
One Watershed Framework Report

Prepared for

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CA Governor's Office of
**Land Use and
Climate Innovation**

As communities in California experience more frequent, prolonged, and severe impacts from climate change, communities and governments at all scales are developing strategies and implementing actions to build a climate-resilient future. However, many jurisdictions, especially under-resourced communities in California, lack the capacity, tools, guidance, and resources to effectively prepare for climate change impacts. The APGP addresses this capacity gap by providing funding to help fill planning needs, providing communities with the resources to identify climate resilience priorities, and supporting the development of climate resilience projects across the state. The APGP enables communities to take climate risk and adaptation considerations into planning activities and prepare for climate readiness and resilience in the long term.

The APGP is an initiative of the Integrated Climate Adaptation and Resiliency Program (ICARP) housed within the Governor’s Office of Planning and Research. ICARP advances statewide climate adaptation and resilience by coordinating investments, partnerships and climate science to ensure people, natural systems, and the built environment are protected, prepared, and thrive in the face of climate change. Through direct and equity-focused investments and resources, ICARP helps build climate adapted and equitable communities in California, with a focus on solutions that both address the impacts of climate change and reduce greenhouse gas emissions. ICARP works to advance these priorities across all levels of government by developing actionable science and research; providing guidance, tools, and technical assistance; and administering climate resilience-focused grant programs. Learn more: <https://opr.ca.gov/climate/icarp/>

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Resilient San Bruno (RSB) is a local team focused on environmental concerns in the San Bruno community. The team meets once monthly (every 3rd Monday) to discuss and organize around

relevant topics arising for residents. This includes but is not limited to housing, flooding, city policies, transportation needs, air quality concerns, and local events and initiatives. RSB is composed of residents, organization leadership, faith leaders, city leadership and other community stakeholders. RSB is designed to funnel these monthly discussions into tangible projects (delivered once a year) to address the environmental needs of San Bruno.

EXECUTIVE SUMMARY

E.1. Introduction

In 2023, the City/County Association of Governments of San Mateo County (C/CAG) received a grant from the California Integrated Climate Adaptation and Resilience Program (ICARP) Adaptation Planning Grant Program to develop and pilot the *OneWatershed Climate Resilience Framework and Community-Led Plan* (OneWatershed Framework or Project), an equitable climate adaptation approach focused on integrated watershed management. The ICARP-funded project is led through a collaborative partnership of agencies and community partners, including C/CAG, Climate Resilient Communities (CRCs), San Mateo County Flood and Sea Level Rise Resiliency District (also known as OneShoreline), City of San Bruno, County of San Mateo Sustainability Department, City of South San Francisco’s South San Francisco-San Bruno Regional Water Quality Control Plant, and the Bay Area Water Supply & Conservation Agency (BAWSCA).

E.2. Background

San Mateo County is at risk from several categories of climate change hazards that have significant consequences for watershed infrastructure and resources. The OneWatershed Framework leverages the definitions and approaches in the California Adaptation Planning Guide (California Governor’s Office of Emergency Services [Cal OES] 2020) to support an integrated watershed management approach focused on climate resilience in San Mateo County). Cal OES defines a hazard as follows:

*“a **hazard** [as] an event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss.”*

*“A **climate change hazard** is a dangerous or potentially dangerous condition created by the effects of the local climate.”*

The OneWatershed Framework focuses on specific climate change hazards for which studies have already been completed and identified as high priority for Bay Area regional planning, for example: sea level rise, drought, extreme precipitation, extreme heat, and wildfire.

E.3. OneWatershed Framework

The OneWatershed Framework is both a conceptual framework and a data-driven method intended to support the collaborative efforts of San Mateo County (County) agencies and interested parties, working across jurisdictions/organizations and watershed boundaries to achieve long-term and strategic climate resilience. The OneWatershed Framework is designed to employ a community co-creation approach to listen to the lived experiences of community members and weigh this input along with available quantitative climate change hazard exposure data and projections regarding the potential impacts of climate change on water infrastructure and resources. Key objectives of the approach are to use community-scale input and climate change hazard exposure assessment data to identify the most vulnerable infrastructure, water

resources, and community amenities at a watershed scale and develop a suite of multi-benefit projects that address climate resilience and regulatory needs of multiple water infrastructure sectors and can be funded through innovative partnership approaches. The OneWatershed Framework is intended to be used on a longer-term basis to advance broad-scale equitable watershed-based climate resilience throughout in San Mateo County, though the Project will demonstrate the approach through a pilot OneWatershed Pilot Study in the San Bruno Creek watershed.

This OneWatershed Framework has been developed through the ICARP grant funding awarded to C/CAG and Project partners. A portion of the grant funding was directly awarded to CRC as the collaborating community-based organization (CBO), and the remainder was contracted with a technical Consultant Team. Several groups were formed to support the development of the OneWatershed Framework, including the Project Management Team (PMT), which leads the Project; the Technical Advisory Committee (TAC); the Equity Priority Community Workgroup, comprising CBOs, nonprofits, and interested County residents; and the Resilient San Bruno Team, which is the local Climate Change Community Team¹ made up motivated and interested residents, community leaders, and/or community organization representatives from the San Bruno Creek watershed. These groups and representatives were engaged throughout the development of the OneWatershed Framework through interactive meetings and review and comments on project deliverables.

The OneWatershed Framework defines a stepwise process that has been designed to be used on a watershed-basis for any watershed in San Mateo County. The process is intended to result in hyper-local watershed-specific OneWatershed Climate Resilience Plans that leverage Countywide tools but are guided by the lived experiences and priorities of the local community. The overall OneWatershed Framework approach is illustrated in Figure E-1.

¹ Climate Change Community Teams include local CBOs, religious leaders, youth leaders, and those interested in advancing climate change adaptation and action at the local level.

STEP
1

Identify multiagency, multi-stakeholder collaborative partnerships specific to the communities in the target watershed.



STEP
2

Assess watershed-scale vulnerability of water infrastructure and assets to climate hazards:

2a



Compile climate change hazard and community vulnerability data available in the OneWatershed Dashboard along with local studies.

2b



Conduct a Community Vulnerability Assessment to understand community:



2c

Use the outcomes of 2a and 2b to identify vulnerable infrastructure assets within the watershed.



Location Description	OneWatershed Assets	Exposure	Sensitivity	Impact	Adaptive Capacity

STEP
3

Identify and prioritize climate resilience projects.



Image courtesy of C/CAG

Figure E-1: OneWatershed Framework Process

Geographic information system (GIS) data used for this analysis have been compiled in the [OneWatershed Web Viewer](#). The data and Web Viewer are described in the OneWatershed Data Inventory attached to this report (Appendix C). The watershed-specific Steps 2b and 2c of the OneWatershed Framework process should be completed by compiling separate watershed-specific data, including OneWatershed asset information, localized and/or asset-specific climate exposure or consequence projections, and existing relevant project planning data across all OneWatershed infrastructure network sectors, including but not limited to data from stormwater capital improvement program projects; water supply infrastructure plans; wastewater infrastructure plans; green stormwater infrastructure plans; climate action plans; other climate resilience plans; creek and stream plans; pedestrian/bike, safe routes to school, or other transportation plans; development plans, etc.

E.4. Assessment of Climate Change Hazard Vulnerability

Step 2 of the OneWatershed Framework is to *assess watershed-scale vulnerability of OneWatershed infrastructure and assets to climate change hazards*. For the assessment of vulnerability at the watershed level, Countywide climate change hazard exposure data has been compiled on the OneWatershed Dashboard, along with water infrastructure network and resource information (used for Step 2a). Climate change hazards compiled include sea level rise, extreme heat, extreme precipitation, drought, and wildfire. Climate change hazards were compiled for four future climate scenarios selected to correspond with sea level rise scenarios recommended for use in the Regional Shoreline Adaptation Plan (RSAP) Guidelines (San Francisco Bay Conservation and Development Commission [BCDC] 2024).

The ultimate climate change-related vulnerability or risk of an asset also depends on the sensitivity to the hazard, adaptive capacity of the asset, and the potential impact or consequence of the exposure (e.g., whether an asset will be damaged due to flooding when exposed to inundation from sea level rise). Community and asset vulnerability to climate change hazards can vary on a block-by-block basis and have as much to do with community resources (or lack thereof) as they do with physical land characteristics and infrastructure. In addition to available studies, quantitative outputs, and geospatial data, the OneWatershed Framework relies on experiential input gathered from outreach to community members to understand a selected watershed's exposure and sensitivity to climate change hazards, the existing resources available to mitigate harm (i.e., adaptive capacity), and potential impacts (as Step 2b). The OneWatershed Framework recommends a community vulnerability assessment be conducted to gather this key information from community members.

Step 2c of the OneWatershed Framework process entails using the outcomes of Steps 2a and 2b to identify (1) vulnerable locations, resources, infrastructure, and assets within the watershed and (2) specific OneWatershed assets and resources that are co-located with, serve, or rely on these areas, resources, and assets. The OneWatershed Framework recommends a semiquantitative approach to assess vulnerability, whereby the data and information gathered are compiled into a narrative table to describe and prioritize key vulnerabilities (rather than a detailed quantitative analysis that calculates costs associated with impacts, for example).

E.5. Climate Resilience Projects

The OneWatershed Framework is ultimately designed to identify a variety of cross-water sector, cross-agency/partner climate resilience projects that could reduce priority vulnerabilities and increase resilience on a watershed scale (Step 3 of the OneWatershed Framework process). These projects could include new projects or already-planned projects that have been identified through other planning processes. The proposed OneWatershed Framework focuses on multi-benefit, multiscale green infrastructure as a primary OneWatershed project type; however, the framework is intended to include consideration for a broader range of resilience infrastructure, including gray infrastructure upgrades, stormwater retention/detention, shoreline resilience, and creek restoration projects.

Step 3 first entails compiling climate resilience project, program, and policy opportunities within the watershed. This should include project opportunities identified through planning processes

completed by the City, watershed-based CBOs, or other agencies with assets in the watershed, along with other suggestions from stakeholders or residents participating in the OneWatershed Framework process.

Once climate resilience project opportunities are compiled, the OneWatershed Framework process recommends a prioritization process to identify those climate resilience projects that could address key vulnerabilities within the watershed, receive community and partner support, provide multiple benefits, and/or are more feasible to implement. Implementation feasibility includes consideration of the process for project approval by the local jurisdiction, engineering feasibility, and funding needs.

Over the long term, the OneWatershed Climate Resilience Plans developed through the OneWatershed Framework (including the San Bruno Creek Pilot Study (which will be completed by early 2026) can be used to prioritize which climate resilience projects are implemented across the County.

E.6. Pilot Application to San Bruno Creek Watershed

In 2025, the Consultant Team and PMT will work collaboratively with Resilient San Bruno and other watershed residents to pilot the OneWatershed Framework in the San Bruno Creek watershed. Step 1 is to ***identify multiagency, multi-stakeholder collaborative partnerships specific to communities in the target watershed***. This step has been initiated through the establishment of the Resilient San Bruno Team and the multiagency PMT overseeing the Pilot Study. The Consultant Team and PMT have initiated Step 2, ***assess watershed-scale vulnerability of OneWatershed infrastructure and assets to climate change hazards***, resulting in a prioritized list of vulnerable OneWatershed infrastructure network assets. These vulnerabilities will be addressed by completing Step 3, ***identify and prioritize climate resilience projects***. In close coordination with the Resilient San Bruno Team, the PMT and the Consultant Team will identify potential climate resilience projects that could address prioritized vulnerabilities within the watershed. These projects will be prioritized to maximize the climate change hazard resilience benefits provided, in alignment with community priorities.

