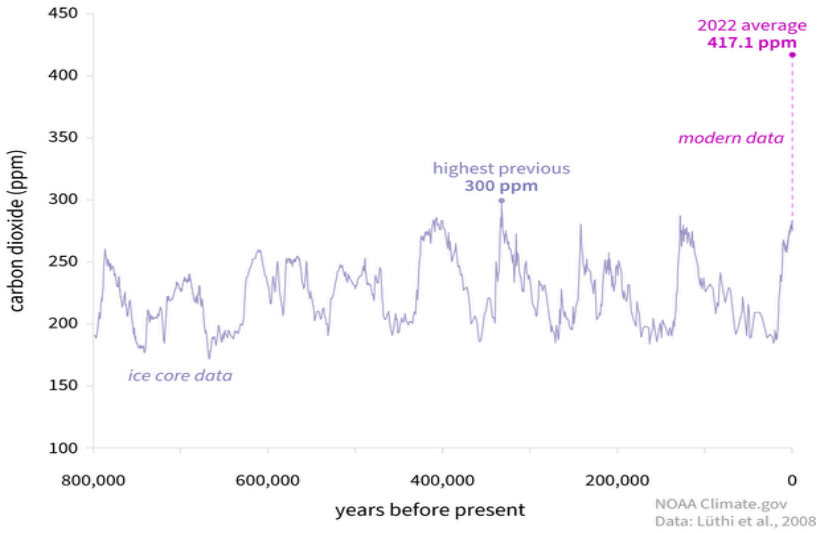
Global Warming

The increasing level of carbon dioxide released into the atmosphere by human activities, especially the burning of fossil fuels, leads to trapping of the sun's radiation when it's reflected

[1] Lindsey, R. and Dahlman, L., NOAA Climate.Gov, *Climate Change: Global Temperature*, 2024.

back from the earth's surface, which causes an increase in temperature. The increased release of carbon dioxide in industrial times has caused global warming at a rate far exceeding anything seen for millenia.[2]

Figure 2. Carbon dioxide rise over 800,000 years



Atmospheric carbon dioxide (CO_2) in parts per million (ppm) for the past 800,000 years based on ice-core data (light purple line) compared to 2022 concentration (bright purple dot). The peaks and valleys in the line show ice ages (low CO_2) and warmer interglacials (higher CO_2). The increase over the last 60 years is 100 times faster than previous natural increases.

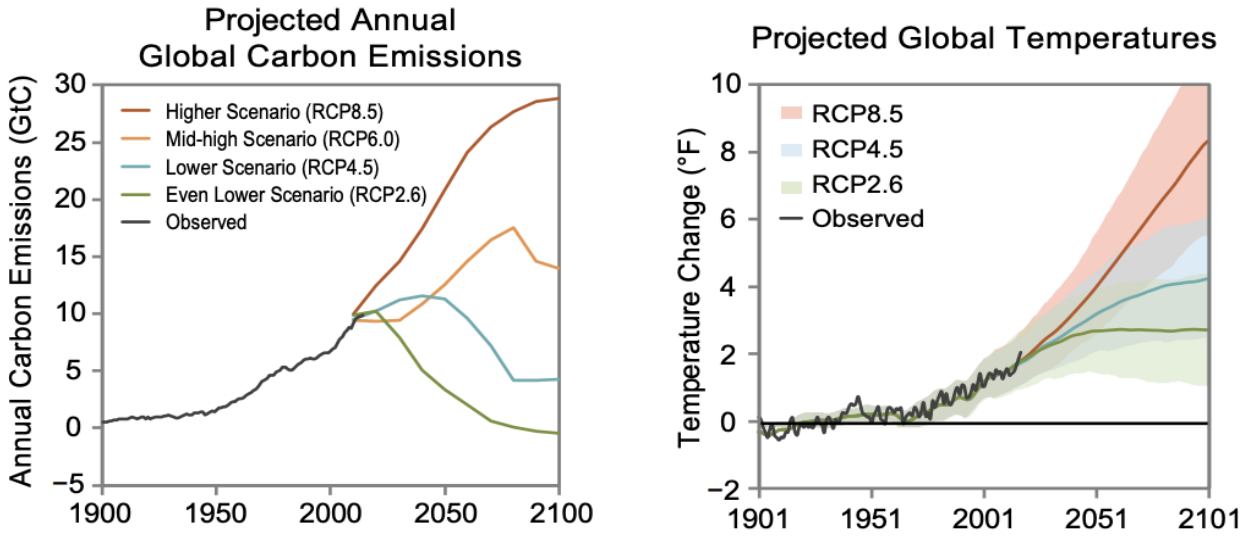
Greenhouse gases (mostly carbon dioxide) have already led to an increase in global surface temperatures of about 2 ℉ compared to pre-industrial times.[3] It is estimated that global warming will increase by an additional 2.7℉ to 7.2℉ in the next 75 years depending on our ability to limit emissions. If all countries are able to limit greenhouse gases, particularly over the next two decades, it is still possible to keep future warming under 4.5℉ by the end of the century (as opposed to the business-as-usual scenario that would propel the world towards 7.2℉ of warming).[4]

[2] NOAA Climate.gov, 2024.
[3] NOAA 2023 Annual Climate Report.
[4] Lee, et al., "Climate Change 2023: Synthesis Report," IPCC

Sea Level Projected to Rise 3.5 feet by 2100

There is scientific consensus that human activities have warmed our atmosphere, ocean, and land. The melting of ice sheets along with an increase in ocean temperature has caused the global mean sea level to increase by about 7.1 inches between 1901 and 2018. The average rate of sea level rise was 0.05 inches per year between 1901 and 1971, compared to 0.15 inches per year between 2006 and 2018.[5]

Figure 3: Greater emissions lead to significantly more warming



Left: Annual historical and a range of plausible future carbon emissions in units of gigatons of carbon (GtC) per year; Right: Historical observed and modeling of future temperature changes that would result for a range of future scenarios relative to the 1901–1960 average. Representative Concentration Pathways (RCPs) refer to future low (2.6), medium (4.5), and high (8.5) levels of CO2 potentially released into the atmosphere. From Climate Science Special Report (2022)[6]

The US National Oceanic and Atmospheric Administration (NOAA) reports that "Sea level along the U.S. coastline is projected to rise, on average, 10–12 inches in the next 30 years (2020–2050), which will be as much as the rise measured over the last 100 years. Sea level rise will vary regionally along U.S. coasts because of changes in both land and ocean height, with 4-8 inches predicted for the US west coast and 14–18 inches for the east coast."[7]

[5] "Climate Change 2023: Synthesis Report."
[6] "Climate Change: Global Temperature," 2024.
[7] Sweet, et al., NOAA Sea Level Rise Technical Report, 2022.

"In addition, about 2 feet of sea level rise along the U.S. coastline is increasingly likely between 2020 and 2100 if the current rate of carbon emissions holds steady. Failing to curb future emissions is likely to cause an additional 1.5–5 feet of rise for a total of 3.5–7 feet by the end of this century."[8]

"Sea level rise will create a profound shift in coastal flooding over the next 30 years by causing tide and storm surge heights to increase and reach further inland. By 2050, "moderate" (typically damaging) flooding is expected to occur, on average, more than 10 times as often as it does today, and can be intensified by local factors."[9]

Photo by F.Waldman

Increased Warming Will Bring More Extreme Precipitation

Historically, the Bay Area has benefited from a Mediterranean climate, with about 75% of its annual average rainfall between November and March, with little to no rainfall occurring in summer. The Bay Area oscillates between extremes, with periods of below average annual rainfall (i.e., drought conditions) interspersed with years of above-average annual rainfall.

[8] NOAA, "Sea Level Rise Technical Report." Accessed March, 2024.
[9] NOAA, "Sea Level Rise Technical Report." Accessed March, 2024.

Two storm types typically bring rainfall to the Bay Area:

- Extratropical cyclones develop offshore and can bring cloudiness and mild showers, but also severe gales, thunderstorms, blizzards, and heavy rain.
- Atmospheric rivers originate in the tropics and can bring light beneficial rain, but also torrential downpours and high winds.

Each storm type can occur on its own, or they can occur in combination. A single atmospheric river can also co-occur with a series of back-to-back extratropical cyclones. Atmospheric rivers and extratropical cyclones on the more hazardous end of the spectrum are associated with an increased risk of flooding in low-lying areas throughout the Bay Area.

The atmospheric warming associated with climate change allows for greater amounts of water vapor in the air, leading to increased levels of precipitation from these storm events. A recently published study[10] done in collaboration with the San Francisco Public Utilities Commission used storm data from five recent storms to model what future storm levels might look like with increasing atmospheric warming. They found that increased warming is very likely to be associated with significant increases in the frequency and intensity of atmospheric rivers and extratropical cyclones.

Climate Resilience: Adaptation and Mitigation

Adaptation[11] in climate parlance means anticipating the adverse effects of climate change and taking appropriate action to prevent or minimize the damage these effects can cause. Examples of adaptation measures include large-scale infrastructure projects, such as building defenses to protect against sea-level rise. Adaptation can be understood as the process of adjusting to the current and future effects of climate change.

Mitigation means making the impacts of climate change less severe by preventing or reducing greenhouse gas emissions into the atmosphere. Mitigation is achieved either by reducing the sources of these gases, for example by increasing the use of renewable energies, or by

[10] Patricola et al.,2022, "Future changes in extreme precipitation over the San Francisco Bay Area: Dependence on atmospheric river and extratropical cyclone events," *Weather and Climate Extremes* 36:2212.
[11] 2017, European Environment Agency. Accessed March, 2024.

expanding the forest footprint in order to capture these gases. Mitigation is a human intervention that reduces the sources of greenhouse gas emissions and/or enhances carbon sinks, such as forests.

The City's Response to Climate Change

San Francisco is a recognized leader in its response to climate change.

In 2013, San Francisco became one of the first 100 Resilient Cities (100RC) to receive funding and support from the Rockefeller Foundation. In 2014, San Francisco was the first city to hire a Chief Resilience Officer, and in 2016 was the first to complete a strategic plan for resilience.

To institutionalize resilience as a civic priority, in 2016 the Capital Planning Program and the Office of Resilience and Recovery merged to create the new Office of Resilience and Capital Planning (ORCP), led by the city's Chief Resilience Officer.

ClimateSF: a Partnership of City Agencies

In October 2021, the Mayor's Office launched the Climate Resilience Program, also known as ClimateSF, a partnership of city agencies to initiate, develop, and coordinate the governance of San Francisco's climate resilience efforts. Led by the Mayor's Office, the core agencies are the ORCP with the city's Chief Resilience Officer, the Planning Department, the San Francisco Environment Department (SFE), the Port of San Francisco (Port) and the San Francisco Public Utilities Commission (SFPUC). They are augmented by three partner agencies Public Works (DPW), Municipal Transportation Agency (MTA) and Recreation & Park (RPD).

ClimateSF's objectives are threefold: 1) aligned communications and engagement; 2) coordinated planning and performance management; and 3) climate resilient building and infrastructure across current projects. There is a three-tiered committee structure: department heads (Directors) of the agencies listed above are to meet quarterly; their deputy department heads are to meet every six weeks; and a team of designated staff members from each department, referred to as "the Champions," are to meet biweekly or as needed.[12]

[12] Office of Resilience and Capital Planning, ClimateSF, August 18, 2021, "Climate Resilience Program Charter," 8.

Decisions are expected to be made primarily through consensus among the Core Agencies with deference given to the agency-assigned task/project-lead for that element. When the team cannot come to a consensus, decisions can be escalated to the next level of authority, starting with the Deputies Committee and then the Directors Committee. There is no express provision in the program charter to resolve the inability to achieve consensus at the Director level meeting.

> "The objective of this approach is to ensure that all climate resilience projects throughout the city use and provide input into the climate resilience framework as well as coordinate together. Staff who are engaged in the staff level meetings shall brief and gather executive input from their respective agencies and vice versa."[13]

Progress on meeting success metrics is communicated in an annual report produced prior to the first quarterly Directors meeting after the end of the Fiscal Year.

Among the success metrics to be evaluated are:

- Developing a Resilient Infrastructure Finance Working Group that will recommend financing strategies for mitigation and adaptation projects.

- Mapping vulnerable communities located in the Sea Level Rise Vulnerability Zone as part of the Environmental Justice Framework.[14]

The Climate Resilience Framework (updated July 2022) asserts that "ClimateSF will be assessed on an annual basis. During this assessment, a rolling list of key challenges will be reviewed and revised in addition to the goals and vision."[15]

The ORCP assigned a Program Manager to ClimateSF responsible for facilitating interagency collaboration on all tasks to ensure that all program deliverables are developed in a consistent fashion. The Program Manager oversaw the ClimateSF working groups and committees and supported regular communication amongst agencies.[16] After budget cuts in the spring of 2023,[17] this position was defunded.