As part of the San Bruno Creek OneWatershed Pilot Study, the top 10 prioritized opportunities will be identified on a map that includes a one to two sentence description of each proposed improvement. The Consultant Team will work with the Resilient San Bruno Team and the PMT to identify 1 of the 10 opportunities that will be developed into a 10% concept design. The entire process completed for the San Bruno Creek watershed will be captured in a Pilot Study Report that will be reviewed by the Resilient San Bruno Team and the PMT and shared with the TAC and Equity Priority Community Workgroup.

E.7. OneWatershed Dashboard

The OneWatershed Dashboard (<https://gis2.paradigmh2o.com/?k=7bd16b45f>) is a web-based tracking and visualization tool that has been developed to facilitate development of watershed-specific OneWatershed Climate Resilience Plans. The Dashboard provides climate change hazard exposure data for the four OneWatershed climate scenarios as well as social vulnerability data throughout the County. The Dashboard and integrated visualization tools are

intended to be used for future watershed-scale climate resilience planning efforts. The primary user interface of the Dashboard is a web map that displays locations of OneWatershed assets and the OneWatershed infrastructure network unit boundaries, along with the climate exposure layers and social vulnerability layers. Additionally, clicking on an asset and the resulting button for more information directs the user to a separate web page for that asset (the web page is shown in Figure 7). When an asset is added to the Dashboard, the tool generates a unique URL that can be easily shared with other agencies for planning purposes. The OneWatershed Dashboard includes a similar pop up for climate resilience projects that are added to the map.

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Appendix B:	OneWatershed Framework Development Approach Memorandum

Appendix C: OneWatershed Data Inventory

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Appendix E: Composite Exposure Score, Example Analysis

ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
BAWSCA	Bay Area Water Supply & Conservation Agency
BCDC	San Francisco Bay Conservation and Development Commission
C/CAG	City/County Association of Governments
Cal OES	California Governor's Office of Emergency Services
Caltrans	California Department of Transportation
CBO	community-based organization
CNRA	California Natural Resources Agency
CosMos	Coastal Storm Modeling System
CRC	Climate Resilient Community
DWR	Department of Water Resources
FEMA	Federal Emergency Management Agency
GSA	Groundwater Sustainability Agency
ICARP	Integrated Climate Adaptation and Resilience Program
LTVA	Long-Term Vulnerability Assessment and Adaptation Plan
mgd	million gallons per day
MS4	municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
PMT	project management team
RCP	representative concentration pathway
RSAP	Regional Shoreline Adaptation Plan
SF RWS	San Francisco Regional Water System
SFEI	San Francisco Estuary Institute
SFPUC	San Francisco Public Utilities Commission
SGMA	Sustainable Groundwater Management Act
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
SPUR	San Francisco Bay Area Planning and Urban Research Association
TAC	Technical Advisory Committee
USGS	United States Geological Survey

1. INTRODUCTION

In 2023, the City/County Association of Governments of San Mateo County (C/CAG) received a grant from the California Integrated Climate Adaptation and Resilience Program (ICARP) Adaptation Planning Grant Program to develop and pilot the *OneWatershed Climate Resilience Framework and Community-Led Plan* (OneWatershed Framework or Project), an equitable climate adaptation approach focused on integrated watershed management. The ICARP-funded project is led through a collaborative partnership of agencies and community partners, including C/CAG, Climate Resilient Communities (CRCs), the San Mateo County Flood and Sea Level Rise Resiliency District (OneShoreline), City of San Bruno, County of San Mateo Sustainability Department, City of South San Francisco's South San Francisco-San Bruno Regional Water Quality Control Plant, and the Bay Area Water Supply & Conservation Agency (BAWSCA).

In collaboration with the Project partners, C/CAG is developing the OneWatershed Framework as a method to assess the regional and shared risk of climate change to water infrastructure and resources (sewer, water, and stormwater) and to establish a cross-sector institutional foundation to build adaptive capacity to climate change hazards for the most vulnerable communities in San Mateo County through climate-resilience-focused programs, policies, and green and/or gray infrastructure projects. The OneWatershed Framework is intended to be a model that can be applied to watersheds throughout San Mateo County. The OneWatershed Framework will be piloted in the San Bruno Creek watershed.

This OneWatershed Framework Report conceptually defines the goals, processes, data analyses, and stakeholder communication and outreach strategies that can be used to understand and assess the shared-risk of climate change hazards for water infrastructure and resources at the watershed scale and develop and advance climate resilience projects to reduce climate change impacts and establish equitable and sustained funding cost frameworks. This report is organized as follows:

- Section 2 provides relevant background information for the OneWatershed Framework.
- Section 3 describes the objectives of the OneWatershed Framework, the development of the framework, and the framework components.
- Section 4 details the countywide climate change hazard exposure data compiled for use in OneWatershed planning, and vulnerability assessment approach.
- Section 5 introduces OneWatershed climate resilience projects, programs, and policies and a potential approach to prioritize project opportunities.
- Section 6 summarizes the proposed approach for the San Bruno Creek watershed pilot application of the OneWatershed Framework.
- Section 7 describes the OneWatershed Dashboard.
- Section 8 includes document references.

2. BACKGROUND

Many data sources, developed methodologies, regulations, and related studies were compiled and referenced through the development of the OneWatershed Framework. This section describes the key climate risks facing San Mateo County, key considerations for vulnerable communities within San Mateo County, the infrastructure of focus for the OneWatershed Framework, key regulatory requirements, and details on how climate adaptation and resilience is defined for this Framework Report.

2.1 Climate Risks to Communities in San Mateo County

San Mateo County is at risk from several categories of climate change hazards that have significant consequences for watershed infrastructure and resources. San Mateo County has the highest population of any county in California living in projected sea level rise inundation areas, with an estimated \$39.1 billion in assets at risk to flooding in the next 50 to 100 years. In addition to public infrastructure, nearly 30,000 homes and 3,000 commercial parcels in San Mateo County are vulnerable to the impacts of sea level rise, including potential displacement and job loss (San Mateo County 2018). The county's location, bounded by the Pacific Ocean to the west and the San Francisco Bay to the east, makes it especially vulnerable to extreme rainfall through atmospheric river events, high tides, storm surge, and sea level rise, which place strain on the County's infrastructure and impact communities. In 2023, a number of communities in San Mateo County experienced unprecedented wet weather events, and portions of the County received more than 4 inches of rain in a single storm² causing major property flooding, road closures, and even deaths (Bay City News 2023). Communities in San Mateo County are anticipated to face additional severe climate risks in the coming decades, including coastal flooding and erosion, with especially significant erosion on the Pacific Coast side of the County; upland flooding from increasing extreme precipitation events (C/CAG 2021); wildfire, with an eight-fold increase in probability of a large fire occurring in the County by 2070 (Climate Ready San Mateo County n.d.); increased water stress due to drought, with two major droughts in the County spanning 9 out of 11 consecutive years (between January 2012 and December 2022) with record-high heat and low precipitation (*Statesman Journal* 2024); and increased urban heat (Climate Ready San Mateo County n.d.), especially in the highly urbanized communities along the Bay shore.

These climate change hazards have and will cause direct damage, including harm to natural and built assets, adverse consequences to wildlife and ecosystems, and groundwater depletion, as well as indirect damage, such as a decrease in public safety, community equity, and economic vitality. In many cases, climate risks can be compounded with cascading effects due to the County's geography and interrelated infrastructure dependencies. For example, runoff-generated flooding in a tidally influenced location could trigger cascading disruptions to critical services in an expanded area upstream, including transportation networks, water delivery and treatment processes, and energy infrastructure. While other environmental hazards, such as earthquakes,

² Approximately equivalent to a 25-year, 24-hour event per the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 for Bayside San Mateo County (4.4 inches).

could further compound impacts when climate change hazards are present, these non-climate-related hazards are not examined in this framework.

In support of the overall and parallel resilience planning efforts in San Mateo County and in alignment with state guidance on climate adaptation, the OneWatershed Framework uses the definitions and approaches in the California Adaptation Planning Guide (California Governor’s Office of Emergency Services [Cal OES] 2020). This includes definitions relating to the consequences of climate change. Key definitions from Cal OES (2020) include the following:

“Climate change refers to a change in the climate that can be identified by changes in the mean and/or variability of its properties and that persists for an extended period, typically decades or longer.”

“A climate change effect is any consequence, generally a negative one, that is caused by climate change.”

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

“A climate change hazard is a dangerous or potentially dangerous condition created by the effects of the local climate.”

The OneWatershed Framework focuses on specific climate change hazards for which studies have already been completed. For example, climate change hazards prioritized for San Mateo County in the OneWatershed Framework include sea level rise, drought, extreme precipitation, extreme heat, and wildfire. These were selected as the primary climate change impacts that will likely have direct and/or coinciding impacts on water infrastructure and resources, which is the focus of the OneWatershed Framework.

2.2 Vulnerable Communities

Underserved and vulnerable communities in San Mateo County are at disproportionate risk of exposure to climate change hazards and the resulting consequences. As seen in recent years, the pendulum swing between extreme heat and drought and torrential atmospheric river events causes climate impact whiplash to communities across San Mateo County. The most vulnerable communities in the County, including underserved communities and those neighborhoods identified as disadvantaged per state and federal classifications, already and will continue to experience many of the greatest impacts. This is often due to being in low-lying coastal or Bayside areas where aged, undersized, and/or underfunded water, sewer, and storm drain systems are at a higher risk of failure during large storms, as well as often lacking access to resources to adequately prepare for and respond to climate change impacts. These consequences are expected to increase with projected future changes in precipitation and other climate change hazard impacts.

San Mateo County has greater income inequality than any other county in California, with underserved climate-vulnerable communities located in some cases within minutes of some of the wealthiest communities in the country, and there are distinct differences in the level of preparedness and resources available to address climate resilience effectively across these communities. The County of San Mateo and other Project Partners have enacted several measures to address the County’s equity gap. Among these, the County of San Mateo has created the County Equity Framework ([County Equity Framework | County of San Mateo, CA](#)) that includes adopted resolutions and an ordinance to address equity challenges in the County, with a stated aim “to create a strong, diverse, and equitable county where all people feel a deep sense of belonging and are empowered to voice their needs and manifest their aspirations.” The County of San Mateo also has a Recovery Initiative ([SMC Recovery Initiative | County of San Mateo, CA](#)), which

“is a collaboration among local government agencies, nongovernment organizations, private partners, and residents to promote inclusive recovery and leverage the collective capacity of the whole community to build a more equitable, healthy, and connected San Mateo County.”

Additionally, C/CAG has an adopted Equity Framework and Action Plan ([Equity Assessment, Framework, and Action Plan | C/CAG](#)), which states a commitment for C/CAG and its member agencies to advance process and outcomes-based equity in San Mateo County

“by taking concrete steps to advance equity through its planning efforts, projects, programming, and role as a countywide funder that allocates millions of dollars into various programs and projects each year.”

Additional details about San Mateo County communities and the San Bruno Creek community, where the OneWatershed Framework will be piloted, are provided in the OneWatershed Community Engagement Plan included as Appendix A.

2.3 OneWatershed Infrastructure Networks

San Mateo County is served by several different watershed infrastructure networks and water resources that are potentially vulnerable to climate change hazards. To address the overlapping risk of climate change to water infrastructure and resources—focusing on the most vulnerable communities—the OneWatershed Framework focuses on the infrastructure networks summarized in Table 1, which are referred to as “OneWatershed infrastructure networks” throughout this document.

Table 1: OneWatershed Infrastructure Networks

Category	Infrastructure ¹	Water Resource of Focus
Water Supply	Reservoirs, supply lines, turnouts, interties, storage tanks, treatment plants	Water Supply Sources

Category	Infrastructure ¹	Water Resource of Focus
Wastewater Services	Private laterals, sewer main pipes, lift stations, wet wells and detention facilities, treatment plants, recycled water distribution system	Sanitation and Recycled Water
Stormwater Drainage System	Inlets, storm drainpipes, pump stations, channels, detention facilities, outfalls, stormwater treatment assets (e.g., green stormwater infrastructure)	Receiving Waters
Groundwater Basins	Private and public wells, pumps, treatment equipment	Groundwater

¹ Represents major classes of infrastructure, not intended to include all infrastructure classes.

Available OneWatershed infrastructure network data was compiled as part of this project effort (compiled layers may be viewed on C/CAG’s Stormwater Resource Plan [web viewer](#)). The data compiled represents the publicly available data at the Countywide scale and is not complete. Additional effort, including coordination with water and wastewater agencies, is required to compile all data that might be relevant for the development of a OneWatershed Climate Resilience Plan at the watershed scale.

2.4 Regulatory Requirements

San Mateo County, C/CAG member agencies, water suppliers, wastewater collection and treatment providers, and groundwater basins are subject to myriad regulatory requirements. These regulatory systems can in some cases create barriers or challenges to collaborative projects that could more effectively address the consequences of climate change to water infrastructure and resources. In other cases, or with future policy changes, these regulatory systems could create incentives for greater collaboration across the water sectors. These regulations include but are not limited to the following:

- Climate Resilience
 - California Senate Bill 272 (California State Legislature 2023)³ was signed into law on October 7, 2023, and requires all local governments within the coastal zone or under the jurisdiction of the San Francisco Bay Conservation and Development Commission (BCDC) to develop a sea level rise plan as part of a local coastal program or a subregional San Francisco Bay shoreline resiliency plan by January 1, 2034.

³ Sea Level Rise Planning and Adaptation, California S. 272 (2023), https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240SB272.

- The California Coastal Commission established guidelines for preparing the sea level rise plans developed by local coastal programs in an update to the Sea Level Rise Policy Guidance adopted in November 2024 (California Coastal Commission 2024).
 - The BCDC established guidelines for preparing a subregional San Francisco Bay shoreline resiliency plan in their Regional Shoreline Adaptation Plan (RSAP) published in December 2024.
- Recycled Water
 - The State Water Resources Control Board adopted an amendment to the Water Quality Control Policy for Recycled Water on December 11, 2018 (effective on April 8, 2019). The policy provides direction regarding the method and appropriate water quality control criteria for the State Water Board and the regional water boards to use when issuing recycled water project permits (California State Water Resources Control Board 2018).
 - The allowable applications, required treatment, and use area requirements for recycled water use in non-potable applications are defined in the Water Recycling Criteria, Title 22, Division 4, Chapter 3 of the California Code of Regulations. Indirect potable reuse regulations for groundwater replenishment projects (DPH-14-003E) became effective on June 18, 2014, and are included in Articles 5.1 and 5.2 of the Water Recycling Criteria, Title 22, Division 4, Chapter 3 of the California Code of Regulations. Indirect potable reuse regulations for surface water augmentation (SBDDW-16-02) became effective on October 1, 2018, and are included in Article 5.3 of the Water Recycling Criteria, Title 22, Division 4, Chapter 3 of the California Code of Regulations. Direct potable reuse regulations (SBDDW-23-001) became effective on October 1, 2024 (California State Water Resources Control Board 2023a).
- Water Supply
 - The California Safe Drinking Water Act establishes drinking water standards for public water systems (e.g., primary and secondary maximum contaminant levels).
 - The construction of new private groundwater wells is regulated by San Mateo County Environmental Health Services via the [Water Well Ordinance](#) (No. 4023, 2001). After the initial permit is granted, the long-term maintenance of the well, including water quality, is typically the responsibility of the owner. In March of 2024, the California Department of Water Resources (DWR) published *Groundwater Well Permitting: Observations and Analysis of Executive Orders N-7-22 and N-3-23*, which included policy recommendations for future well permitting, such as not issuing new groundwater well permits in medium- or high-priority basins without Groundwater Sustainability Agency (GSA) approval.
- Wastewater
 - Wastewater treatment plants are regulated under the federal Clean Water Act and are permitted to discharge treated water effluent in accordance with individual

National Pollutant Discharge Elimination System (NPDES) Permits, which regulate the types and amounts of pollutants that can be discharged into receiving waters.

- Stormwater
 - The California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit (R2-2022-0018), which C/CAG member agencies are subject to. Other entities within San Mateo County are also subject to other NPDES permits, including the Phase II Small Municipal Separate Storm Sewer System (MS4) Permit (Order WQ 2013-0001-DWQ, as amended) for entities including school districts and universities; the California Department of Transportation (Caltrans) MS4 Permit (Statewide Stormwater Permit Order 2022-0003-DWQ) for highways; and varying Industrial General Permits and Waste Discharge Requirements for other industrial facilities.
 - The State Water Resources Control Board is currently drafting regulations for the on-site treatment and reuse of non-potable water for non-potable end uses (SBDDW-22-001) (State Water Resources Control Board 2024a).
 - The State Water Resources Control Board is currently developing a policy, known as the Urban Stormwater Infiltration Policy, to set statewide standards for stormwater infiltration in urban areas (State Water Resources Control Board 2024b).
- Groundwater
 - In California, the Sustainable Groundwater Management Act (SGMA) was passed in 2014 and established a new structure for managing California’s groundwater resources at the local level by local agencies. SGMA required GSAs to form in the state’s high- and medium-priority basins and subbasins by June 30, 2017. The Water Code states that a GSA shall produce a Groundwater Sustainability Plan to sustainably manage these subbasins. San Mateo County includes nine SGMA basins, but none are listed as high or medium priority (California DWR n.d.).

These regulatory requirements should be considered for any climate resilience mitigation measure planning and implementation and might create pathways to future coordinated project implementation and even cost-sharing if stakeholders continue to engage and advocate for policies and regulations that support cross-sector collaboration.

2.5 Climate Adaptation and Resilience

Cal OES (2020) describes climate adaptation planning as follows:

“Climate adaptation planning allows communities to identify ways that they might be harmed by future conditions, including those unique to their communities, and to prepare for these conditions before they happen.”

The Adaptation Planning Process, as illustrated by Cal OES (2020), is included in Figure 1 below.

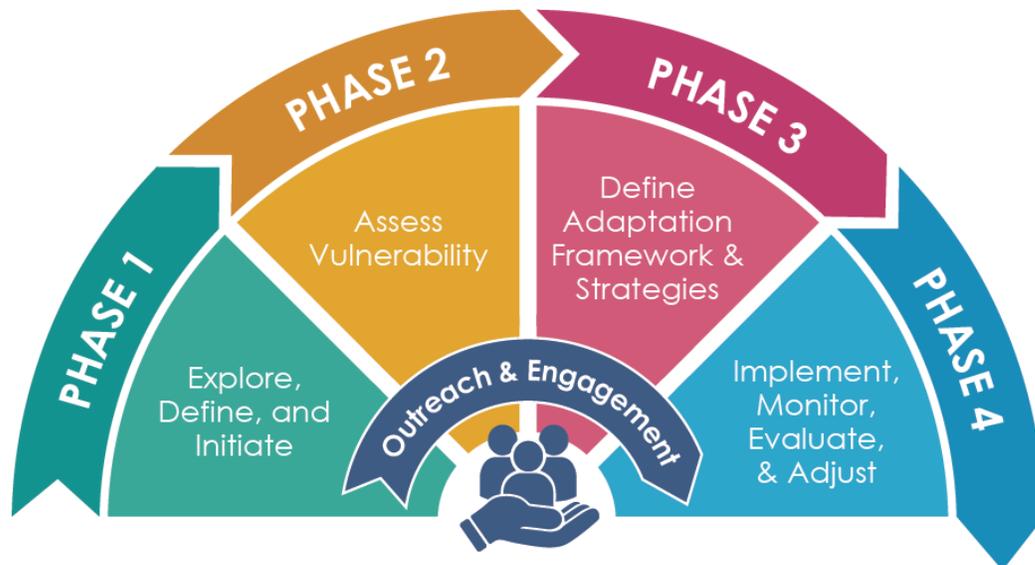


Figure 1: Adaptation Planning Process (Cal OES 2020)

Key definitions from Cal OES (2020) have been included below to orient the OneWatershed Framework approach around resilience, understanding climate vulnerability, and developing mitigation approaches that can reduce climate change impacts:

*“**Resilience** is the capacity of any entity—an individual, a community, an organization, or a natural system—to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience. Adaptation actions contribute to resilience, which is a desired outcome or state of being.”*

*“**Mitigation** is an act or sustained actions to reduce, eliminate, or avoid negative impacts or effects.”*

*“**Hazard mitigation** is a sustained action taken to reduce or eliminate the long-term risk to human life and property through actions that reduce hazard, exposure, and vulnerability. Hazard mitigation can be one component of climate change adaptation.”*

*“**Climate change mitigation**, also referred to as **Greenhouse Gas (GHG) mitigation** or **GHG reduction**, refers to actions to reduce GHG emissions to reduce the severity of climate change.”*

*“**Vulnerability** is the exposure of human life and property to damage from natural and human-made hazards. Climate vulnerability describes the degree to which*

natural, built, and human systems are at risk of exposure to climate change impacts. Differences in exposure, sensitivity, and adaptive capacity affect an individual's or community's vulnerability to climate change. Vulnerability can increase because of physical (built and environmental), social, political, and/or economic factor(s). Vulnerability is considered a function of exposure, sensitivity, and adaptive capacity."

*"**Exposure** is the presence of people, infrastructure, natural systems, and economic, cultural, and social resources in areas that are subject to harm."*

*"**Sensitivity** is the degree to which a species, natural system, or community, government, and other associated systems would be affected by changing climate conditions."*

*"**Impact** is a specific negative result of a climate change effect, generally on a particular population or asset. Impact is often determined by the combination of exposure and sensitivity. For example, if the effect of climate change is that droughts are likely to become more frequent and severe, a potential impact to farmers is that less water could be available for irrigation."*

*"**Adaptive capacity** is the combination of the strengths, attributes, and resources available to an individual, community, society, or organization that can be used to prepare for and undertake actions to reduce adverse impacts [or] moderate harm or [to] exploit beneficial opportunities. Simply stated, it is the ability to adjust to potential damage, to take advantage of opportunities, or to respond to consequences."*

*"**Risk** is the potential for damage or loss created by a hazardous condition that affects populations or community assets. For example, a freeway in an area that can experience flooding can be labeled as 'at risk' of flooding. Sometimes a level of risk will be assigned, which can be either qualitative or quantitative (e.g., a house that faces a 'high risk' from wildfires, or a community that faces a 30 percent chance of a major earthquake in the next 40 years)." (Cal OES 2020)*

The vulnerability assessment steps included in Cal OES (2020) bring together these definitions to illustrate the process to assess and understand climate vulnerability for communities (see Figure 2). This approach as outlined in Cal OES (2020) guided the OneWatershed Framework development. A similar approach is presented in the recently released RSAP Guidelines (BCDC 2024), provided as Figure 3.