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[13] ORCP, Aug 18, 2021, "Climate Resilience Program Charter," 3.
[14] ORCP, Aug 18, 2021, "Climate Resilience Program Charter," 8.
[15] ORCP, Aug 18, 2021, "Climate Resilience Program Charter," 9.
[16] ORCP, Aug 18, 2021, "Climate Resilience Program Charter," 9.
[17] Dan Goncher, et al., City and County of San Francisco, Mar 31, 2023, "*Budget Outlook Update (March Five Year Update).*"

At a meeting of departmental deputies at a meeting on April 26, 2023, there was a strong preference to have a manager level position hired to lead the project.[18] There is currently no one at the department level or at the deputy level managing the city's climate change resilience program.

A posting for "ClimateSF Program Manager" was listed on December 13, 2023, and applications for this 0923 Manager II position closed on January 4, 2024.[19] A review of the ClimateSF website on May 8, 2024 did not find that a program manager had been selected.[20]

Projects Coordinated by ClimateSF

ClimateSF functions as a coordinating body for departmental projects but does not manage those projects specifically. The six lead and three partner agencies of ClimateSF oversee projects in various states of planning and implementation. Currently, there is no complete list of ongoing projects related to climate resilience in the city, nor a complete disclosure of their projected costs.

We have provided an expanded summary of many of the relevant city projects in Appendix A as identified by the Office of Resilience and Capital Planning (ORCP) on the ClimateSF website.[21] Three are described below as examples for the essential role that interdepartmental coordination plays in planning and implementation.

Ocean Beach Climate Change Adaptation Project

The Ocean Beach project is the first major climate change adaptation project in San Francisco. The SFPUC is the lead on this project to construct a buried wall to protect wastewater infrastructure and recycled water facilities from shoreline erosion.

This project was originally recommended by the 2012 Ocean Beach Master Plan, a collaborative vision for San Francisco's western coast, which brought together city agencies, the Federal Highway Administration, and the National Park Service.[22]

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[18] ClimateSF Meeting Notes, 26 Apr 2023.
[19] ClimateSF Program Manager Position, 2023, SF Careers.
[20] Office of Resilience and Capital Planning, Who We Are. Accessed May 9, 2024.
[21] Office of Resilience and Capital Planning, Climate SF. Accessed May 9, 2024.
[22] *SFPUC*, "Ocean Beach Climate Change Adaptation Project." Accessed May 6, 2024.

The Ocean Beach Project required approvals from the SFPUC, RPD, DPW, the MTA, the Golden Gate National Recreation Area (part of the National Park Service), and the Federal Highway Administration.

More than a decade later, in October 2023, the Planning Commission certified the Final Environmental Impact Report, and the project was approved by the SFPUC and Recreation and Park Commission.

On April 1, 2024 the National Park Service (NPS) published the NEPA Environmental Assessment to consider whether to issue an easement and Special Use Permit to the city for work within NPS land to implement the Ocean Beach Climate Change Adaptation Project.[23]

In the spring of 2024, the Recreation and Park Commission presented the plan for closure of the Great Highway Extension between Sloat and Skyline Boulevards to the Board of Supervisors as an essential element of the project. The latest delay concerned a tenant of the Recreation and Park Department, the San Francisco Zoological Society, about the effect of the closure on parking lot access for patrons.

At a hearing of the Board of Supervisors Land Use and Transportation Committee on April 29, 2024, after a community leader referenced "multi-year delays," an ordinance to close the Great Highway Extension in 2026 was forwarded to the full Board which passed it within three weeks.

The current schedule estimates construction will begin in 2025 and last for approximately four years.

Sewer System Improvement Program

Since 2012, the SFPUC has been implementing the Sewer System Improvement Program (SSIP), a 20-year, citywide investment to upgrade aging infrastructure, addressing seismic vulnerability, climate change, localized flooding, and water quality.[24]

[23] 2024. San Francisco Recreation and Park Civic Alert.
[24] *SFPUC* website, "Sewer System Improvement Program."

Stormwater flooding occurs during storm events as rainfall runoff collects in areas that once were naturally-formed waterways but are now contained within the city's combined sewer and stormwater collection system.[25]

Stormwater flooding can cause physical damage to buildings and infrastructure, disrupt economic activity, and impair public health.[26]

As climate change causes sea level rise and precipitation events to become more intense, the frequency and extent of stormwater flooding will increase.[27]

Extreme storms will increasingly drop more rain in a shorter period. The intensity of the more frequent smaller storms will increase even more than extreme storms.[28] As sea level rises, the ability for the sewer system to discharge to the Bay and creeks will be counter-gravitational, thus requiring mechanical assistance to avoid stormwater seepage into buildings and onto streets when the system capacity is overwhelmed.

Additionally, if coastal storm water overtops the shoreline and is captured by our combined sewer system, the saline content has the potential to damage biological treatment processes and further decrease available system capacity for wastewater needs, as designed, into the Bay.[29]

In general, flooding adaptation requires one or a combination of three options: accommodate (raise or waterproof assets in place), protect (create natural or engineered barriers, such as wetlands or levees), or retreat (relocate sensitive assets to low-risk areas and/or transition high-risk areas to lower-risk uses).

In a presentation to the Capital Planning Committee, in December of 2022, the SFPUC Climate Change Project Manager reported that the Wastewater Enterprise could not "manage that change alone" within our sewer system.[30]

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[25] *SFPUC* website, "Our Combined Sewer."
[26] National Institutes of Health, "Health Impacts of Extreme Weather." Accessed May 6, 2024.
[27] Environmental Protection Agency, 2023, "Climate change indicators in coastal flooding."
[28] Mak M, Neher J, May CL, Finzi Hart J, Wehner M, Roche A., 2023, "*San Francisco Precipitation in a Warmer World*," Volume 1: State of the Science, 9.
[29] Port of San Francisco, "San Francisco Waterfront Flood Study."
[30] Capital Planning Committee, Dec. 12, 2022, Minutes, "Extreme Precipitation Study Slide 9."

Without the capacity to either convey, store or discharge the amount of water beyond the existing Level of Service objective (a three-hour storm event that delivers 1.3 inches of rain), the SFPUC expects inland flooding.[31]

The Islais Creek area (Cayuga/Alemany), South of Market, Inner Mission, and Civic Center/Western Addition include significant areas that are at risk of stormwater flooding during a 100-year storm, that is, a storm with a projected likelihood of 1% in any given year, as well as during rainfall events that occur more frequently.[32]

Seawall Resilience Project and Army Corps of Engineers Study

In January 2024, the US Army Corps of Engineers (USACE) and the Port issued a draft feasibility and environmental impact study of a program to reduce the risk of flooding along approximately seven and a half miles of the city's northeastern waterfront.[33] Prepared over the course of six years, the draft report seeks to "identify vulnerabilities and recommend strategies to reduce current and future flood risks."

The draft report's origins lie in a 2018 congressional appropriation, the San Francisco Waterfront Coast Flood Study, and a general obligation bond known as the Embarcadero Seawall Earthquake Safety Bond, approved by voters in November 2018.

The study projects that flooding from rising sea levels could result in approximately $23 billion in damages to Port properties and adjoining neighborhoods over the next 100 years, and makes high-level recommendations of flood and seismic defenses that will need to be built to mitigate these risks. Much of the projected work is directed at shoring up the city's century-old seawall.[34]

Figure 4 shows the currently estimated limits of flooding and inundation along the city's eastern shoreline due to the anticipated increase in sea level.

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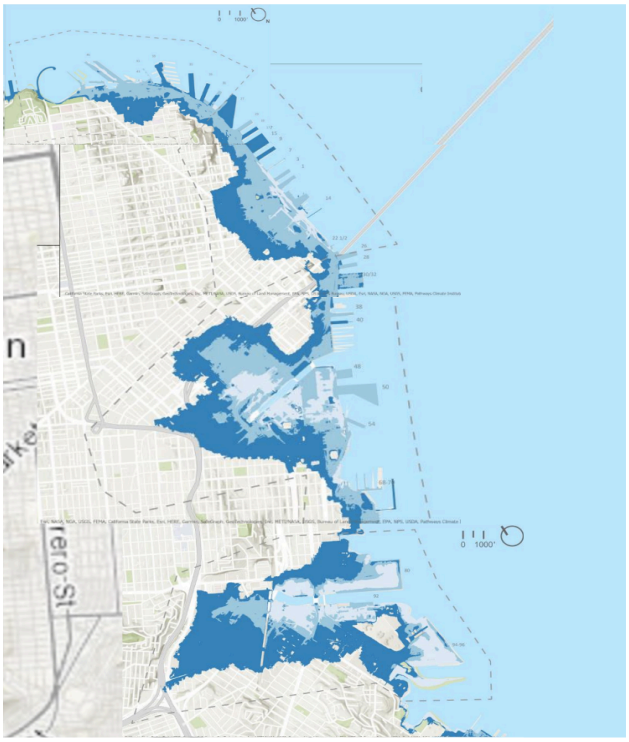
[31] *San Francisco Precipitation in a Warmer World*, Volume 1.
[32] San Francisco Waterfront Flood Study.
[33] United States Army Corps of Engineers, 2024, "San Francisco Waterfront Coastal Flood Study, CA Draft Integrated Feasibility Report and Environmental Impact Statement."
[34] USACE, 2024, "San Francisco Waterfront Coastal Flood Study," and Port of San Francisco, U.S. Army Corps of Engineers Draft Plan press release.

Figure 4: Composite map showing USACE inundation areas [35]



Extent of possible inundation by 2140 expected under 1% likely flood event and Relative Sea Level Rise as described in the USACE "Future Without a Project" scenario.

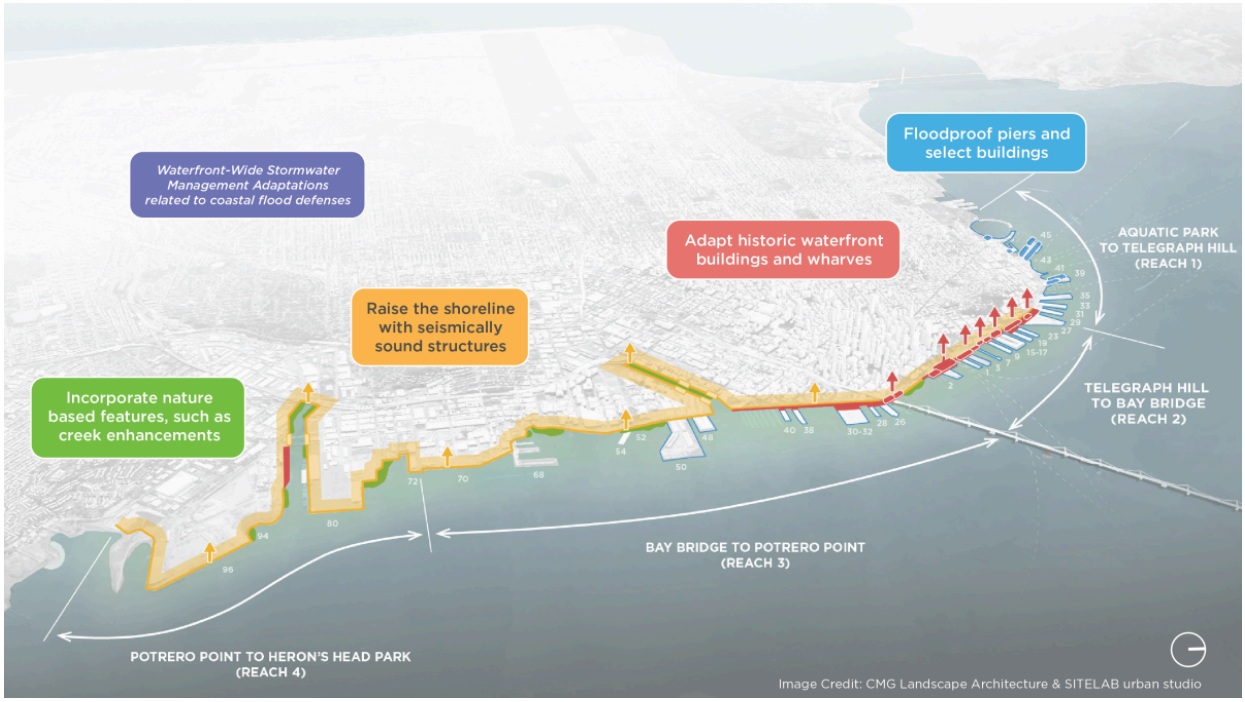
Colors refer to low ( ), intermediate ( ) and high ( ) relative sea level rise.