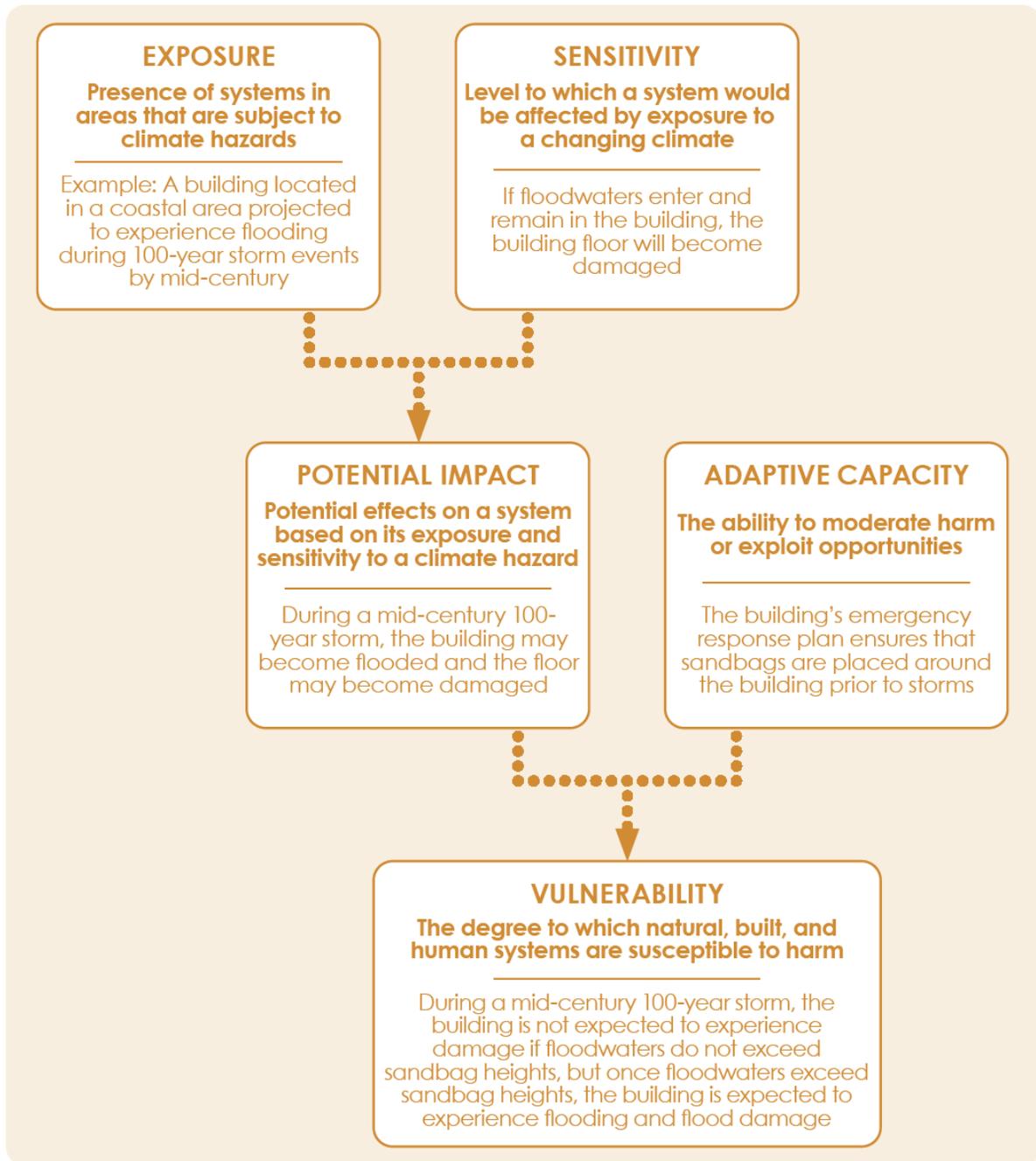


Figure 2: Vulnerability Assessment Steps (Figure 10 of Cal OES 2020)

Responding to Different Components of Flood Risk in Adaptation



Figure 1-9. A description of flood risk for the RSAP. This includes the minimum coastal flood hazards, exposure due to minimum sea level rise scenarios, and components of vulnerability. For more information on types of flood hazards, see Coastal Flood Hazards and Sea Level Rise Scenarios Standard (Section 3.3.1).

Figure 3: Components of Flood Risk in Adaptation (from BCDC 2024)

3. ONEWATERSHED FRAMEWORK

The OneWatershed Framework is a three-step process that was developed with input from several different stakeholder groups. This section describes the objectives for the OneWatershed Framework, the development of the Framework, provides an overview of the Process, and summarizes potential next steps for the Framework,

3.1 Objectives

The OneWatershed Framework is intended to support the collaborative efforts of San Mateo County (County) agencies and interested parties, working across jurisdictions/organizations and watershed boundaries to achieve long-term and strategic climate resilience. The approach is a countywide integrated water infrastructure and resource management strategy designed to address the overlapping climate risks to community infrastructure from multiple interrelated hazards, especially flooding, sea level rise, heat, drought, and emergent groundwater conditions. The OneWatershed Framework is designed to employ a community co-creation approach to listen to the lived experiences of community members and weigh this input along with available quantitative climate change hazard exposure data and projections and available geospatial vulnerability data. This engagement model empowers communities to identify local climate-related concerns affecting their most vulnerable residents, infrastructure, and geographic areas, and work together to represent local concerns in larger-scale, collaborative climate resilience solutions across the County’s watersheds.

The OneWatershed Framework builds from and integrates with several previously completed studies and programs focusing on climate adaptation and resilience in San Mateo County. C/CAG, its member agencies, and other partnering agencies and organizations in San Mateo County have completed substantial planning to identify infrastructure solutions that can reduce flooding impacts, improve water quality, and provide other co-benefits (see Appendix B for a memorandum that summarizes previous studies and provides citations). Much of C/CAG’s efforts in this space have been focused on advancing multi-benefit green stormwater infrastructure to support water quality goals related to the San Francisco Bay Municipal Regional Stormwater Permit, but efforts have also included increasing the adaptive capacity of drainage systems and communities with respect to the impacts of more frequent, intense storms. Through several countywide studies,⁴ C/CAG found that a greater quantity of drainage areas could be managed with green stormwater infrastructure more cost-effectively through a collaborative, regional-scale stormwater management approach. C/CAG further investigated a more regional approach to sustainable stormwater management in its Advancing Regional-Scale Stormwater Management Project (Flows to Bay 2024), funded through a California Natural Resources Agency grant and developed with input from many of the OneWatershed Framework collaborators. C/CAG’s Sustainable Street Master Plan (C/CAG 2021) also provides the basis for better integrating stormwater management with climate adaptation efforts through roadway

⁴ See the *Stormwater Resource Plan for San Mateo County* (San Mateo Countywide Water Pollution Prevention Program [SMCWPPP] 2017), the *PCBs and Mercury Total Maximum Daily Load (TMDL) Control Measure Implementation Plan and Reasonable Assurance Analysis (RAA) for San Mateo County* (SMCWPPP 2020b).

improvements and protecting road networks from projected increases in precipitation and associated roadway runoff.

The OneWatershed Framework extends these efforts by providing a process and an institutional basis to further identify and prioritize multi-benefit stormwater capture and other water resilience infrastructure projects that could begin to address the cumulative consequences of climate change on water infrastructure and resources at a watershed scale. In this way, the OneWatershed Framework creates a unifying lens through which shared risk to water infrastructure and resources is the focal point for evaluating potential project opportunities that increase resilience. Climate change hazard and geospatial vulnerability data, available at the Countywide scale, are combined with the knowledge of the local community members experiencing climate change hazards at a watershed or community scale, along with jurisdiction-specific and other detailed studies, to obtain a more complete understanding of community-specific climate-related risks to water infrastructure and resources. This deeper understanding of climate change vulnerability will be used to identify potential projects from prior or parallel planning efforts, such as climate action plans, bike-ped master plans, urban forestry plans, C/CAG's Sustainable Streets Master Plan, other plans, or newly identified projects, that can help support regulatory requirements related to water and watershed management in relation to climate change goals and integrate with or provide other water infrastructure and resource benefits. The OneWatershed Framework has been designed to encourage a more efficient, effective, equitable and collaborative strategy in the County to protect against impending climate change impacts.

Despite the significant progress to date on addressing the climate change challenges in San Mateo County among the numerous public agencies, nonprofit organizations, community-based organizations (CBOs) and other stakeholders, there are a number of longstanding institutional and financial constraints that still hinder the establishment of full-scale climate resilience programs in San Mateo County:

- Aged, degraded, and drainage infrastructure undersized to handle projected flood risk and water quality concerns under current conditions and future climate scenarios
- Ongoing fragmentation among watershed, water quality, climate resilience, and other infrastructure planning and implementation among County agencies and other implementation partners
- Lack of dedicated funding due to state constraints on property-related fees to support much needed storm drain improvements, water quality, and climate resilience infrastructure
- Competing or sometimes misaligned regulatory mandates to address stormwater quality, drinking water quality, wastewater quality, and climate resilience goals that do not always support resilience goals integration and more effective cross-sector planning

The OneWatershed Framework is intended to promote collaborative partnerships that can begin to address these challenges. A key goal of the approach is to use available quantitative and geospatial data and community input to identify the infrastructure, water resources, and

community vulnerabilities that are likely to impact communities most. A key goal of the approach is to develop a suite of multi-benefit projects that address the climate resilience and regulatory needs of multiple water infrastructure sectors and can be funded through innovative partnership approaches.

Beyond establishing a conceptual model and a forum among key stakeholders for piloting the OneWatershed Framework in its current form, this Project is intended to be a starting point for future collaboration and the advancement of a broader OneWatershed program in San Mateo County. The framework could be employed near-term in other priority watersheds by agencies and community partners advancing climate resilience projects and planning efforts in those areas, following the process and model of the San Bruno Creek OneWatershed Pilot Study. Additionally, C/CAG and the other Project Partners may choose to develop the OneWatershed Framework further in future years to update the data inventory, enhance quantitative analyses at a countywide scale, improve the function of the OneWatershed Dashboard (web-based tool created to support OneWatershed planning), and create an overarching umbrella program. The umbrella OneWatershed program could include broader interagency/departmental and community engagement; the establishment of higher-level program goals, objectives, and performance metrics; evaluation of funding strategies; and completion of additional OneWatershed Climate Resilience Plans and studies for priority watershed areas. This work could be planned through a comprehensive OneWatershed Strategic Plan that would be used long term to advance equitable watershed-based climate resilience in San Mateo County. The long-term vision is that this is rolled out in watersheds across the County to identify a variety of climate resilience and adaptation efforts that could be implemented at different scales and for different stakeholders/partners.

3.2 Development

The OneWatershed Framework was developed through the ICARP grant funding awarded to C/CAG and Project partners. A portion of the grant funding was directly awarded to CRC as the collaborating CBO, and the remainder was contracted with a technical consultant team led by Geosyntec Consultants, Inc., and supported by Paradigm Environmental, Hazen, Craig Communications, and EOA, Inc., with technical advising from Carollo.

The following groups were formed to support the development of the OneWatershed Framework:

1. The Project Management Team (PMT), which leads the Project and is made up of staff from C/CAG, CRC, OneShoreline, City of San Bruno, County of San Mateo Office of Sustainability Department, City of South San Francisco's South San Francisco-San Bruno Regional Water Quality Control Plan, and BAWSCA
2. The Technical Advisory Committee (TAC), which includes County agencies, regional partners, and other interested parties with technical knowledge of climate resilience, water, and/or emergency planning

The OneWatershed Framework development has also been informed by two groups focused on equity and outreach, led by CRC:

1. The Equity Priority Community Workgroup, composed of CBOs, nonprofits, and interested County residents
2. The Resilient San Bruno Team, which is the local Climate Change Community Team⁵ made up of motivated and interested residents and/or community organization representatives from the San Bruno Creek watershed, with a focus in the highly impacted Belle Air neighborhood

These groups and representatives were engaged throughout the development of the OneWatershed Framework through a series of interactive meetings and review and comments on project deliverables. The engagement plan developed for the OneWatershed Framework was reviewed by each of the above groups. The individuals who participated in each group are listed in Appendix A. C/CAG staff presented the development of the OneWatershed Framework and the OneWatershed Framework Report to its Stormwater and Congestion Management & Environmental Quality Committees and the C/CAG Board of Directors for feedback.

Several key resources from industry leaders in California and beyond were reviewed as part of the development of the OneWatershed Framework, many of which are cited throughout this document. The studies reviewed to guide the overall thinking behind the approach and to ensure the appropriate level of understanding and integration of equity and climate resilience goals across water/watershed management agencies and other climate resilience stakeholders, included the following:

- *The California Adaptation Planning Guide* (Cal OES 2020)
- *Draft California Climate Adaptation Strategy* (California Natural Resources Agency [CNRA] 2024)
- *Racial Equity Impact & Implementation Guide* (City of Oakland 2020)
- *Caltrans Climate Change Vulnerability Assessment Statewide Summary Report* (Caltrans 2024)
- *Climate Resilience Framework Recommendations Report* (City of Toronto 2019)
- *Sonoma Water Climate Adaptation Plan* (Sonoma Water 2021)

The BCDC RSAP Guidelines (BCDC 2024) were released after the bulk of the OneWatershed Framework had been developed but have informed revisions to the framework.

⁵ Climate Change Community Teams include local community-based organizations, religious leaders, youth leaders, and those interested in advancing climate change adaptation and action at the local level. Climate Change Community Teams are hyperlocal and focused on addressing climate justice issues in their neighborhoods. The Climate Change Community Teams are freestanding community organizing infrastructure intended to become a group that builds expertise over time.

3.3 Process

The OneWatershed Framework defines a stepwise process designed to be used on a watershed basis for any watershed in San Mateo County or elsewhere where multiagency/stakeholder climate resilience efforts are underway. The process is intended to result in hyper-local watershed-specific OneWatershed Climate Resilience Plans that use Countywide tools but are guided by the lived experiences and priorities of the local community. The approach is illustrated in Figure 4.

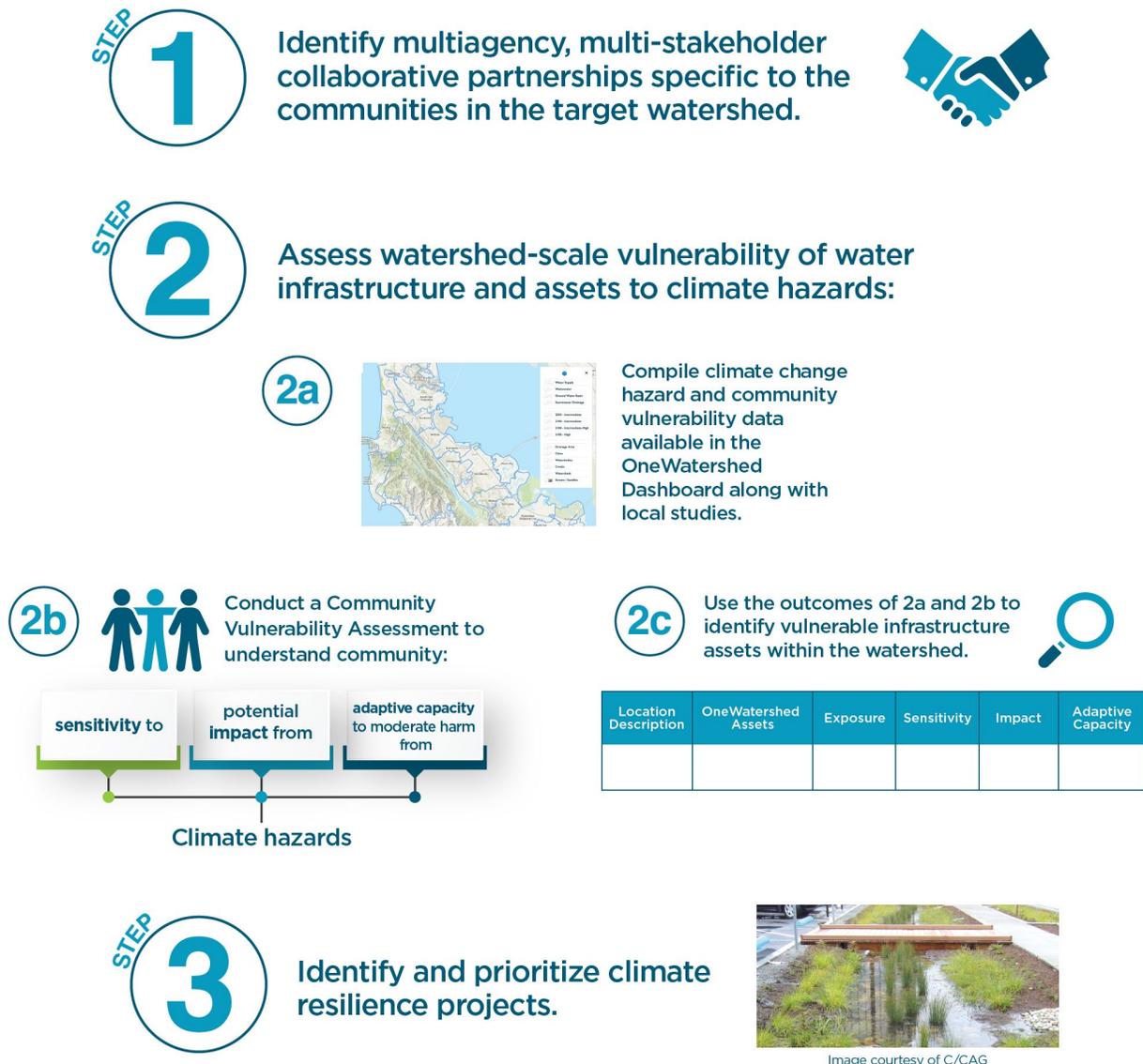


Figure 4: OneWatershed Framework Process

In San Mateo County, Step 1, identifying collaborative partnerships, has been initiated through various working groups and project coordination efforts, and is not specifically called out in the

Cal OES process. Substantial initial studies and exploration of climate change hazards have been conducted throughout San Mateo County (i.e., Phase 1 – Define, Explore, and Initiate of the Cal OES process shown in Figure 1), and the OneWatershed Framework is intended to build upon those efforts. Step 2, assess watershed-scale vulnerability of water infrastructure and assets to climate change hazards, corresponds with Phase 2 – Assess Vulnerability in the Cal OES process and Step 3, identify and prioritize climate resilience projects, initiates Phase 3 – Define Adaptation Framework and Strategies of the adaptation planning process defined by the Cal OES (2020) (see Figure 1). The process is described below:

Step 1: Identify multiagency, multi-stakeholder collaborative partnerships specific to the communities in the target watershed. When implemented at the watershed scale, the OneWatershed Framework requires the combined collaboration of local jurisdictions, water and wastewater agencies, groundwater managers, CBOs, and residents. Establishing these partnerships is a critical first step for implementing the OneWatershed Framework.

Step 2: Assess watershed-scale vulnerability of OneWatershed infrastructure and assets to climate change hazards. Following Cal OES (2020) (see Figure 2), watershed-scale vulnerability is assessed through a multistep process:

- 2a: Use the Countywide climate change hazard data and community vulnerability data made available through the OneWatershed Dashboard web-based tool developed to support OneWatershed planning (see Section 4 and Section 7, along with detailed local studies as available to identify areas within the watershed with increased exposure, sensitivity, or vulnerability to climate change hazards.
- 2b: Conduct a community vulnerability assessment (see Section 4.2) to understand the community’s lived experience and validate or refine key sensitivities of the watershed-based community to exposure to climate change hazards, understand the resulting potential impact or consequence from climate change hazards, and the existing adaptive capacity to moderate harm posed by climate change hazards.
- 2c: Use the outcomes of Steps 2a and 2b to identify vulnerable locations, resources, infrastructure and assets within the watershed and identify the specific OneWatershed assets and resources that are co-located with, serve, or rely on these areas, resources, and assets.

Step 3: Identify and prioritize climate resilience projects. Follow a multistep process to identify projects that target key vulnerabilities within the watershed:

- 3a: Compile project opportunities in existing plans developed by cities, agencies, water/wastewater districts, the County, and other partners within the watershed.
- 3b: Identify additional potential project, program, or policy opportunities within the watershed through community engagement in collaboration with local agencies and a Climate Change Community Team (or an analogous CBO) located within the watershed.

- 3c: Complete a prioritization process for compiled projects, programs, and policy opportunities to identify those climate resilience projects that could address key vulnerabilities within the watershed, receive community and partner support, provide multiple benefits, and/or are more feasible to implement (see Section 5.2).

The outcomes of these steps are to be captured in a watershed-specific OneWatershed Climate Resilience Plan that identifies climate resilience projects prioritized for implementation within the watershed.

3.4 Next Steps

The OneWatershed Climate Resilience Plans developed through the OneWatershed Framework (including the San Bruno Creek OneWatershed Pilot Study, which will be completed by early 2026) can be used over the long term to elevate and prioritize implementation of cross-sector climate resilience projects across the County. Critical to the next implementation phase is developing a funding and delivery strategy that could support full design, installation, and ongoing operations and maintenance of climate resilience projects. These funding and delivery strategies may build upon previous work conducted by C/CAG, including funding options outlined in *Advancing Regional-Scale Stormwater Management Projects* and the *Regional Collaborative Program Interim MOU-Based Regional Collaborative Program Summary Report* (C/CAG 2023). The Regional Collaborative Program is intended to enable jurisdictions within the County to co-fund the implementation and maintenance of regional multi-benefit stormwater capture projects and regional-scale implementation of green stormwater infrastructure projects. Projects identified for implementation through the OneWatershed Framework approach could be funded through the Regional Collaboration Program as well as a range of other funding sources targeting other water sectors. As noted, a future phase of this work could entail the development of a Countywide OneWatershed Strategic Plan to establish a full-scale program with broader community engagement, public agency and other stakeholder support, defined program goals, objectives and performance measures and defined funding strategies. This OneWatershed Framework Report does not provide detailed plans or analyses for these next steps.

4. STEP 2: ASSESS CLIMATE CHANGE HAZARD VULNERABILITY

Step 2 of the OneWatershed Framework is to ***assess watershed-scale vulnerability of OneWatershed infrastructure and assets to climate change hazards***. Communities are served by several different OneWatershed infrastructure networks that are potentially vulnerable to climate change hazards. Many of these infrastructure networks are intentionally or unintentionally interconnected or co-located, such as stormwater runoff that inflows into wastewater treatment systems, or systems that store stormwater for capture and groundwater recharge or non-potable water supply.

Per Cal OES (2020) and the RSAP Guidelines (BCDC 2024), understanding the location and magnitude of projected climate change hazards can help planners understand Community and asset exposure to these hazards. Climate change hazard projections can also provide information about how interconnected OneWatershed infrastructure networks might share exposure to these hazards. For example, sea level rise and storm surge flooding projected in a location where it impacts coastal drainage systems and inundates a nearby wastewater treatment plant. Countywide climate change hazard exposure data along with water infrastructure network and resource information has been compiled on the OneWatershed Dashboard to facilitate the assessment of vulnerability at the watershed level (see Section 4.1.1).