Coastal hazards relevant to the 7.5 mile San Francisco Waterfront study include coastal flooding, inundation, waves, and erosion. Coastal flooding occurs when Bay water levels rise above the shoreline along the waterfront. Coastal flooding already occurs almost annually along the lowest spots of the shoreline. Given the currently projected extent of flooding, the potential damage and disruption can result in physical damage to structures, business interruption, transit delay and inundation of contaminated areas.[36] The draft report does not detail specific designs for proposed construction, but it estimates that adaptation efforts will cost approximately $20.5 billion over twenty years. Subject to Congressional approval, the United States federal government would furnish 67% of funding, with the State of California and the city responsible for the balance.

[35] San Francisco Civil Grand Jury composite map based upon USACE "San Francisco Waterfront Coastal Flood Study," ES-1, ES-2; Figures 3-6, 3-7, 3-8, 3-9; 59-63.
[36] Port of San Francisco, U.S. Army Corps of Engineers Draft Plan press release.

Figure 5 depicts the maps for Reaches 1–4 of the USACE study, spanning the coastline from Aquatic Park in the north to Heron's Head in the south. This figure describes the types of adaptation methods suitable for the four different major portions of the USACE draft study.

Figure 5: Seawall Resilience Project and Army Corps of Engineers study



The draft report is currently available for review and comment by city departments. A final report is expected in early 2025.

Climate and Hazards Resilience Plan

The three projects described above, two led by the SFPUC, and one led by the Port of San Francisco, require design and planning in coordination with other city departments.

The coordination of planning has been guided by the 2020 Hazards and Climate Resilience Plan (HCR), itself an inter-agency effort led by the ORCP, to better understand and address the impacts of natural disasters on San Francisco[37]. The HCR serves as a near-term implementation

[37] San Francisco Office of Resilience and Capital Planning, 2020, "Hazards and Climate Resilience Plan."

plan for the long-term policies of the Community Safety Element of the San Francisco General Plan.

The HCR's risk assessment evaluation quantifies the impact of flooding risks to the city.[38] In its citywide hazard exposure analysis, the HCR identifies 23,700 San Francisco residents at risk of inland stormwater flooding, or 2.7% of the city's population.[39] Importantly, the HCR acknowledges the impact of climate change increases over time, affecting more people, more critical facilities and more commercial parcels.

The HCR also serves as a plan for the city to "increase resilience to the impacts of climate change."[40] It provides more than ninety-five strategies for the adaptation and mitigation of hazards and risks to the city over multiple projects, carrying varied timelines for implementation. Sixty-five of these strategies are in response to the hazards of flooding.[41]

Of strategies in the HCR, the jury highlights fifty-nine strategies directly related to the hazards and risks of climate change across the three cost domains detailed in the HCR.[42] Appendix C highlights the strategies and projects the jury identifies as relating to climate change. The extent to which each strategy relies on multiple city departments demonstrates how climate resilience necessitates cross-departmental work and project management. The following table details the projected cost ranges for each of these strategies, giving insight on the financial implications of climate resilience in San Francisco. [43]

[38] ORCP, 2020, "Hazards and Climate Resilience Plan," 198.
[39] Number of residents at risk from stormwater flooding during a 100-year storm. ORCP, 2020, "Hazards and Climate Resilience Plan," 200.
[40] ORCP, 2020, "Hazards and Climate Resilience Plan," 5.
[41] ORCP, 2020, "Hazards and Climate Resilience Plan," 233-239.
[42] ORCP, 2020, "Hazards and Climate Resilience Plan," 229-293.
[43] ORCP, 2020, "Hazards and Climate Resilience Plan," 233-291.

Table 1. Climate resilience strategies identified in the Hazards and Climate Resilience Plan

	Low Cost Level (0-$500k per strategy)	Medium Cost Level ($500k-$5M per strategy)	High Cost Level ($5M and above per strategy)	Cost Level Yet To Be Determined
Number of climate change identified strategies in each cost level	18	15	18	8

Financing of Climate Resilience

The Jury investigated two sources of funding for climate resilience, debt financing and flood insurance, which are subject to the city's process and policies, while acknowledging that grants from federal and state budgets must serve a major role in the financing of infrastructure projects required by climate change. For a more extensive review of city finance, please see Appendix B.

Debt Financing

Like virtually all municipalities and agencies, the City issues debt to fund major capital projects (e.g., buildings and infrastructure improvements). Efforts to fund climate resilience projects have included a number of individual bond measures. A $425 million Seawall Resilience bond measure was approved by San Francisco voters in 2018.

A $250 million Waterfront and Climate Safety bond measure is scheduled for a vote of approval in March 2028, followed by another $200 million Waterfront and Climate Safety bond measure scheduled for a November 2032 vote.[44]

[44] City and County of San FranciscoCapital Plan for Fiscal Years 2024-2033, Table 51.1, 65

Flood Insurance

The City is a participant in the National Flood Insurance Program (NFIP). Under this program, which is managed by the Federal Emergency Management Agency (FEMA), the federal government makes flood insurance available at affordable rates in the city. Homeowners, renters, and businesses are eligible to purchase federally subsidized flood insurance to protect their properties.

Analysis

ClimateSF Was Designed to Coordinate Planning, Not to Coordinate Implementation

ClimateSF's program charter states as an objective the "coordinated planning and performance management" of infrastructure projects, but it has played more of an active role in shared planning between departments than in coordinating the implementation of projects. The management of projects has been the responsibility of the designated lead agency.

Departments Function Within Silos

The practice of designating separate departments as "leads" for individual projects has adversely affected the way in which city agencies operate. That independent culture has resulted in agencies having their own teams for capital projects, for communications, and for finance. When a project requires coordination between departments, we found no specific process in place to optimize the collaboration.

The Ocean Beach Climate Change Adaptation Project offers a cautionary tale regarding interdepartmental cooperation. We learned in our investigation that the excessive delay leading to the projected 2025 construction start of the Adaptation Project from a recommendation in the 2012 Ocean Beach Master Plan was due in significant part to the lack of coordinated planning and implementation between the various participating departments and agencies.

The "multi-year delays" were commented upon at the April 29, 2024, hearing before the Board of Supervisors' Land Use and Transportation Committee on an ordinance to close the Great Highway Extension. Based upon the concern the ordinance would have on their visitors' access to a parking lot, the San Francisco Zoological Society continued to debate the enabling legislation.

The Waterfront Coastal Flood Study released in January 2024 by the United States Army Corp of Engineers (USACE) is a contemporary example of the need to work in conjunction with other

agencies when designing and constructing a significant capital improvement like a seawall. While a seawall may prevent intrusion by seawater due to rising sea levels, it might also limit the effectiveness of the city's infrastructure to remove excessive stormwater runoff from an extreme precipitation event. As a consequence, the USACE Study will likely include modeling of the city's drainage systems' ability to collect and discharge stormwater in response to severe precipitation of varying intensity and duration.[45]

There is much to admire in the Port's success in being awarded the USACE Study, and it would not have happened if the USACE were not convinced that the Port could work efficiently with the San Francisco Public Utilities Commission (SFPUC), the Municipal Transportation Agency (MTA), Public Works and other city departments. However, there is little evidence that the structure of the ClimateSF partnership influenced the award process.

Federal study of the waterfront seawall improvements began in 2013, years before the formation of ClimateSF. In addition, the Port Director had direct access to the Mayor and the Mayor's Chief of Staff throughout the planning process, and was never reliant on the Flood Administrator or the Chief Resilience Officer.

At the March 25, 2024, Board of Supervisors Land Use and Transportation Committee, there was a hearing to receive an informational presentation on the USACE Study. The Committee Chair questioned the Waterfront Resilience Program Director on how the Port was going to coordinate the necessary implementation of the adaptation projects with the various affected city agencies. The Program Director replied that ClimateSF was the mechanism for coordination. The Chair then asserted that ClimateSF was fine for coordinating planning projects, but it did not indicate who would coordinate the governance, budgeting, and project management necessary to implement the projects.[46]

Absenteeism at Director Level Meetings

Review of the minutes from the ClimateSF Directors meetings in the last few years show an average of two or three directors and up to a dozen lower level staffers attending. Our investigation revealed that staffers at every agency involved in ClimateSF would attend the

[45] United States Army Corps of Engineers, 2024, "San Francisco Waterfront Coastal Flood Study," ES-12.
[46] Board of Supervisors Land Use and Transportation Committee Minutes, March 25, 2024.

quarterly Director meetings to advise and advocate for policies, but few Directors attended. The directors of the Port and SFPUC, arguably two of the agencies most focused on flood management, only attended one meeting together in all the years reviewed.

However, increased attendance at the Directors level meeting may create new concerns. The overlap in positions between the Director level meeting and the Capital Planning Committee (CPC), raises the possibility that convening Directors at a ClimateSF meeting would create an unannounced, non-agendized quorum of the CPC — which would violate the requirement that such meetings be publicly announced and formally agendized under the Ralph M. Brown Act. It would be important to resolve this Brown Act issue to facilitate greater attendance by Directors at the Directors level meeting.

Staff Initiatives Do Not Get Elevated and Amplified at Directors' Level

Initially, ClimateSF meetings were intended to be structured to facilitate sharing information between departments and discussing the climate resilience projects each agency was considering. However, our investigation revealed that the current meeting structure does not provide a procedure to propagate ideas through the departments toward implementation. Good ideas were discussed at the staff level; however, by not attending staff level meetings, departmental leadership did not then develop ideas for implementing them. The Directors and lower level staff with whom we met agreed that this represents a limit to ClimateSF's structure.

The conclusion of staff and administrators at the core agencies is that ClimateSF has been helpful as a structure to share information at the staff level, but not an effective structure to manage infrastructure projects.

ClimateSF's Failure to Publish an Annual Review Conceals Their Success

Each year, ClimateSF performs an annual review of the success metrics listed in the program charter. However, the Jury has not found any publication of the results of these reviews. The ClimateSF website provides a link to sign up for a quarterly newsletter in which such results could be published.[47]

[47] San Francisco Office of Resilience and Capital Planning, "ClimateSF".

The public needs to know what is being currently done to adapt to climate change, as they will be the taxpayers, ratepayers, and floodplain dwellers affected by the success of the city's resilience efforts.

No Citywide Plan to Aggregate Costs of Climate Adaptation

Climate adaptation funding is hampered by departmental silos, self imposed limits on debt financing, and the lack of a consolidated list of projects.

As discussed above, the city's efforts to fund climate resilience projects include bond measures, with 2018's bond supplemented by bonds scheduled for voter approval in 2028 and 2032. Regrettably, these funds alone will not be enough. Combined, these bond packages amount to less than $1 billion — but the state's and city's projected share of the $21 billion USACE Waterfront Plan alone exceeds $7 billion.

The Jury found no citywide plan to address the aggregate costs of climate adaptation, nor the impact that financing the adaptation projects will have on property tax rates or service rates at the city's so-called enterprise departments — SFPUC, MTA, the Port, and the San Francisco International Airport (SFO).

Departmental Silos

A recent funding dispute augurs the difficulties the city will face in marshaling multiple departments to secure funding for climate adaptation programs.

In 2021–2022, the San Francisco Civil Grand Jury recommended an independent, third-party study of Hunters Point Shipyard to predict modifications to the site under multiple sea level rise scenarios. When the Mayor disagreed with this recommendation, the Board of Supervisors (BOS) resolved to implement the study through the budget appropriations process — but the SFPUC subsequently refused to allocate funds from its reserve to fund the study. The BOS was forced to appropriate $500,000 from the City's general fund, instead.

When departments withhold even minuscule amounts relative to the costs of resiliency adaptation, it is clear that funding in response to climate change must be centrally coordinated.

The Jury agrees with a remark from the SFPUC's Climate Change Project Manager in a December 2022 hearing: the challenges of dealing with sea-level rise, shallow groundwater, and excess surface water from extreme precipitation will require efforts that span departments. Neither the SFPUC nor any other Enterprise or General Fund department can "manage that change alone."

Self-Imposed Limits on Debt Financing

The city's funding for climate resilience-related projects will require financing using debt securities comprising both General Obligation and other General Fund-serviced debt, and revenue bonds issued by the city's enterprise departments. A summary of these financing strategies is available in *Appendix B*.