The ultimate climate change-related vulnerability or risk of an asset also depends on the sensitivity to the hazard, adaptive capacity of the asset, and the potential impact or consequence of the exposure (e.g., whether an asset will be damaged due to flooding when exposed to inundation from sea level rise). Community and asset vulnerability to climate change hazards can vary on a block-by-block basis and have as much to do with community resources (or lack thereof) as they do with physical land characteristics and infrastructure. Because vulnerability and risk are a composite of exposure, sensitivity, potential impact or consequence, and available resources (or adaptive capacity), those areas projected to experience the highest exposure to climate change hazards in the future could be different from those areas that are at greatest risk of impact from that exposure. This also means that the data needed to assess community and asset vulnerability and risk of impact must be neighborhood-specific. There is limited data at the Countywide level related to community sensitivity, resources, and vulnerability, but some available vulnerability-relevant datasets have also been compiled for use in watershed-specific OneWatershed Climate Resilience Plans (see Section 4.1.2).

In addition to available studies, quantitative outputs, and geospatial data, the OneWatershed Framework relies on experiential input gathered from outreach to community members (see Section 4.2) to understand a selected watershed's exposure and sensitivity to climate change hazards, the existing resources available to mitigate harm (i.e., adaptive capacity), and potential impacts. While detailed quantitative analysis can be designed and performed to understand specific climate change risks and/or the potential cost of specific consequences, the approach recommended by Cal OES (2020) and this OneWatershed Framework to assess overall vulnerability qualitatively considers the range of data and inputs collected (this could also be considered semiquantitative as quantitative inputs are referenced). A qualitative approach is recommended for the OneWatershed Framework to acknowledge data limitations, minimize the

resources needed to complete the vulnerability assessment, and provide a method that better incorporates key output from community engagement. A recommended approach for prioritizing vulnerable Community locations and/or OneWatershed assets is provided in Section 4.3.

4.1 Step 2a: Compile Data and Studies

The OneWatershed Framework encompasses many different categories of data. These are described in the following subsections.

4.1.1 Countywide Data

Step 2 of the OneWatershed Process references Countywide data provided on the OneWatershed Dashboard (<https://web.paradigmh2o.com/smc-gi/onewatershed>, see Section 7 for additional details on this web tool). Details of the geographic information system (GIS) data compiled on the Dashboard are described in this section.

4.1.1.1 Climate Change Hazards

Climate change hazard-related data has been compiled on the OneWatershed Dashboard for use during Step 2 of the OneWatershed Framework process, to understand Community exposure. Climate change hazards were selected based on California’s Fourth Climate Change Assessment San Francisco Bay Area Region Report (Ackerly et al. 2018) and vetted by the PMT and the advisory committees based on the likelihood of direct or coincidental impacts on identified OneWatershed infrastructure networks. These climate change hazards include the following:

- Sea level rise
- Extreme heat
- Extreme precipitation
- Drought
- Wildfire

Four climate scenarios were identified for associated climate change hazard exposure data, based on those included in the BCDC RSAP Guidelines (BCDC 2024), and the recommendations of California Sea Level Rise Guidance: 2024 Science and Policy Update (California Ocean Protection Council 2024). These are summarized in Table 2 below.

Table 2: OneWatershed Climate Scenarios (based on California 2024 scenarios for sea level rise)

Time Frame	Emissions Scenario	California Sea Level Rise Scenario	OneWatershed Climate Scenario ¹
2050	Intermediate	0.8 feet (9.6 inches)	Mid-Century – Intermediate
2100	Intermediate	3.1 feet (37 inches)	End of Century – Intermediate
2100	Intermediate-High	4.9 feet (59 inches)	End of Century – Intermediate-High
2100	High	6.6 feet (79 inches)	End of Century – High

¹ California Ocean Protection Council (2024) was referenced to assign climate scenarios to the sea level rise scenarios identified in BCDC 2024.

Climate change hazard exposure data for each of the OneWatershed climate scenarios is provided on the OneWatershed Dashboard. Details for each of the climate change hazards are provided in the following subsections.

Sea Level Rise

Sea level rise caused by climate change is a major threat to community infrastructure. Infrastructure flooded from surface inundation or groundwater intrusion due to sea level rise could be acutely damaged or corroded over time and might not operate properly or negatively affect water quality. Rising groundwater will introduce many challenges, including increasing the likelihood of flooding during winter storms as well as other subsurface impacts including increased liquefaction risk, contaminant mobilization, and damage to critical infrastructure, such as sewer systems, drinking water pipes, roads, and building foundations (San Francisco Bay Area Planning and Urban Research Association [SPUR] 2024). Flooding and groundwater intrusion also create challenges regarding properly maintaining infrastructure, especially in coastal areas, so that it operates over the long term as designed and under changing conditions. For groundwater intrusion especially, individual assets require location-specific assessments to understand the level of climate change impact or consequence. As described in San Francisco Estuary Institute (SFEI), there are many areas along the bay margin that currently experience groundwater levels less than 6 feet below surface and have been designed to operate in this environment without consequence (SFEI 2022).

A recent update to San Mateo County’s sea level rise map viewer (San Mateo County Sustainability Department n.d.) includes data projections from the United States Geological Survey (USGS) Coastal Storm Modeling System (CoSMoS). Sea level rise projections and groundwater rise corresponding to the BCDC scenarios shown in Table 3 were compiled from CoSMoS (CoSMoS v2.1; Barnard et al. 2019) accessed via the Our Coast Our Future web platform (Point Blue Conservation Science and USGS 2021) Projections included the 100-year coastal storm and moderate hydraulic conductivity rate for groundwater.

Table 3: Sea Level Rise and Groundwater Rise Scenarios corresponding to OneWatershed Climate Scenarios

OneWatershed Climate Scenario¹	Corresponding CoSMoS Sea Level Rise and Groundwater Rise Scenario
Mid-Century – Intermediate	0.8 feet
End of Century – Intermediate	3.3 feet
End of Century – Intermediate-High	4.9 feet
End of Century – High	6.6 feet

These projections have been made available on the OneWatershed Dashboard for the OneWatershed climate scenarios.

Extreme Heat

Extreme heat is an increasingly serious climate change hazard with cascading consequences. Extreme heat negatively impacts communities, especially vulnerable populations. As stated by the California Governor’s Office of Land Use and Climate Innovation:

“Vulnerable populations including aging populations, children, and those with certain health conditions are at higher risk of heat-related illness. When vulnerable populations face health inequities due to factors such as poverty, linguistic isolation, the cost of cooling, and the legacy of racist redlining policies, this puts them at disproportionately high risk of heat-related illness and death”
(California Governor’s Office of Land Use and Climate Innovation 2025).

Extreme heat also reduces the ability of workers to perform work tasks, resulting in lost labor time for water infrastructure operations. Extreme heat increases electricity use and can result in interruptions to electricity service, which can have consequences for water infrastructure and other municipal operations that communities depend on. Extreme heat also causes physical impacts to infrastructure and buildings, including water-related infrastructure and resources. Extreme heat can also cause environmental and water quality impacts to receiving waters and aquatic ecosystems.

San Mateo County has developed an Extreme Heat Dashboard, which provides projections (from Cal-Adapt) of days exceeding a selected temperature threshold (City Systems 2023). The San Mateo County analysis was conducted based on specific carbon emissions scenarios, or representative concentration pathways (RCPs). The scenarios available on the Extreme Heat Dashboard were matched as possible given available analyses and information to the associated OneWatershed climate scenarios. The RCPs and ranges selected for each scenario are provided in Table 4, with RCP 4.5 assumed to represent an Intermediate emissions climate scenario, and RCP 8.5 representing a High emissions climate scenario. The planning horizon available from the San Mateo County Extreme Heat Dashboard extends through 2056–2085, which was used for the OneWatershed End of Century scenarios.

Table 4: Extreme Heat Scenarios Used Corresponding to OneWatershed Climate Scenarios

OneWatershed Climate Scenario	San Mateo County Extreme Heat Dashboard Scenarios ¹
Mid-Century – Intermediate	Year Range 2040–2049, Carbon Pathway RCP 4.5
End of Century – Intermediate	Year Range 2056–2085, Carbon Pathway RCP 4.5
End of Century – Intermediate-High	Year Range 2056–2085, Carbon Pathway Average of RCP 4.5 and RCP 8.5
End of Century – High	Year Range 2056–2085, Carbon Pathway RCP 8.5

¹ Temperature threshold of 85 degrees Fahrenheit (°F) and average of climate models. Carbon pathway RCP refers to the representative concentration pathway, which relate to the future carbon emissions scenario used in the model.

The projected number of high heat days varies for each census block across the County. Geospatial files presenting these projections by census block are available on the OneWatershed Dashboard for each of the OneWatershed climate scenarios.

Extreme Precipitation

Extreme precipitation occurs when rainfall substantially exceeds what is typical based on available historical records and/or projections from historical data. In California, extreme precipitation is typically associated with multiday atmospheric river events. Precipitation projections used as inputs to modeling from C/CAG’s San Mateo Countywide Sustainable Streets Master Plan (C/CAG 2021), which leverages a suite of 10 climate models from Cal-Adapt (Cal-Adapt 2024a), were used to evaluate and identify areas projected to have the highest increase in future precipitation. The climate models and data used for the precipitation projections are described in [Appendix A](#) of the Sustainable Streets Master Plan.

Cal-Adapt uses several methods to define an extreme event. In San Mateo County, all methods classify the extreme event as a 50% annual chance storm (also referred to as the 2-year storm, a large storm that historically occurs every other year) or greater. Storm drain infrastructure is constructed to specific design standards that correspond to historical return frequencies (e.g., the 10% annual chance storm [i.e., 10-year event] or the 4% annual chance storm [i.e., 25-year event]). When historically large storms become significantly larger due to climate change, storm drain infrastructure (and other drainage or conveyance infrastructure) might no longer perform per its design standard and could cause more frequent flooding within the storm drain catchments and communities it serves.

The projected percent increase for the identified OneWatershed climate scenarios was estimated by evaluating exposure for two emission scenarios (RCP 4.5 and RCP 8.5) and a mid-century and end-of-century period. The End of Century – Intermediate-High scenario is calculated from the average of the two emission scenarios. The OneWatershed Scenarios and the proposed corresponding extreme precipitation scenarios from Cal-Adapt (2024a) are presented in Table 5.

Table 5: Extreme Precipitation Scenarios Used Corresponding to OneWatershed Climate Scenarios

OneWatershed Climate Scenario	Cal-Adapt Extreme Precipitation Scenario¹
Mid-Century – Intermediate	RCP 4.5 (2034–2064)
End of Century – Intermediate	RCP 4.5 (2069–2099)
End of Century – Intermediate-High	Average of RCP 4.5 + RCP 8.5 (2069–2099)
End of Century – High	RCP 8.5 (2069–2099)

¹ Median of climate models.

The projected change in the 10-year event was calculated for each stormwater catchment throughout the County. These geospatial files are available for each of the OneWatershed climate scenarios and are provided on the OneWatershed Dashboard.

Drought

Droughts are periods with below-average precipitation and when sustained can result in shortages in surface water supplies that might rely on a certain amount of precipitation per year. As highlighted in the California Fourth Climate Change Assessment, when compared to historical periods, more frequent, longer, and drier droughts are likely with climate change. Drought exposure was measured and scored relative to water supply impacts in San Mateo

County, specifically related to projected water supply shortages under climate change conditions. Water supply shortages were measured as the difference between projected demand and projected supply availability under climate change conditions.⁶ Thresholds of water supply shortages are proposed to be directly related to the California DWR standard Water Shortage Contingency Plan stages identified in Table 6 below.