However, the city's ability to issue debt beyond amounts reflected in the current 10-Year Capital Plan[48] is constrained in two ways:

- There are explicit limitations on how much debt the city can issue that is serviced by funds from the General Fund.
- There are implied limitations on how much debt the city's enterprise departments can issue in order to maintain affordability for their ratepayers and competitive pricing for their customers.

General Obligation Bonds: Hitting the Limit in 2028

Since 2006, the Board of Supervisors has approved annual budgets in conformity with a Capital Planning Committee (CPC) policy that imposes a financial constraint on the use of General Obligation debt such that debt service does not increase property owners' tax rates above fiscal 2006 levels. This limit is shown as the red line in Figure 6, Capital Plan G.O. Debt program FY 2024–33.

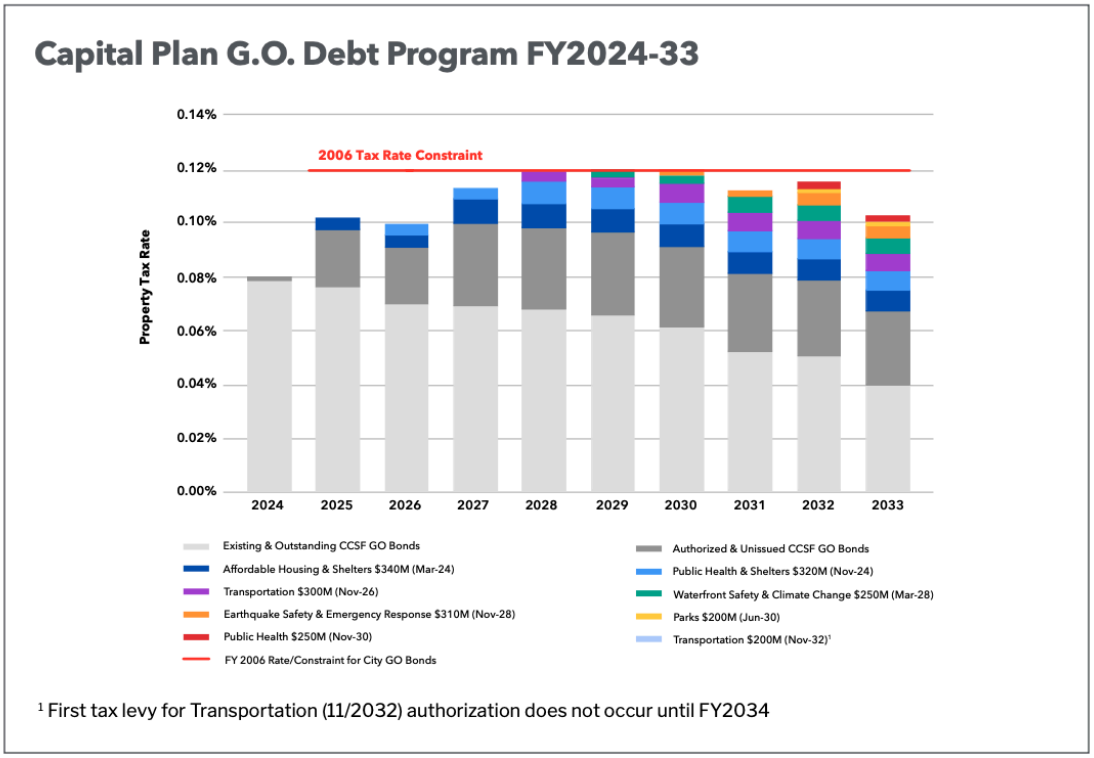
[48] City and County of San Francisco Office of Resilience and Capital Planning, 2021, "City and County of San Francisco Capital Plan for Fiscal Years 2024-2033," Fiscal Years 2024-33 Capital Plan.

The limitation is included in CPC budget presentations and in ballot pamphlets when bond measures are put before the electorate. However, the limitation is not reflected in the city's official debt policy published by the Controller's Office of Public Finance.[49]

As Figure 6 shows, the city's ability to issue additional General Obligation Debt will become limited by this constraint in FY28, FY29, and FY30. Note that this 10-Year Capital Plan does *not* yet reflect the incremental spending needed to fund the city's contribution to the seawall project proposed in the USACE report.

The USACE report notes an estimated $7.2 billion cost share to be paid by the combination of the State of California and the city.[50] It is not yet known what percentage of this cost share will need to be borne by the city — but it is clear that given the extraordinary future costs of climate related adaptation, the city needs to reassess self imposed limits on debt financing.

Figure 6: City General Obligation Bond Program expected issuance[51]



[49] San Francisco Controller's Office, 2019, "Debt Policy of the City and County of San Francisco."
[50] USACE Study, ES-9.
[51] City and County of San Francisco Capital Plan for Fiscal Years 2024-2033, Chart 1.1, 10

Enterprise Divisions Have Little Room for Additional Debt

Like the city itself, the SFPUC, the MTA, SFO, and the Port may need to make additional investments beyond those amounts now planned to ensure their operating infrastructures are upgraded to provide adequate climate resilience.

These enterprise departments maintain their own capital budgets and long-term capital plans, and their ability to service debt is a function of both current debt outstanding and the revenue streams they expect to receive from users and citizens in the form of fees paid for services received.

The 10-Year Capital Plan identifies $8.3 billion in revenue bond issuances by the SFPUC and SFO for projects now planned:

Figure 7: Planned revenue bond issuances FY 2024–33[52]

Planned Revenue Bond Issuances FY2024-33
(Dollars in Millions)

Agency	FY24-28	FY29-33	Total
SFPUC	5,289	1,258	6,546
Airport	669	1,060	1,729
Total	**5,958**	**2,318**	**8,276**

The precise timing and scale of the effects on the city of sea level rise, groundwater inundation, and surface water flooding from extreme precipitation are beyond the scope of this report. Nevertheless, it is clear that, over the next several decades, the need will arise for additional capital projects not now contemplated.

To better understand the abilities of the major Enterprise divisions to issue additional debt beyond the amounts set out in the 10-Year Capital Plan, we engaged the divisions to learn more.

Overall, our investigation found the Enterprise divisions currently operate with levels of debt that are well matched to their abilities to service the debt given the service rates now in place.

[52] San Francisco Office of Resilience and Capital Planning, 2023, "10-Year Capital Plan FY2024–33," 69.

However, little additional capacity exists for unexpected major capital projects. Major new costs would require increases in these departments' service rates, or subsidies drawn from the city's General Fund. Key facts learned in our analyses of various enterprise divisions include:

- The SFPUC's ability to support unexpected debt issuance is sharply constrained by commitments to maintain affordability for the most economically vulnerable 20% of the customer base. That commitment will become limiting in FY2036–37.[53] This suggests any major unexpected capital projects will require the SFPUC to revisit the affordability policies for all customers.

- The SFMTA is currently grappling with an operating deficit forecast to be approximately $13 million in FY2025–26 and $240 million in FY2026–27.[54] Consequently, the SFMTA has little capacity to issue any debt beyond those amounts reflected in the Capital Plan. Should unexpected projects require funding, it is unclear how the SFMTA would be able to finance such projects without reverting to additional funding from the City General Fund and/or increasing service fees and transit fares.

- SFO's planning horizon contemplates supporting capital infrastructure growth to accommodate an increase in traffic with annual enplanements rising from 47 million passengers in FY2022–23 to an estimated 71 million within 15 years. Management's capital budgeting process now plans for expenditures of $1.9 billion for a range of projects addressing terminal redevelopment, airfield, groundside, and terminal enhancements.

The 10-Year Capital Plan, the city Debt Policy maintained by the Department of Public Finance within the Controller's Office, and CPC and capital plan forecasts maintained by enterprise divisions do not discuss the conditions under which self-imposed policies and limitations may have to be modified, nor do they discuss the possible scope and scale of those modifications that may be necessary to provide funding for climate resilience programs.

[53] San Francisco Public Utilities Commission. 2024, "FY 2025 10-Year Financial Plan Presentation," slide 9.
[54] San Francisco Municipal Transportation Agency, 2024, "SFMTA Board Workshop," slide 23.

Lack of a Consolidated List and Cost of Infrastructure Projects

The costs of implementing climate adaptation will be substantial. Policymakers need to assess those costs relative to costs currently incurred and future costs avoided. Unfortunately, however, there is no clear answer to what the city is spending now to address climate change.

In our investigation, the Jury found neither a consolidated list of infrastructure projects devoted to climate change resilience, nor a line item in the capital budget representing investment in the necessary adaptation. Without such centralized reporting, city planners are hampered in their efforts to estimate how much capital investment will be necessary to adapt to climate change.

Each department pursues its separate efforts to plan and implement projects for climate change resiliency, but neither the San Francisco Environment Department nor the ORCP maintains a comprehensive list of projects specifically focused on climate change resilience.

The Office of the Controller does not segregate expenditures that involve investments in climate adaptation, so neither the two-year budget nor the 10-Year Capital Plan distinguishes those items.

It is difficult to determine how much the city is currently spending on climate change as a baseline for future investments.

Flood Management Planning Lacks Interdepartmental Coordination

Currently when storms are predicted, the heads of DPW and SFPUC and their staff make contact to manage the potential flooding as a team. The connections are made *ad hoc* to the storm conditions of the moment. There is no formal meeting structure for prospective flood planning.

Repeatedly in our investigation, we were told that interdepartmental processes are highly dependent upon the personal knowledge and history of relationships of the particular staff members. While there is a certain efficiency in these informal networks, staff turnover and flood infrastructure planning may require a more formal process.

Future Stormwater Will Exceed the Capacity of Our Wastewater Enterprise

In a December 2022 presentation on the increase of extreme precipitation made to the Capital Planning Committee, the SFPUC Climate Change Project Manager reported that the Wastewater Enterprise could not "manage that change alone" within the city's sewer system.[55]

Without the capacity to convey, store, or discharge the amount of stormwater in question, the SFPUC predicted inland flooding from a three-hour storm event that delivered 1.3 inches of rain.[56]

Flood Administrator Lacks Operational Governance

The 2008 Floodplain Management Ordinance enabled access to federal flood insurance, governed construction in flood-prone areas, and designated the City Administrator's Office (CAO) as the city's Floodplain Administrator.

Our research showed that the intent of the ordinance was to qualify for federal insurance and construction guidance. Our investigation found that their designation of the CAO as the city's Floodplain Administrator was to comply with a condition of participating in the National Flood Insurance Program. With no additional staff or budget allocated to the CAO, there were no changes in operational authority for floodplain management added to the CAO's already considerably wide portfolio of responsibilities.

The interdepartmental issue of flooding will require more centralized governance and clarity as to lines of authority.

The City Pays Avoidable Costs from Flooding

To support the National Flood Insurance Program (NFIP), FEMA publishes Flood Insurance Rate Maps (FIRMs) for participating communities, which are used for flood insurance and floodplain management purposes. FIRMs show Special Flood Hazard Areas (SFHAs), which are defined as

[55] San Francisco Public Utilities Commission, 2022. "Extreme Precipitation Study," slide 9.
[56] Mak M, et al., 2023, *San FranciscoPrecipitation in a Warmer World*, Volume 1: State of the Science, 23.

areas subject to inundation during a flood having a 1-percent chance of occurrence in any given year (also referred to as the Base Flood or 100-year flood).

Under Federal laws that govern the lending industry, flood insurance is required only for structures in SFHAs that have mortgages from federally backed or federally regulated lenders. Otherwise, flood insurance purchase is voluntary.[57]

Property owners that are not underwritten by NFIP seek compensation for flood damage by making claims against the city for inadequate waste water drainage. These claims, when granted, are paid by the city's General Fund.

Climate Change Policy Lacks Coordinated Communications

While the program charter of ClimateSF includes "aligned communication and engagement" as its first objective, the departments continue to rely on their own robust public affairs organs of communication.

Flood Management Decisions Require Public Accountability

Decisions about which areas of the city are valuable enough to fund for climate resilience projects and which will need to be abandoned in managed retreats have huge impacts on residents. The public needs to know how those decisions are made and who makes them.

Additionally, decisions about where public money gets invested to respond to flooding should be transparent. Without a published list of cross departmental projects on flooding, those decisions are not fully available for review and public comment.

[57] San Francisco Office of Resilience and Capital Planning, "Floodplain Management Program."

Findings and Recommendations

The Jury made the following findings and recommendations in regard to the City of San Francisco's response to climate change and efforts to create a more resilient city.

Finding 1 – ClimateSF Governance and Coordination Are Inadequate

ClimateSF provides neither the necessary governance nor interdepartmental coordination of projects to address climate change because the currently configured Director level meeting cannot execute the recommendations generated from the staff level meetings.