Table 6: Linkage Between DWR Water Shortage Contingency Plan Stages and Proposed One Watershed Drought Exposure Level

Water Shortage Contingency Plan Stage	Level of Projected Water Supply Shortage
Stage 1	0%–10%
Stage 2	10%–20%
Stage 3	20%–30%
Stage 4	30%–40%
Stage 5	40%–50%
Stage 6	>50%

Data sources used to estimate future water supply shortages within San Mateo County included data and context from San Francisco Public Utilities Commission’s (SFPUC’s) Long-Term Vulnerability Assessment and Adaptation Plan (LTVA) (Francois et al. 2021), 2020 Urban Water Management Plans for water suppliers in the County, and the USGS Basin Characterization Model (Flint and Flint 2014).

In San Mateo County, 16 water agencies, containing 90% of the county’s population, purchase water primarily from SFPUC and are represented by BAWSCA. Based on water production volume data from 2023, 95% of the water supply to San Mateo County’s BAWSCA member agencies came from the SFPUC Regional Water System (RWS), while 5% consisted of local groundwater and surface water supply.

In 2021, SFPUC⁷ published their LTVA, which assessed how climate change and other external factors could affect SFPUC’s ability to meet level of service goals over the next 50 years. A total of four future water demand and 1,360 climate scenarios were modeled over a 2021–2070 simulation period to evaluate water supply shortages within the SF RWS. The analysis and values below are a distillation of the LTVA model simulations and reflect median climate change projections for each scenario. The LTVA 2040 and 2070 RCP 8.5 scenarios provide comparable climate factors to the Mid-Century Intermediate and End-of-Century High bookend scenarios,

⁶ External factors affecting water supply availability, such as future infrastructure investments and regulatory conditions are assumed to be held constant to current conditions.

⁷ Partnered with The Water Research Foundation and University of Massachusetts Hydrosystems Research Group

respectively. The 265-million-gallon-per-day (mgd) systemwide demand scenario was chosen because it reflects an expected upper limit of total SF RWS demand.⁸

The above scenarios result in a maximum modeled water shortage of 42% by 2040 and 43% by 2070 RCP 8.5 for SFPUC wholesalers in aggregate and a frequency of SFPUC systemwide rationing of 20% or greater in about 1 in every 10 years on average for both scenarios. Given the minimal variation in median climate factors and consistent demand between the two bookend scenarios, the approximate maximum annual water supply shortage and shortage frequency do not vary significantly. It can be assumed that values for both shortage and shortage frequency in the End-of-Century Intermediate and End-of-Century Intermediate-High scenarios would fall within this range.

Although the LTVA study did not provide detailed statistics regarding local groundwater and surface water sources to BAWSCA agencies in San Mateo County, given the small percentage of total supply, it can be assumed that the impact of climate change to local water sources will not significantly alter the total supply reliability to San Mateo BAWSCA agencies.

Table 7: Summary of SF RWS Imported Water Supply Impacts to BAWSCA Agencies at Median Climate Change Projections and 265 mgd Systemwide Demand

One-Watershed Scenario	Representative Year + RCP Scenarios	Comparable LTVA Scenario	Approximate Maximum Modeled Shortage
Mid-Century – Intermediate	2040–2049, RCP 4.5	2040	42%
End-of-Century – Intermediate	2056–2085, RCP 4.5	N/A*	42.5% *
End-of-Century – Intermediate-High	2056–2085, Average of RCP 4.5 + RCP 8.5	N/A*	42.5% *
End of Century – High	2056–2085, RCP 8.5	2070 RCP 8.5	43%

Notes:

* The SFPUC LTVA study did not provide comparable surrogate scenarios for the End-of-Century Intermediate and the End-of-Century Intermediate-High scenarios. These placeholder values represent the average of the bookend scenarios, as the climate factors outlined in these intermediate scenarios fall between the ranges.

BAWSCA: Bay Area Water Supply & Conservation Agency

LTVA: Long-Term Vulnerability Assessment and Adaptation Plan

mgd: million gallons per day

RCP: representative concentration pathway

SF RWS: San Francisco Regional Water System

⁸ The 265 mgd captures the sum of both SFPUC’s retail demand nearing buildout (2045 retail demand projections from the SFPUC 2020 Urban Water Management Plan) and the BAWSCA agencies’ Individual Supply Guarantees from SFPUC (the contractual upper bound of SFPUC deliveries to each wholesale customer).

The projected maximum modeled shortage (i.e., provided in the table above) for SFPUC dependent water supply boundaries is provided for each of the OneWatershed climate scenarios on the Dashboard.

Wildfire

Wildfire poses risks to communities through impacts to air quality and to infrastructure through damage and loss and can impact water quality of water resources beyond the more obvious and devastating potential impacts to communities, property, and life, especially in areas in the wildland urban interface. Cal Fire has assigned current wildfire risk for areas across San Mateo County and has compiled the risk of areas identified as local responsibility areas in their most recent recommended update of the “Local Responsibility Area Fire Hazard Severity Zones” (CalFire 2025). Cal Fire ranks wildfire hazard within their responsibility area as moderate, high, and very high. This layer is provided directly on the OneWatershed Dashboard. Notably, it does not change with climate scenario.

Cal-Adapt has a tool that allows users to examine whether wildfire activity is likely to increase, though the projections are only available at a coarse spatial scale (Cal-Adapt 2024b). This tool has not been incorporated into the OneWatershed Dashboard but could be considered for certain watershed-specific studies if wildfire is a high priority in the area.

4.1.2 Vulnerability Data

There are limited Countywide datasets providing vulnerability. Three social vulnerability layers have been provided on the OneWatershed Dashboard to allow watershed planners to begin to consider how climate change hazard exposure might intersect with communities and areas more vulnerable to impacts. These include the following:

1. California Office of Environmental Health Hazard Assessment CalEnviroScreen 4.0 (2021)
2. BCDC Community Vulnerability Map (2023)
3. Metropolitan Transportation Commission and Associate of Bay Area Governments Plan Bay Area 2050+ Equity Priority Communities (2024)

The OneWatershed Framework recommends that these layers be used in combination with other watershed-specific technical study output, geospatial data, anecdotal evidence, and community experiential data to understand vulnerability throughout a watershed of focus.

4.1.3 Watershed-Specific Data and Studies

Watershed-specific data (i.e., not currently available on the OneWatershed Dashboard) should be separated and compiled to complete the watershed-specific Step 2a of the OneWatershed Framework process. Data compiled at the watershed-scale should include but not be limited to the following:

- More detailed OneWatershed asset information, including locations of assets, sizes, elevations, components, and other aspects.

- Watershed-specific and/or asset-specific climate exposure or consequence projections, if hyper-local studies have been conducted or are available. This could include, for example, storm drain master plan or other extreme event or flood model results.
- The Federal Emergency Management Agency (FEMA) flood hazard areas and flood zones within the watershed.
- Geospatial datasets of anecdotal or measured climate impacts, including for example, areas of burn scars from wildfires, flood reports, or locations experiencing higher urban heat.

Some more detailed data layers have been made available through a separate portal (the [OneWatershed Web Viewer](#)), which could be helpful for completing watershed-specific analysis. Data compiled at this source includes OneWatershed infrastructure network data, including the following:

- Stormwater infrastructure (e.g., storm drains, catchments, outfalls, watershed boundaries)
- Groundwater resources (e.g., groundwater basins)
- Wastewater infrastructure (e.g., wastewater treatment facilities)
- Water reclamation facilities
- Water supply infrastructure (e.g., reservoirs, dams)
- Data from the Peninsula Resilience Planning (PREP) study
- Other geospatial layers

The data compiled in the Web Viewer are described in the OneWatershed Data Inventory attached to this report (Appendix C).

4.2 Step 2b: Community Vulnerability Assessment Approach

The OneWatershed Framework incorporates a community vulnerability assessment that gathers information from community members. The results of this assessment are intended to be used to support Step 2b and 2c of the OneWatershed process (i.e., assess watershed-scale vulnerability of OneWatershed infrastructure and assets to climate change hazards).

The community vulnerability assessment is designed to compile experiential (lived experience) data from residents living in frontline communities. The data collected is intended to identify what resources are currently being used to prevent climate change impacts and recover from climate change impacts and what resources are needed that could improve prevention or recovery. These components can be used to understand community sensitivity to climate change hazard exposure that are not captured by the available data layers, potential impacts from climate change hazards, and the community's current adaptive capacity, as well as the gap between potential community impacts and adaptive capacity. All this information is compiled into a

community vulnerability assessment report. An example community vulnerability assessment process (for the San Bruno Creek Pilot Study) is provided in Section 6.

4.3 Step 2c: Vulnerability Assessment

Step 2c of the OneWatershed Framework process entails using the outcomes of Steps 2a and 2b to identify (1) vulnerable locations, resources, and infrastructure within the watershed and (2) specific OneWatershed assets and resources that are co-located with, serve, or rely on these areas, resources, and infrastructure. The OneWatershed Framework recommends a semiquantitative approach to assess vulnerability, whereby the data and information gathered are compiled into a narrative table to describe and prioritize key vulnerabilities (rather than a detailed quantitative analysis that calculates costs associated with impacts, for example).

The OneWatershed Framework recommends a process similar to that recommended by Cal OES (2024), which results in a table that describes vulnerability and consequence for specific locations and their associated OneWatershed assets within the watershed. To identify those key locations or neighborhoods and associated assets that should be identified in the watershed vulnerability summary table, Cal OES (2020) recommends that the following questions be asked:

- Which climate impacts might result in loss of life or significant human health impacts?
- Which impacts might create disruptions or damages to essential facilities?
- Which impacts might generate significant losses for the local economy?
- Which impacts might create significant environmental impacts, such as release of hazardous materials?

The watershed vulnerability summary table should describe the details of the vulnerability components for the associated location, neighborhood, and/or asset, including the projected severity of **exposure** to climate change hazard(s), the **sensitivity** of the location or asset to exposure, the potential **impact** of exposure, and existing resources or **adaptive capacity** to mitigate harm. An example watershed vulnerability summary table is provided in Table 8.

If the OneWatershed Climate Resilience Plan is also intended to be used to build the RSAP, the exposure of all Minimum Categories and Assets⁹ to the RSAP sea level rise scenarios standard¹⁰ should be included in the table or a separate table within the plan, along with additional description of flood risk conditions.¹¹

⁹ See Section 3.3.2 of the RSAP Guidelines (BCDC 2024).

¹⁰ That is, 0.8 feet (2050), 3.1 feet (2100 Intermediate), 4.9 feet (2100 Intermediate-High), and 6.6 feet (2100 High), which the OneWatershed Climate Scenarios were developed to be consistent with.

¹¹ Flood risk conditions include factors that (per BCDC 2024) influence flood risk, including areas of overtopping, flood pathways, tipping points, ad hoc management, hydraulically connected areas, and/or conditions that could lead to increased flood risk.

Table 8: Watershed Vulnerability Summary Table

Location Description	One Watershed Assets	Exposure	Sensitivity	Impact	Adaptive Capacity
Briefly describe the location or neighborhood	Describe or list the impacted One Watershed assets	Describe the potential exposure to specific climate change hazards	Summarize key sensitivities of the location to climate change hazard exposure (e.g., low-lying, legacy contamination, dense vegetation for fire prone areas)	Describe the potential impact to the asset from exposure to climate change hazards (e.g., flooding inundation and property damage, property damage from wildfire)	List existing resources available to mitigate impacts, and any resource gaps.