Recommendations

Recommendation 1.1 — Henceforth, the quarterly Director level meetings of ClimateSF shall be included as part of the monthly Capital Planning Committee meeting agenda.

Recommendation 1.2 — Henceforth, the monthly Capital Planning Committee meetings shall include a permanent agenda item with an update on the status of resilience plans.

Recommendation 1.3 — Beginning 2025, ClimateSF shall prepare an annual report for the public, summarizing the status of the ongoing climate resilience projects, using standardized metrics, including a description of the project, the Core agency in charge, the intended climate resilience measures, a projected cost, budget status and project timeline. This recommendation may and should be implemented administratively.

Recommendation 1.4 — If Recommendation 1.3 is not implemented administratively, the Board of Supervisors shall enact an ordinance making the annual report a legal requirement.

Finding 2 – Resilience Projects Are Not Easily Identifiable

The city infrastructure projects designed for climate resilience are not transparently identifiable, hindering management and audits.

Recommendations

Recommendation 2.1 — By April 30, 2025, the Controller shall aggregate and publish departmental expenditures that address climate change adaptation and mitigation. This information shall be given consistent search tags describing resilience projects that allow for efficient tracking of expenditures.

Finding 3 – Funding of Climate Resilience Is Hampered by Debt Cap and Service Rate Constraints

Absent a citywide plan to fund the necessary adaptation infrastructure, the city is additionally hampered by a self-imposed limit on the use of general obligation bonds ($0.1201 per $100 of assessed value). Further, the jury finds the SFPUC, SFMTA, SFO, and Port face service rate constraints or competitive concerns that hamper additional use of revenue bonds.

Recommendations

Recommendation 3.1 — By December 31, 2024, the Mayor and/or City Administrator shall develop and publish a cross-department financial plan to respond to the anticipated costs of climate change resilience and potential sources of funding.

Recommendation 3.2 — By December 31, 2024, the Board of Supervisors shall direct their Budget and Legislative Analyst to do an analysis of the impact on the city's General Fund of increasing the current limit for General Obligation Bonds.

Recommendation 3.3 — By December 31, 2024, the Controller's Office of Public Finance shall add a disclosure of the property tax limit to the *Debt Policy of the City and County of San Francisco*, Section VII Debt Limitations Section A General Obligation Bonds.

Recommendation 3.4 — By December 31, 2024, the City Administrator shall direct the Capital Planning Committee to include in the 10-Year Capital Plan the likely property tax and enterprise service division rate increases that will be necessary to fund emerging climate resilience measures.

Finding 4 – Flood Management Needs Interdepartmental Coordination

Flood management lacks a formal coordination process for an increasing environmental extremity that requires planning and implementation between multiple city departments.

Recommendations

Recommendation 4.1 — By December 31, 2024, the Mayor and the Board of Supervisors shall request a report from the City Administrator, as Floodplain Administrator, on the optimal governance structure (for example, CPC, Deputy City Administrator, Floodplain Administrator) to implement interdepartmental flood adaptation procedures.

Recommendation 4.2 — By December 31, 2025, the Mayor, the City Administrator, and all city agencies that interface with flood management planning shall sign a Memorandum of Understanding that specifies governance, budget, and priorities for Flood Management planning, and that clearly describes the responsibilities of core agencies and ancillary agencies.

Finding 5 – Flood Damage Claims Are Not Funded by Insurance

The city is compensating claims for flood damage from the General Fund that might be obtained by insurance underwriting.

Recommendations

Recommendation 5.1 — By December 31, 2024, the Board of Supervisors shall request a Budget and Legislative Analyst report on the advisability of a Board resolution urging modification of the federal mandate to purchase flood insurance beyond that which is currently required in the FEMA designated floodplain.

Recommendation 5.2 — By December 31, 2024, the City Administrator, as Floodplain Administrator in coordination with the City Attorney and the Mayor, shall develop procedures to inform and encourage property owners to voluntarily purchase flood insurance.

Finding 6 – The City Fails to Communicate Impacts of Climate Change

The city is failing to communicate the future impacts of climate change to the residents who will be most affected.

Recommendations

Recommendation 6.1 — Starting October 1, 2024, ClimateSF shall coordinate the communication of the projected impacts of climate change and the city's mitigation and adaptation efforts.

Recommendation 6.2 — By December 31, 2024**,** the Board of Supervisors shall direct their Budget and Legislative Analyst to prepare a financial analysis of the possible differential harms of climate change resilience projects within marginalized communities.

Recommendation 6.3 — By December 31, 2025, the Board of Supervisors shall hold annual public hearings on the differential harms of climate change resilience projects within the impacted communities with testimony from the Department of the Environment and the Human Rights Commission.

Recommendation 6.4 — By December 31, 2025, the Commission on the Environment shall hold annual public hearings on the differential harms of climate change resilience projects within the impacted communities. The annual public hearing may, but need not, occur in conjunction with the annual public hearing of the Human Rights Commission referenced in Recommendation 6.5.

Recommendation 6.5 — By December 31, 2025, the Human Rights Commission shall hold annual public hearings on the differential harms of climate change resilience projects within the impacted communities. The annual public hearing may, but need not, occur in conjunction with the annual public hearing of the Commission on the Environment referenced in Recommendation 6.4.

Required and Requested Responses

Pursuant to California Penal Code §933, the Jury requires responses to the findings and recommendations shown in *Table 2*.

- Mayor and City Attorney within 60 calendar days
- Board of Supervisors within 90 calendar days

Table 2 : Required responses

Respondent	Findings	Recommendations
Mayor	1, 3, 4, 6	1.1, 3.1, 3.4, 4.1, 4.2, 6.1
Board of Supervisors	1, 3, 4, 5, 6	1.4, 3.2, 4.1, 5.1, 6.2, 6.3
Office of the City Attorney	5	5.2

The Jury invites responses to the findings and recommendations from the city institutions shown in *Table 3*.

- City Administrator, Controller, ORCP Director, Port Director, and PUC Manager within 60 calendar days.
- Human Rights Commission and Commission on the Environment within 60 calendar days.

Table 3 : Requested responses

Respondent	Findings	Recommendations
Office of the City Administrator	1, 3, 4, 5, 6	1.1, 1.2, 1.3, 3.1, 3.4, 4.1 4.2, 5.2, 6.1
Office of Resilience and Capital Planning	1, 6	1.1, 1.3, 6.1
Office of the Controller	2, 3	2.1, 3.3

Respondent	Findings	Recommendations
Executive Director of the Port of San Francisco	4	4.2
General Manager of the San Francisco Public Utilities Commission	4	4.2
Human Rights Commission	6	6.5
Commission on the Environment	6	6.4

Methodology

To prepare this report, the Jury conducted over 40 interviews and reviewed dozens of analytic reports, government documents, and thousands of pages of data from local, state, peer municipal, and federal jurisdictions.

The Jury interviewed multiple city officials and employees knowledgeable about climate resilience planning at the staff, deputy, and director's levels in the various city departments. Emphasis was placed on city departments engaged in resilience planning.

The Jury reviewed and analyzed published documents, web sites, and internal memos related to climate resilience planning. Of most importance were the following publicly available documents:

- Hazards and Climate Resilience Plan (2020)
- ClimateSF Charter (2021), and meeting notes
- SFPUC Extreme Precipitation study (2023)
- SF 10-Year Capital Plan FY 2024-33 (2023)
- USACE Report (2024)
- Board of Supervisors legislative hearings

Appendix A: An Expanded Description of Projects Coordinated by ClimateSF

Hazards and Climate Resilience Plan

Lead Agency: ORCP

Type: Planning and strategy document

Timeline: Published in 2020, to be updated recurrently.

Description:

The Hazards and Climate Resilience Plan (HCR) serves as both the city's hazard mitigation and climate adaptation plan. The HCR acts as a comprehensive outline of the risks and vulnerabilities facing the city around 13 hazards: Earthquake, Tsunami, Landslide, Dam/Reservoir Failure, Flooding, High Wind, Extreme Heat, Drought, Large Urban Fire, Wildlife, Poor Air Quality, Pandemic, & Hazardous Materials.

Notably, many of these categories intersect with the effects of climate change. As such, the HCR represents an extensive outline of the city's plans for climate resilience, highlighting projects around mitigation and adaptation planning and details guiding principles to frame that policy. In all, the HCR details over ninety-five strategies to mitigate and adapt to the risks and hazards facing the city, assigning them to projected cost ranges: 25 strategies at low cost ($0-$500k), 25 strategies at medium cost ($500k-$5M), 30 strategies at the high cost range ($5M+) and 18 strategies with cost yet to be determined.

Link To Source:
https://onesanfrancisco.org/sites/default/files/inline-files/HCR_FullReport_200326_0.pdf

Waterfront Resilience Program

Lead Agency: Port

Type: Planning framework, Projects mostly in planning phases

Timeline: Ongoing

Description: The Port describes its' Waterfront Resilience Program as including the following components:

- SF Waterfront Flood Study Draft Plan - The flood study in collaboration with the US Army Corps of Engineers sought to detail the risk to San Francisco's shoreline, strategize on reducing risk and outline the projects to adapt to sea level rise. It also sought to educate

the public on the scope of work needed to adapt to that risk, and identify funding mechanisms to pay for the work. It carries a $13B estimated cost, with possibly up to 65% of the cost paid by the federal government. (San Francisco Waterfront Flood Study.)

- 23 Embarcadero Early Projects - Cost $650M - $3B, to be funded through Proposition A GO Bond, and other funding sources and partnerships. The projects are mostly around seismic and flooding adaptation, including work to buildings and city infrastructure. 7 identified projects are in “needs assessment” or “alternatives analysis” phases and could begin implementation as early as this year. (Embarcadero Early Projects.)
- Living Sea Wall Project - A pilot program started in 2022, the Living Seawall Project tests seawall materials to improve the ecological benefit of future construction materials.

Link To Source: https://sfport.com/wrp/lbe

SF Climate Action Plan

Lead Agency: SFE

Type: Projects mostly in planning phases

Timeline: Ongoing

Description: The 2021 Climate Action Plan and the 2023 Water Supply addendum detail 34 strategies and 174 supporting actions to mitigate climate change. Analysis from the Berkeley Center for Law, Energy & the Environment projects the implementation costs of these strategies and actions to be $2.3B - $21.9 B. In all, the strategies and supporting actions are grouped in 6 sectors: Energy Supply, Building Operations, Transportation and Land Use, Housing, Responsible Production and Consumption, and Healthy Ecosystems.

Link To 2021 Climate Action Plan:
https://www.sfenvironment.org/files/events/2021_climate_action_plan.pdf

Link to 2023 CAP Water Addendum:
https://www.sfenvironment.org/media/13679/download?inline

Link to 2024 CLEE Report on Funding the SF CAP:
https://www.law.berkeley.edu/wp-content/uploads/2022/11/Funding-San-Francisco-Climate-Action-Nov.-2022.pdf

SF Planning Focus on Resilience and Sustainability

Lead Agency: PLN

Type: Planning Guidelines

Timeline: Ongoing, some projects completed.

Description: The Planning Department has developed guidelines for resilience and sustainability for city planning, policy and project decisions to respond to the effects of climate change and make a safer and more resilient San Francisco. Essential to these guidelines is the Environmental Justice framework that seeks to protect and lift up marginalized communities often most impacted by the effects of climate change. This framework is in addition to the 2022 Safety and Resilience Element detailed below.

This larger focus from Planning Department includes:

Integrated long-range planning and policy development (General Plan, Area Plans, Inter-Agency Strategies), early interface with projects in the built environment (Regulatory Processes and Planning Code), tools (Sustainable Neighborhood and Environmental Justice frameworks), and horizontal and vertical design review (Major Development Application Projects). (ClimateSF.)

Some completed projects included in Planning's focus on Resilience and Sustainability are: Urban Forest Plan (2015), Food System Policy Program (2013), Local Coastal Plan (2018), Better Roofs (2017), Sustainable Neighborhood Program (2020)

Link To Source: https://sfplanning.org/resilience-and-sustainability

Ocean Beach Climate Adaptation

Lead Agency: SFPUC

Type: Projects adapting infrastructure, shoreline habitats and recreation

Timeline: Planning began in 2012 and construction is currently scheduled as of spring 2024 to begin in 2025 and last 4 years

Description: Ocean Beach is under threat from climate change induced erosion, storm surge and sea level rise, impacting public recreational space and infrastructure such as the wastewater treatment plant and the Great Highway as well as natural habitats.

The 2012 Ocean Beach Master Plan, an inter-agency planning effort led by SPUR, details 6 moves for specific reaches of Ocean Beach to adapt to the effects of climate change and sea level rise. The overall result of the plan, designed to be implemented over decades, is to protect infrastructure assets and adapt coastal access and public space to create a new more resilient waterfront. The project is led by the SFPUC and stakeholders include the SFMTA, Recreation & Park Department, SFDPW, the Golden Gate National Recreation Area (National Park Service) and the Federal Highway Administration. (ClimateSF.)

Link To Source: https://sfpuc.org/construction-contracts/construction-projects/oceanbeach

SFMTA Sustainability and Climate Action Program

Lead Agency: SFMTA

Type: Planning Guidelines and Policy Strategy Documents

Timeline: Varies

Description: The SFMTA Sustainability and Climate Action Program provides an umbrella of guidelines and policy documents relating to how transit and the SFMTA mitigates and adapts to the effects of climate change. The Program includes climate-related aspects from foundational SFMTA documents like the 1973 Transit First Policy, the FY 2021-2024 Strategic Plan, and the 2023 Climate Roadmap, which articulates policy strategy to align the SFMTA with the mitigation goals laid forth in the 2021 Climate Action Plan:

1. Build a fast and reliable transit system that will be everyone's preferred way to get around.
2. Create a complete and connected active transportation network that shifts trips from automobiles to walking, biking and other active transportation modes.
3. Expand programs to communities that shift trips to transit, walking and bicycling.
4. Manage parking resources more efficiently over time to charge the right price for every space.
5. Accelerate adoption of zero-emissions vehicles (ZEVs) and other electric mobility options, where motor vehicle use is necessary.
6. Conduct impactful community engagement and implement community-based transportation plans to ensure climate actions are addressing residents' needs.

Link To Source:
https://www.sfmta.com/about-us/sustainability-and-climate-action/vision-sustainability-and-climate-action

ORCP Capital Plan

Lead Agency: ORCP

Type: Budget Planning Document

Timeline: Updated every 2 years, current plan covers FY24-33

Description: The 10-Year Capital Plan is submitted every other (odd-numbered) year and offers an assessment of San Francisco's capital expenditures and infrastructure needs, discloses the investments required to meet those needs and offers a plan to finance those investments. The Capital Plan is required by the Administrative Code, prepared by ORCP, the CPC and city departments and submitted by the City Administrator to the Mayor and Board of Supervisors for approval. The FY22-31 Capital Plan details $41.4 B in capital expenditures across 8 service

areas, aligned by its funding principles and towards goals of resilience and sustainability. Climate resilience is detailed in the plan and it highlights many strategies, planning documents and capital projects related to climate resilience.

Link To Source:
https://onesanfrancisco.org/sites/default/files/2023-05/CapPlan-Doc-Book_Final_0.pdf

Heat and Air Quality Resilience Project

Lead Agency: ORCP/DPH, SFDEM

Type: Risk Analysis and Strategy Document

Timeline: Published 2023

Description: The Heat and Air Quality Resilience Project (HAQRP) is an assessment of the risks to public health and city assets and infrastructure from extreme heat and wildfire smoke as they are derived from climate change. The HAQRP goes on to provide guidelines and strategies for mitigation and adaptation to heat and air quality threats, detailing 4 pathway strategy groups to develop resilience against the cited threats. The report highlights 31 specific strategies in those groups for implementation.

Link To Source: https://onesanfrancisco.org/sites/default/files/inline-files/HAQR-230522.pdf

Safety and Resilience Element

Lead Agency: Planning

Type: Policy Document and Planning Guidelines

Timeline: 2022

Description: Replacing the 2012 Community Safety Element, the Safety and Resilience Element seeks to outline policies and guidelines to protect people and assets from all natural and human-made hazards. The updated guidelines especially affirm the need to ensure environmental justice standards to protect those most vulnerable to environmental hazards, often low income communities or communities of color. The Safety and Resilience Element totals 122 policies to meet 6 goals:

1. *All People Live in Safe & Healthy Communities:* To ensure equitable safety, San Francisco must remedy past injustices and eliminate environmental burdens for all San Franciscans, starting with those experienced by Environmental Justice Communities.

2.*Multi-Benefit Climate and Hazard Resilience:* Pursue multi-hazard risk reduction strategies and maximize community benefits along the way to becoming a net-zero emissions city by 2040.

3.*Hazard Mitigation:* The city must reduce the likelihood, scale, and severity of impacts from all disasters to the economy; the built and natural environment; and all communities, starting with reducing such impacts in Environmental Justice Communities.

4.*Emergency Preparedness:* Ensure San Francisco residents, workers, and visitors have the knowledge, capacity, and government support needed to be safe in the face of disasters.

5. *Response:* Provide San Francisco residents, workers, and visitors with the essential support and services needed immediately following a disaster for life safety and functional recovery.

6.*Recovery and Reconstruction:* Rebuild San Francisco's built, natural, and social assets and communities towards a more equitable and resilient future. (citation)

Link To Source: https://generalplan.sfplanning.org/I8_Safety_and_Resilience.html

Sea Level Guidance

Lead Agency: ORCP

Type: Planning Guidelines

Timeline: Ongoing, Established 2014 and updated in 2015 and 2020.

Description: A set of planning guidelines and training on planning for city projects within the zone vulnerable to sea level rise. Designed for projects to be proposed for inclusion in the 10-Year Capital Plan, the sea level rise checklist ensures disclosures of vulnerabilities for capital projects to sea level rise over time.

Link To Source: Sea Level Rise Guidance | Office of Resilience and Capital Planning

Sea Level Rise Vulnerability and Consequences Assessment

Lead Agency: Planning

Type: Planning and Risk Analysis Document

Timeline: Report released 2020

Description: This document describes the threats of sea level rise and coastal flooding to San Francisco public assets. It further details these impacts on the people, economy and environment of San Francisco. It includes detailed reporting across asset sectors of what planning efforts San Francisco has taken to adapt and mitigate coastal flooding up to the time of publication, and offers a valuable assessment of the risks from sea level rise considering

impacts on areas of society,equity, economy, environment and governance. (Sea Level Rise Vulnerability and Consequences Assessment.)

Link To Source:
https://sfplanning.s3.amazonaws.com/default/files/plans-and-programs/planning-for-the-city/sea-level-rise/SLRVCA_Report_Full_Report.pdf

Appendix B: Overview of Financing Options for the City and County of San Francisco

The City and County of San Francisco funds expenditures for a variety of operating activities and capital projects. Monies used for funding can be considered as grouped into three categories: (1) revenue collection, (2) drawdown of reserve funds, and (3) monies raised in the debt capital markets through issuance of a variety of debt instruments, for example General Obligation Bonds, Certificates of Participation, Revenue Bonds issued by Enterprise Divisions, and Special Finance District Bonds, among others. It is not the purpose of this report to provide an expansive and detailed overview of the city's revenue sources and budgetary process, yet for the purposes of this report, we offer a brief explanation to frame the discussion of the tools the city has available to finance climate resilience projects through the city's Capital Plan, 2024-2033 ("the Capital Plan")[58].

The city is required by Charter Section 9.101(c) to operate with a balanced budget[59]. In simple terms, this means the city shall not spend (e.g., make expenditures) in any year amounts that exceed the resources to pay for those expenditures. The resources to pay for expenditures come from several sources: (1) Revenues collected from various taxes and fees, (2) monies received from both the State of California and the United States Federal Government, (3) withdrawals from the city's reserve fund (a simple analogy is a personal savings account), and (4) proceeds received from the issuance of various debt securities discussed immediately above.

Debt Financing

Using personal finance as an analogy, individuals work and receive paychecks. Those paychecks are comparable to the revenue the city collects as various taxes, fees for services, and capital and operating grants. As individuals, we consume goods and services and pay for those items by paying cash or writing checks (directly to merchants or to pay credit card bills when the credit

[58] SF Office of Resilience and Capital Planning, "The San Francisco Capital Plan, 2024-2033." Adopted May 9, 2023.
[59] Charter Section 9,101(c).

card was used for purchases). These personal expenditures are equivalent to the operating expenditures the city makes for the myriad goods and services involved in the day to day delivery of services to the citizens of the city.

Occasionally individuals may experience a very large personal expense (e.g. expensive car repair). We may choose to pay for that by tapping our personal savings. For the city, this is analogous to using funds from the Reserve Fund. When individuals choose to make a very large purchase, for example a vehicle or major home repair or purchase, we may choose to incur debt that will be paid off over several years. The analogous actions for the city are referred to as Capital Projects. These projects are planned in advance, from both a physical and financing scheduling process to ensure the projects can be paid for and the debt service for the bonds used for the projects can also be paid in future years.

Pay-As-You-Go Program

Routine expenses incurred to maintain the buildings and facilities of the city are typically paid from operating funds. These expenditures are typically linked to routine maintenance to our shared physical infrastructure and modest projects (such as upgrading various public seating accommodations in the city (e.g. benches)). Within the parlance of the Capital Plan, these expenditures are referred to as “ Pay-As-You-Go " expenditures and are sourced from the city’s General Fund. The Capital Plan sets forth various program expenditures with an estimated cumulative spend of $2,165 million in the FY24-FY33 period.

General Obligation Bonds and Certificates of Participation

Major capital projects contained within the Capital Plan are financed using the creditworthiness of the city to issue bonds in the municipal debt capital markets. Creditworthiness is critical to securing low financing costs for major projects, be they projects financed with General Obligation Bonds, or Revenue Bonds issued by enterprise divisions. Just as individuals cannot borrow unlimited amounts in comparison to their ability to service and repay the loan, the same concept is relevant to the city. Buyers of various bonds and debt securities issued by the city and its enterprise divisions insist on “not too much debt” to ensure they will be repaid and tax-paying citizens also have an interest in how much debt is issued as the taxes and fees they

pay for various city services are an element of what pays off the bonds and debt securities the city may issue for its capital projects. The City General Obligation Bonds currently are rated Aaa by Moody's and AAA by Standard & Poor's, ratings that reflect the most creditworthy score by both rating agencies.[60]

In order to ensure property taxes, a key source of revenue for the city to use for servicing and repaying debt, did not escalate rapidly, in 1978 voters passed a state-wide ballot initiative (Proposition 13) focusing on limiting the growth in property tax rates. As a result of voters passing Proposition E, the city adopted a new Charter. This new charter created an explicit cap on General Obligation Bonds outstanding based on real property assessed value. The City Charter (Section 9.106)[61] limits the total amount of General Obligation debt that may be outstanding at any time to an amount equal to no more than 3.0% of the assessed value of property within the city. The aggregate General Obligation debt outstanding is equivalent to 0.7525% of assessed value of property.[62]

An additional financial constraint was enacted in 2006 by the Capital Planning Committee and ratified by the Board of Supervisors upon adopting the first 10-Year Capital Plan that limits the aggregate amount of debt service on issued General Obligation Bonds to ensure property tax rates will not exceed the 0.1201% rate level of 2006. Barring increases in assessed property values (and related higher property taxes at the 0.1201% rate), new General Obligation Bonds can be issued only as older bonds are paid off and retired or as property assessed values increase.

The Capital Plan includes projects through 2033 as listed in Figure 8 excerpted from Capital Plan.

[60] Office of the Controller of the City and County of San Francisco, n.d., "Bond Rating | City Performance Scorecards," City of San Francisco. Accessed May 1, 2024.
[61] San Francisco Charter, "SEC. 9.106. GENERAL OBLIGATION BONDS," American Legal Publishing. Accessed May 1, 2024.
[62] Office of the Controller of the City and County of San Francisco. Accessed February 25 2024.

Figure 8- General Obligation Bond issuance by program[63]

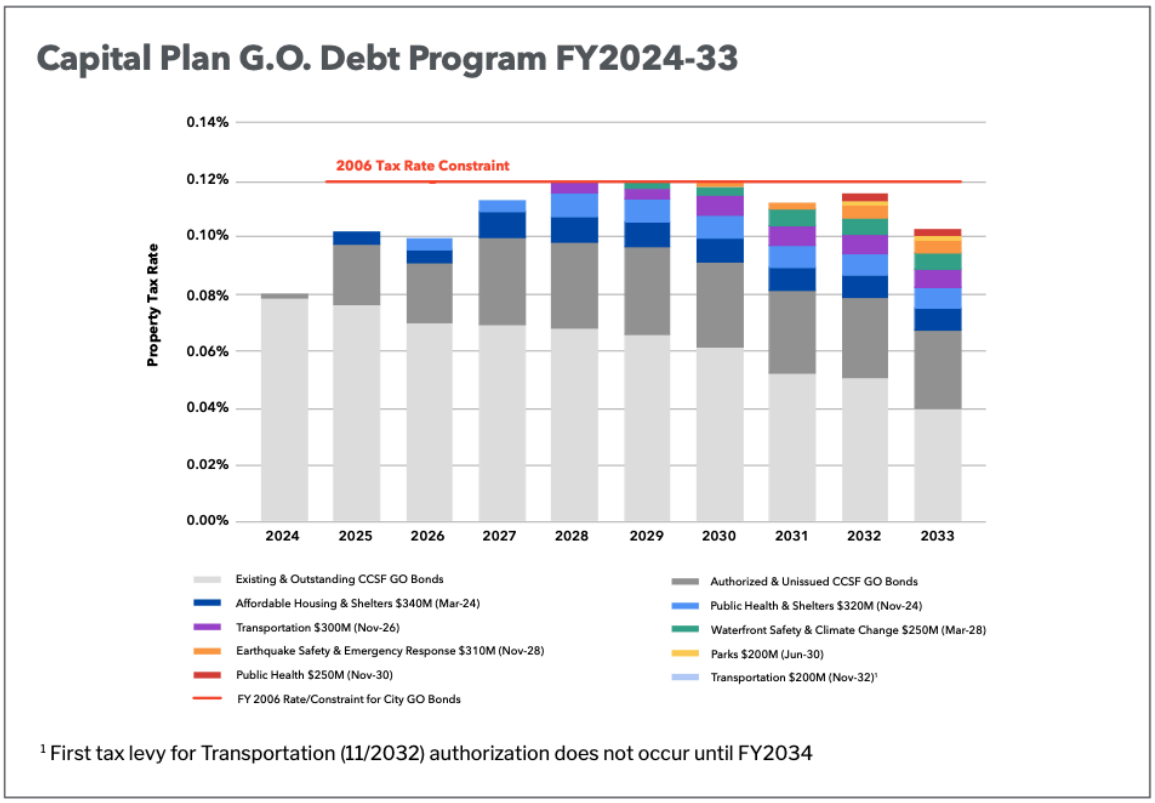
G.O. Bond Debt Program (Dollars in Millions)		
Election Date	**Bond Program**	**Amount**
Mar 2024	Affordable Housing & Shelters	340
Nov 2024	Public Health & Shelters	320
Nov 2026	Transportation	300
Mar 2028	Waterfront and Climate Safety	250
Nov 2028	Earthquake Safety & Emergency Response	310
Jun 2030	Parks and Open Space	200
Nov 2030	Public Health	250
Nov 2032	Waterfront and Climate Safety	200
Total		**2,170**

The Capital Plan estimates the borrowing for these projects will "max out" the City's General Obligation Bond issuance capacity in FY 2028, 2029, and 2030 as constrained by the 0.1201% property tax rate limit. Figure 9 below excerpted from the Capital Plan illustrates this limitation of any spending beyond those projects currently included in the Capital Plan.

A point worth considering is that the funding necessary for the building of a prospective seawall and for other capital improvements that may be necessary to deal with sea-level rise and extreme precipitation are only beginning to be understood and may require a citywide response rather than depending solely on funding by select enterprise divisions.

[63] San Francisco Office of Resilience and Capital Planning, 2023, "10-Year Capital Plan FY 2024–33," Table 1.5, 65.

Figure 9 - City General Obligation Bond Program expected issuance[64]



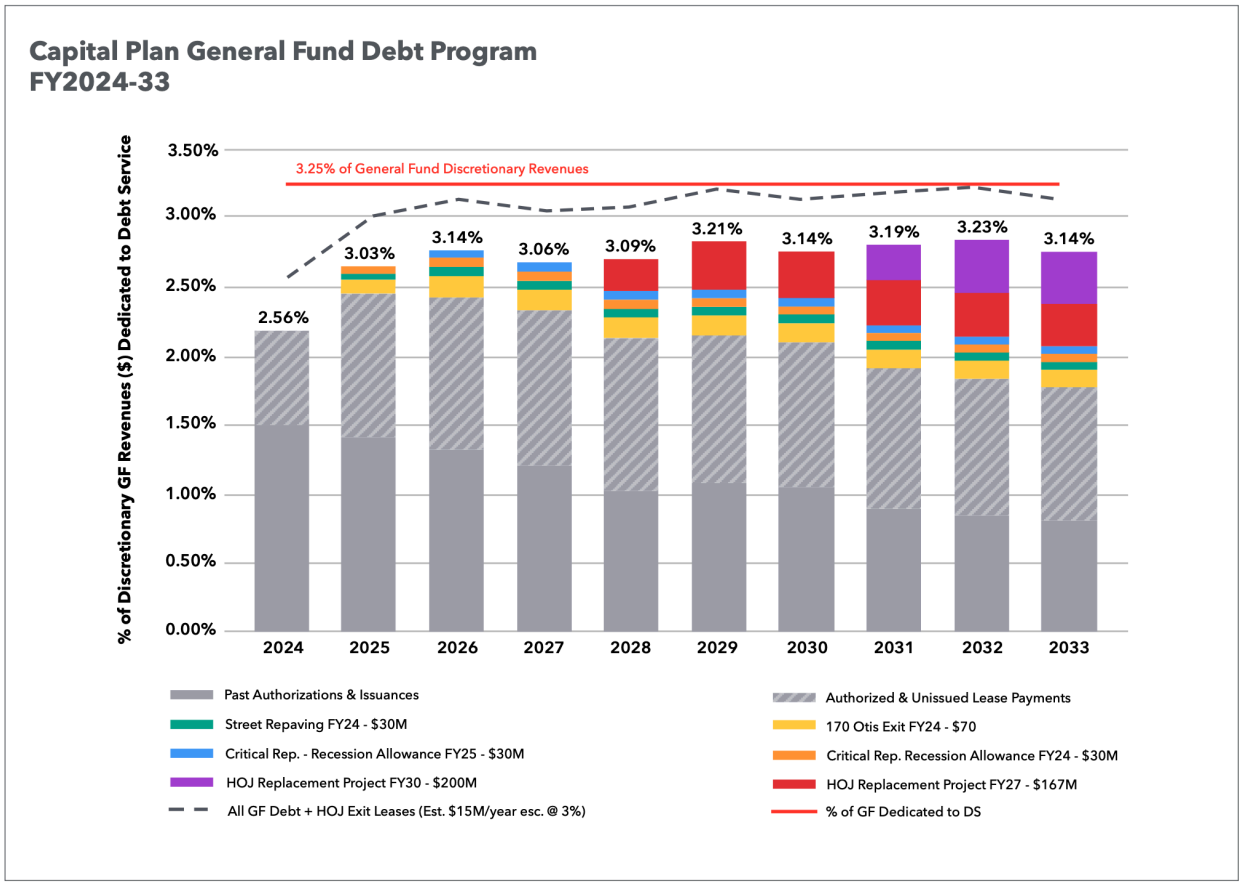
Beyond General Obligation bonds issued by the city, Certificates of Participation ("COPs") are another form of debt security the city may use to raise capital for projects. The COPs are backed by the physical assets owned by the city and are intended to leverage the General Fund to finance capital projects and acquisitions. Such projects typically relate to normal existing city operations rather than the providing of major new services that could arise from a large-scale capital investment project. For example, the Capital Plan[65] notes funding used to relocate city staff to more seismically safe buildings as an example of the type of small capital projects where COPs funding is used. The debt service for the COPs is sourced from the General Funds or from revenues that would otherwise flow into the General Fund. Table 5.2 of the Capital Plan[66] mentions that during the period FY24–FY30, the city expects to issue $527 million of COPs for a variety of small projects.

[64] ORCP, 2023, "10-Year Capital Plan FY 2024–33," Chart 1.1, 66.
[65] ORCP, 2023, "10-Year Capital Plan FY 2024–33," 67.
[66] ORCP, 2023, "10-Year Capital Plan FY 2024–33," Table 5.2, 67.

The city is limited in the amount of COPs it may have outstanding: The COPs program operates with a policy constraint in place that limits General Fund debt (which COPs are) to an amount whose debt service does not exceed 3.25% of discretionary General Fund revenues. Revenues collected by the city that are linked to voter-approved mandated spending from the General Fund may not be used for COPs debt service.

Figure 10, excerpted from the Capital Plan,[67] illustrates the debt issuance limitation with a red line.

Figure 10 - Capital Plan General Debt Fund Program



As can be seen in the figure, the city is planning, based upon projects now contemplated in the 10-Year Capital Plan, to use the majority of its debt capacity that may be funded by discretionary General Fund revenues through FY33.

[67] ORCP, 2023, "10-Year Capital Plan FY 2024–33," Chart 5.2, 68.

Revenue Bond Section

In addition to debt raised by the city that can be serviced from property taxes or the General Fund, enterprise divisions also issue debt. Those enterprise divisions of the city that produce revenue arising from fees paid by users are the typical issuers of revenue bonds. The San Francisco Public Utility Commission ("SFPUC"), the Airport Commission of the City and County of San Francisco - San Francisco International Airport (the "Airport"), The Port of San Francisco ("Port"), and the San Francisco Municipal Transit Authority ("SFMTA") are examples of enterprise divisions with user fee streams that could serve as the financial backing for bonds issued by those entities. It is worth noting that the funds raised from the sale of revenue bonds are required to be used for the intended purposes disclosed in the sale documents and those purposes must be exclusively within the subject enterprise division.

The Capital Plan in Table 5.3[68] notes that during the FY 24-33 period, the SFPUC and the Airport plan, collectively, to raise $8.3 billion for major capital projects.

Debt service for revenue bonds is tied to the revenues collected by the enterprise divisions and not to the city's real estate property tax base. The various enterprise divisions' bond offering statements detail the financial control mechanisms in place to ensure debt service can be provided to investors with a meaningful margin of safety.

To summarize, the debt service linked to an amount of revenue bond debt to be issued by an enterprise division should be less than the revenues from fees collected from users. In the case of the SFPUC, the rates collected from users are our water and sewer charges and those rates are established by balancing operating and capital expense requirements against affordability for households. The SFPUC plans rates, consistent with its published Affordability Policy[69], to ensure affordability for the 40% income percentile household. Thus the rates, linked to household affordability, determine the amount of debt service the SFPUC can afford which then, depending on interest rates, determines the amount of debt that can be raised. The SFPUC

[68] ORCP, 2023, "10-Year Capital Plan FY 2024–33," Table 5.3, 67.
[69] San Francisco Public Utility Commission, 2023, "Affordability Policy."

maintains a policy of budgeting net revenue for current debt coverage of 1.1x[70]. Further details on SFPUC debt coverage criteria can be found at the SFPUC's page addressing financial policies[71]. The enterprise departments, as issuers of revenue bonds, face constraints on the amount of debt they can issue. While most bond indenture credit constraints are linked to some metric relating to the assurance that debt interest and principal can be paid, those limitations are not the first limitations that might constrain the issuance of additional debt by an enterprise division.

The enterprise divisions, like any business, balance revenues with expenses and the revenues are linked to the prices customers pay for services. Those prices are often subject to various public policy constraints relating to affordability of the services in the case of the SFPUC and the SFMTA. For the San Francisco International Airport, rates have an impact on the costs of travel for users of the airports.

The first operational constraint on further debt issuance by the SFPUC relates to affordability. As a matter of public policy, the SFPUC aims to ensure that services rates do not exceed affordability for those in low income situations, defined in the SFPUC's Affordability Policy document.

The Port of San Francisco faces similar dynamics as those faced by the San Francisco International Airport in terms of establishing rates that are competitively appealing to ensure the Port's physical assets are used as much as possible.

The SFMTA currently faces an projected operating deficit which precludes issuing additional debt. Rates for public transportation are a matter of public policy and are set at levels deemed affordable by the most economically vulnerable proportion of users.

Overall, the SFCGJ found in its work that the enterprise divisions do not enjoy substantial latitude to raise additional debt for unexpected and no-unplanned-for climate change adaptation projects without having to breach public policy commitments on affordability and competitiveness of service rates.

[70] San Francisco Public Utility Commission, 2017, "Debt Service Coverage Policy."
[71] San Francisco Public Utility Commission, 2017, "Financial Plans and Policies."

Appendix C: Jury Identified HCR Strategies Related to Climate Change

The jury highlights the following 59 strategies from the Hazard and Climate Resilience Plan to present the scope of the future of climate resilience in San Francisco. Listed are a summary of the strategy, the projected cost, involved government entities and an identifying strategy code containing the domain code, primary hazard group number, the strategy number and the substrategy number. Further detail can be found in the 2020 Hazard and Climate Resilience Plan pages 228-293.

Low Cost Level Climate Related Strategies

- **Strategy: Strengthen citywide efforts to conserve, restore, and steward biodiversity**
- Strategy Code: IN-2.16
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: SFE
- Partners: Various public and private agencies

- **Strategy: Reduce seismic and flood risk along three miles of the San Francisco Waterfront from Fisherman's Wharf to Mission Creek**
- Strategy Code: IN-5.02
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: Port
- Partners: City depts., regional planning agencies

- **Strategy: Develop multi-hazard resilience design guidelines for municipal buildings**
- Strategy Code: B-2.01
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: ORCP
- Partners: Public Works, Planning, SFPUC, Port, SFMTA, SFO, etc.

- **Strategy: Review the guidance for incorporating sea level rise into capital planning**
- Strategy Code: B-2.02
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: ORCP
- Partners: CPC, Planning, Public Works, SFPUC, SFMTA, Port

- **Strategy: Develop a program to analyze, identify, and evaluate properties at risk of stormwater flooding**
- Strategy Code: B-2.03
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: SFPUC
- Partners: Planning, DBI, Assessor

- **Strategy: Increase privately-owned building weatherization rates**
- Strategy Code: B-3.02
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: SFE
- Partners: DPH, SFPUC, BayREN, PG&E, ORCP

- **Strategy: Support increased building electrification (fuel switching) and mechanical upgrades**
- Strategy Code: B-3.03
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: SFE
- Partners: Public Works, SFO, SFUSD, SFPUC, OEWD, DPH

- **Strategy: Develop comprehensive and coordinated code amendments for multi-hazard resilience of private development**
- Strategy Code: B-5.06
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: Planning
- Partners: DBI, SFE, Port, SFO, private property owners

- **Strategy: Develop a public outreach campaign and wayfinding plan for tsunami awareness and evacuation procedures**
- Strategy Code: C-1.06
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: DEM
- Partners: Port, RPD, Public Works, SFMTA, CA Tsunami Program

- **Strategy: Expand household hazardous waste collection efforts**
- Strategy Code: C-4.01
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: SFE
- Partners: Recology SF, Public Works, DEM, DPH

- **Strategy: Create a program to coordinate existing city programs providing in-home and resident-facing services related to hazard and climate resilience**
- Strategy Code: C-5.04
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: DEM, DPH
- Partners: HSA, ORCP, MOHCD, SFE, DBI

- **Strategy: Develop a Preparedness Equipment Purchase Program to direct and fund the purchase of climate preparedness equipment**
- Strategy Code: C-5.05
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: DEM, DPH
- Partners: Public Works, ORCP, SFE, SFFD

- **Strategy: Perform gap analysis of vulnerable populations (i.e., Access and Functional Needs) and available city services**
- Strategy Code: C-5.07
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: MOD
- Partners: DAAS, DPH, CON, DEM, Age & Disability Friendly Initiative

- **Strategy: Study the overlap between vulnerable populations and vulnerable buildings**
- Strategy Code: C-5.15
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: Planning/ DPH/ORCP
- Partners: DBI, SFPUC, SFE, MOHCD, HSH, CBO

- **Strategy: Develop and manage a system for hazard and climate resilience data**
- Strategy Code: C-5.16
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: ORCP/DT
- Partners: DEM, Planning, DPH

- **Strategy: Develop a communications strategy for citywide climate resilience efforts**
- Strategy Code: C-5.17
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: ORCP
- Partners: Planning, Port, SFE, DPH, SFPUC

- **Strategy: Improve San Francisco's climate health research capacity**
- Strategy Code: C-5.18
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: DPH
- Partners: Varies

- **Strategy: Develop and implement a Centralized Air Quality and Extreme Heat Preparedness campaign**
- Strategy Code: C-5.19
- Projected Cost: Low Cost Level (0-$500k per strategy)
- Lead Agency: DPH
- Partners: DEM, ORCP, CBOs, SFE, Public Works, PIOs, Public Government Affairs Staff

Medium Cost Level Climate Related Strategies

- **Strategy: Conduct a Risk and Resilience Assessment and Emergency Response Plan for the city's water infrastructure system**
- Strategy Code: IN-1.04
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: SFPUC

- **Strategy: Implement multi-hazard mitigation improvements for harbor dock infrastructure**
- Strategy Code: IN-1.08
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: Port, RPD
- Partners: DEM, TIDA, California Tsunami Program

- **Strategy: Develop a hazard mitigation and emergency response evacuation plan for SF Zoo**
- Strategy Code: IN-1.09
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: SF Zoo, RPD
- Partners: DEM, SFE, CA Tsunami Program

- **Strategy: Develop projects to address flooding around Islais Creek**
- Strategy Code: IN-2.01
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: Planning
- Partners: Port, SFMTA

- **Strategy: Complete the Extreme Precipitation Study**
- Strategy Code: IN-2.07
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: SFPUC
- Partners: Port, SFO, ORR

- **Strategy: Complete a comprehensive assessment of combined flood risks for San Francisco**
- Strategy Code: IN-2.08
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: SFPUC
- Partners: ORCP, Public Works, SF Planning (Pending scope)

- **Strategy: Develop a strategy to conserve and monitor water use by capital projects**
- Strategy Code: IN-2.13
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: Public Works, SFPUC
- Partners: IDC/BDC clients, City agency building operators

- **Strategy: Develop a Long-term Vulnerability Assessment and Adaptation Plan for the Hetch Hetchy Regional Water System**
- Strategy Code: IN-2.14
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: SFPUC
- Partners: Bay Area Water Supply & Conservation Agency (BAWSCA)

- **Strategy: Implement a Coastal Multimodal Resilience Strategy**

- Strategy Code: IN-2.15
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: SFMTA
- Partners: Port, Planning, ORCP, Public Works

- **Strategy: Continue to mitigate wildfire hazards in SFPUC-owned watersheds to protect source water quality and minimize risk to SFPUC water and power infrastructure**
- Strategy Code: IN-3.03
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: SFPUC
- Partners: National Forest Service, CalFire, county agencies

- **Strategy: Study emergency clean air and cooling capacity at key community facilities**
- Strategy Code: B-3.01
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: DPH
- Partners: SFUSD, DCYF, ORCP, HSA, MOHCD, RPD, SFE, LIB

- **Strategy: Install solar and storage systems at critical facilities**
- Strategy Code: B-5.02
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: Public Works/varies
- Partners: ORCP, SFE, SFPUC, public building owners/operators (Port, SFMTA, RPD, DBI), DPH

- **Strategy: Assess vertical evacuation options in high-hazard areas and guidance for large building refuges**

- Strategy Code: C-1.07
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: DBI, DEM
- Partners: MOD, DPH, Public Works, NEN, SFFD, CA Tsunami Program, BOMA, BART, NERT

- **Strategy: Identify and Create Clean Air/Cooling Hub (CACH) Public Respite Facilities**
- Strategy Code: C-5.01
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: ORCP
- Partners: SFPL, DEM, RPD, ADM, Public Works, DPH

- Strategy: **Develop a community-based capacity building initiative**
- Strategy Code: C-5.08
- Projected Cost: Medium Cost Level ($500k-$5M per strategy)
- Lead Agency: MOD
- Partners: DAAS, DPH, SFCARD, DEM, NEN, RTSF, H4H, Age & Disability Friendly Initiative

High Cost Level Climate Related Strategies

- **Strategy: Increase the resilience of the Municipal Fiber Optic Network**
- Strategy Code: IN-1.06
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: SFDT
- Partners: SFMTA, SFPUC, SFFD, Joint Pole Assoc., PG&E

- **Strategy: Increase the resilience of the 911 Radio System**
- Strategy Code: IN-1.07
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: SFDT
- Partners: SFMTA, SFPUC, SFFD, Joint Pole Assoc., PG&E

- **Strategy: Develop a process to move utilities from under pier structures**
- Strategy Code: IN-2.02
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: Port

- **Strategy: Continue to implement the Ocean Beach Master Plan**
- Strategy Code: IN-2.03
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: SFPUC
- Partners: Public Works, SFMTA, RPD, GGNRA, SF Zoo

- **Strategy: Expand the StreetTreeSF Climate Resilient Tree Planting Initiative**
- Strategy Code: IN-2.06
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: Public Works
- Partners: OEWD, City agencies with streetscape projects, Non-Profit Partners

- **Strategy: Participate in US Army Corps of Engineers (USACE)/Port Flood Study**
- Strategy Code: IN-2.09
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: Port
- Partners: City Departments, regional agencies, businesses and NonProfits

- **Strategy: Diversify water supply options year-round by improving the use of new water sources and drought management**
- Strategy Code: IN-2.12
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: SFPUC
- Partners: DPH, DBI

- **Strategy: Conduct a system-wide, multi-hazard vulnerability and operational assessment for Muni**
- Strategy Code: IN-5.01
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: SFMTA
- Partners: Public Works, SFPUC, Planning, regional agencies

- **Strategy: Continue to advance Sewer System Improvement Program (SSIP) projects to meet level of service objectives**
- Strategy Code: IN-5.03
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: SFPUC
- Partners: Public Works, Port, SFMTA

- **Strategy: Implement the Pipe Replacement Prioritization Program**
- Strategy Code: IN-5.04
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: SFPUC
- Partners: SFFD, DPH, DEM, NERT, Bay Area Peninsula agencies

- **Strategy: Enhance flood and earthquake resilience of regional dams and ancillary facilities**
- Strategy Code: IN-5.06
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: SFPUC, DSOD
- Partners: Downstream municipalities

- **Strategy: Implement SFMTA Asset Management and State of Good Repair Strategy**
- Strategy Code: IN-5.09
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: SFMTA

- **Strategy: Implement SFMTA Transit Fixed Guideway Strategy**
- Strategy Code: IN-5.10
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: SFMTA

- **Strategy: Implement floodproofing and elevation projects for properties at risk of stormwater flooding citywide**
- Strategy Code: B-2.04
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: SFPUC
- Partners: Assessor, DBI, Planning, SFO

- **Strategy: Amend the capital improvement program for transportation facilities to consider hazard mitigation opportunities**
- Strategy Code: B-5.01
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: SFMTA
- Partners: Public Works, SFPUC, Planning, RPD, MOHCD, SFO, PG&E

- **Strategy: Secure a resilient public safety training facility for San Francisco Fire Department (SFFD)**
- Strategy Code: B-5.03
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: SFFD
- Partners: SFPD, SHF

- **Strategy: Increase resilience and operation efficiency of maintenance yards**
- Strategy Code: B-5.04
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: Public Works
- Partners: RPD, SFMTA, SFE, SFPUC, Port

- **Strategy: Continue to meet housing production goals**
- Strategy Code: C-1.05
- Projected Cost: High Cost Level ($5M and above per strategy)
- Lead Agency: MOHCD
- Partners: OCII, DBI, Planning, non-profit housing developers

To Be Determined Cost Level Climate Related Strategies

- **Strategy: Adapt shoreline parks to sea level rise and salt water intrusion, using marshes and plant diversity**
- Strategy Code: IN-2.04
- Projected Cost: TBD
- Lead Agency: RPD
- Partners: Port, USACE

- **Strategy: Assess the current stormwater catchment potential of open space managed by the Recreation and Park Department**
- Strategy Code: IN-2.05
- Projected Cost: TBD
- Lead Agency: RPD
- Partners: SFPUC

- **Strategy: Explore increasing tree canopy and shade structures in parks**
- Strategy Code: IN-2.10,
- Projected Cost: TBD
- Lead Agency: RPD
- Partners: Friends of Urban Forest, Capital Planning

- **Strategy: Assess current plant palettes to consider future climate conditions in plant selection**
- Strategy Code: IN-2.11
- Projected Cost: TBD
- Lead Agency: RPD
- Partners: Public Works Bureau of Urban Forestry

- **Strategy: Develop a Citywide Climate Resilience Framework**
- Strategy Code: IN-5.07
- Projected Cost: TBD
- Lead Agency: ORCP
- Partners: Planning, SFE, SFPUC, DBI, Port

- **Strategy: Explore options to use recreation centers as public respite facilities**
- Strategy Code: B-5.05
- Projected Cost: TBD
- Lead Agency: RPD
- Partners: DEM, DPH, ORCP

- **Strategy: Explore toxins abatement workforce development programs**
- Strategy Code: C-4.03
- Projected Cost: TBD
- Lead Agency: OEWD
- Partners: Public Works, DPH

- **Strategy: Establish disaster relief funding and small business resilience fund**
- Strategy Code: C-5.12
- Projected Cost: TBD
- Lead Agency: OEWD
- Partners: MEDA, CON