There might be the desire to combine this analysis with other more detailed analysis if available studies do not provide a complete understanding of vulnerability. This could include, for example, detailed assessment for water supply. Such an analysis could use modeling tools (e.g., BAWSCA’s Water System & Supply Model) to help quantify water supply shortages under climate change. This detailed modeling effort could incorporate decreased SFPUC supply availability due to climate change, along with local supply sources and future demand levels at the individual agency scale. Within a modeling approach, the USGS basin characterization model could be used to provide insights into groundwater recharge estimates under climate change for watersheds where local groundwater is used as a source of supply. This could be relevant for the San Bruno Creek watershed, where groundwater is a significant part of the water supply portfolio for the agencies in the watershed.

5. STEP 3: CLIMATE RESILIENCE PROJECTS

The OneWatershed Framework is ultimately designed to identify a variety of cross-water sector, cross-agency/partner climate resilience projects that could reduce priority vulnerabilities and increase resilience on a watershed-scale by providing multiple benefits where they are needed most (Step 3 of the OneWatershed Framework process). These projects could include new projects or already-planned projects that have been identified through other planning processes, including but not limited to utility master plans, green infrastructure and long-term stormwater plans, climate adaptation plans, transportation and pedestrian plans, shoreline adaptation projects, local hazard mitigation plans, etc. These projects could be refined or used as-is to match key vulnerabilities or realize co-benefits. Several existing resources could inform what these solutions look like, including but not limited to the following:

- *The Climate Resilience Resources Guide* for green stormwater infrastructure (Green Infrastructure Leadership Exchange and Geosyntec Consultants, Inc. 2023)
- *Implementing Green Stormwater Infrastructure on Schoolyards* (Green Infrastructure Leadership Exchange 2019)
- Resilience Playbook Website (Greenbelt Alliance 2020)
- Water supply plans, including the 2023 Drinking Water Needs Assessment (California State Water Resources Control Board 2023); California’s Water Supply Strategy (CA Governors Office 2022); or California Water Plan Update (CNRA 2023)
- Complete Cleanup of Contaminated Sites on the San Francisco Shoreline Statement (San Francisco Bay Shoreline Contamination Cleanup Coalition n.d.)

Step 3 of the OneWatershed Framework process outlines a multistep process to identify projects that target key vulnerabilities within the watershed. Details are described in the following subsections.

5.1 Compile Climate Resilience Project Opportunities

The OneWatershed Framework process first entails compiling climate resilience project, program, and policy opportunities within the watershed. This should include existing project opportunities identified through planning processes completed by the City, watershed-based CBOs, or other agencies with assets in the watershed, which are identified as part of Step 3a of the process. Additionally, Step 3b entails compiling other new project suggestions from stakeholders or residents participating in the OneWatershed Framework process. Project plans may already include opportunities relevant to the climate resilience of OneWatershed assets, such as stormwater capital improvement program projects; water supply infrastructure plans; wastewater infrastructure plans; green stormwater infrastructure plans; climate action plans; other climate resilience plans; creek and stream plans; pedestrian/bike, safe routes to school, or other transportation plans; development plans, etc.

5.2 Prioritize Climate Resilience Project Opportunities

Once climate resilience project opportunities are compiled, Step 3c of the OneWatershed Framework process recommends a prioritization process to identify those climate resilience projects that could address key vulnerabilities within the watershed, receive community and partner support, provide multiple benefits, and/or are more feasible to implement. Implementation feasibility includes consideration of the process for project approval by the local jurisdiction, engineering feasibility, and funding needs.

An example prioritization table is provided in Table 9 below. Individual watersheds may choose to prioritize projects, programs, and policies based on different criteria. In general, the more categories of benefits provided by a given climate resilience project and the more wide-reaching the benefits (i.e., in terms of acreage treated, flood volume captured, residents benefitted), the higher the project should be prioritized. When the prioritization approach is customized for a specific watershed, if certain benefits are more critical for residents or stakeholders, those benefits could be weighted to boost the prioritization of certain projects that provide them.

Project feasibility should also be considered when prioritizing projects; however, at this preliminary stage, it is recommended that feasibility be based on higher-level checks rather than detailed calculations (which would occur during later stages of design).

Table 9: Example Climate Resilience Project Prioritization Table

Prioritization Question	Check if Yes	Details
Does the improvement address an identified watershed vulnerability?		For these questions (or similar), describe the benefit provided and the extent of benefit
Does the area improved serve at least ten households?		
Is the drainage area captured greater than an acre?		
Will improvement partially reduce precipitation-caused flooding?		
Will improvement partially reduce tidal or sea level rise-based flooding or inundation?		
Would the project recharge a groundwater basin?		
Would the project augment the water supply?		
Would the project provide water quality benefit?		
Would the project partially reestablish natural hydrology?		
Would the project create or enhance habitat?		
Would the project reduce urban heat and/or increase urban greening?		
Would the project reduce wildfire risk to OneWatershed asset(s)?		
Would the project otherwise benefit OneWatershed asset(s)?		
Would the project serve a City-designated low resource area?		
Would the project provide other community benefits not listed above?		
Is the project currently planned or co-located with another project?		

Prioritization Question	Check if Yes	Details
Has the project been prioritized through the owning jurisdiction's capital improvement program process (or co-located with another prioritized project), or could it be?		These questions relate to project feasibility
Is the project preliminarily feasible based on high-level desktop based engineering considerations (e.g., location, grade, known presence of large utilities, footprint, facility size or dimensions, soils/geotechnical or other subsurface conditions)?		
Is the preliminary estimated project cost non-prohibitive based on preliminary judgement and are there potential options for funding?		

6. PILOT APPLICATION TO SAN BRUNO CREEK WATERSHED

In 2025, Consultant Team and PMT worked collaboratively with Resilient San Bruno to begin piloting the OneWatershed Framework in the San Bruno Creek watershed.

6.1 Step 1: Identify Multiagency, Multi-stakeholder Collaborative Partnerships

Step 1 has been initiated in the San Bruno Creek watershed. The lead community group is the Resilient San Bruno Team, working collaboratively with the PMT. CRC established the Resilient San Bruno Team in early 2024, and the group has been meeting monthly to discuss a range of community resilience topics.

6.2 Step 2: Assess Watershed-Scale Vulnerability of OneWatershed Infrastructure and Assets to Climate Change Hazards.

Step 2 was initiated in early 2025. Step 2a first entails compiling the climate change hazard layers and social vulnerability layers available on the OneWatershed Dashboard, along with reports and studies specific to the City of San Bruno, including output from the storm drain master plan and OneShoreline efforts. Next, this step will map these hazards and study output with OneWatershed infrastructure within the watershed and add any existing anecdotal evidence or stakeholder input regarding watershed sensitivity or impacts.

Step 2b entails completing the community vulnerability assessment. Project team member CRC has developed a plan for the community vulnerability assessment conducted for the pilot OneWatershed Framework application in the San Bruno Creek watershed (Appendix D), based on CRC's prior efforts in other areas of the County to develop community vulnerability assessments. This is intended to serve as a model for how future community vulnerability assessments can be completed for watershed-specific applications of the OneWatershed Framework in other watersheds. The plan includes several community-wide workshops specifically designed to gather the data described above, and crucially, relies on information gathered through working closely with the Resilient San Bruno Team, which is the local Climate Change Community Team for the watershed. The community-wide workshops are proposed include the following topics, and will be presented in English and separately in a highly concentrated linguistic group in a language other than English:

- Workshops #1 and #2: Facilitators will present information on climate change hazards compiled through the Countywide climate shared-risk exposure analysis and experiential data collected from the Resilient San Bruno Team. Facilitators will provide a survey to collect additional data from workshop participants as well as their family, friends, and colleagues within the watershed.
- Focus Groups #1 and #2: Facilitators will invite participants into breakout groups, in which guiding questions will be asked to understand the resources community members use to prepare for and recover from climate change impacts. Attendees will

be asked to prioritize resources they wish were available to them following in-depth breakout discussions.

- Workshops#3 and #4: Return findings of the community vulnerability assessment and overall OneWatershed Climate Resilience Plan to the community and describe how data collected through workshops and focus groups will be used and how the community can access it and gain recommendations on how the community hopes the input they provided is used.

Notably, extensive outreach has already been completed in the San Bruno Creek watershed as part of the OneWatershed Framework Project especially through the establishment of the Resilient San Bruno Team but also through parallel planning and engagement efforts led by OneShoreline and the City of San Bruno.

The community vulnerability assessment will explore climate change impacts, but might not necessarily focus on OneWatershed infrastructure categories in particular, as this might narrow the scope of workshops and discussions and/or make participation less accessible to certain stakeholders and community members. Data collected through the community vulnerability assessment will be translated to OneWatershed infrastructure through the overall OneWatershed process at the watershed scale.

Step 2c involves integrating the data compiled in Step 2a with the resident experiences documented through Step 2b. Experiential data from community vulnerability assessment workshop #1 will be added to the map developed for Step 2a. This results in the visualization of key vulnerabilities within the watershed based on quantitative data and lived experiences. Locations identified through the mapping exercise will be documented in the Watershed Vulnerability Summary Table, with the details as recommended in Section 4.3.

6.3 Step 3: Identify and Prioritize Climate Resilience Projects

In close coordination with the Resilient San Bruno Team, the PMT and the Consultant Team will identify potential climate resilience projects that could address prioritized vulnerabilities within the watershed. For the San Bruno pilot, watershed-based plans will be referenced to compile previously identified project opportunities will include but not be limited to the following:

- City of San Bruno Green Infrastructure Plan (City of San Bruno 2019)
- Draft City of San Bruno Climate Action Plan (City of San Bruno 2012)
- City of San Bruno Storm Drain Master Plan (City of San Bruno 2014)
- San Bruno Creek/Colma Creek Resiliency Study (San Francisco International Airport 2015)
- City of San Bruno Walk ‘n Bike Plan (City of San Bruno 2016)
- The San Francisco Estuary Institute’s San Francisco Bay Shoreline Adaptation Atlas (SFEI & SPUR 2019)

- San Mateo County Stormwater Resource Plan (San Mateo Countywide Water Pollution Prevention Program [SMCWPPP] 2017)
- Advancing Regional-Scale Stormwater Management in San Mateo County (SMCWPPP 2022)

In addition, projects suggested by the PMT, including OneShoreline, and suggestions identified by residents in the community vulnerability assessment workshops 2 and 3 will be added to the compiled list of opportunities. These projects will be prioritized to maximize the climate change hazard resilience benefits provided through the prioritization process shown in Section 5.2. The prioritization process will be discussed and finalized with residents in a Resilient San Bruno Team meeting and applied to identified projects to confirm that the highest priority solutions are in alignment with community priorities.

6.4 Next Steps for Prioritized Projects and Pilot Study

As part of the San Bruno Creek OneWatershed Pilot Study, the top 10 prioritized opportunities will be identified on a map that includes a one to two sentence description of each proposed improvement. The Consultant Team and PMT will work with the Resilient San Bruno Team and the PMT to identify 1 of the 10 opportunities that will be developed into a 10% concept design. The project developed into the 10% concept is anticipated to be selected based on benefits provided as well as feasibility of implementation and available funding sources.

The entire process completed for the San Bruno Creek watershed will be captured in a Pilot Study Report that will be reviewed by the Resilient San Bruno Team and the PMT, and shared with the TAC and EPC Workgroup by late 2025.

7. ONEWATERSHED DASHBOARD

The OneWatershed Dashboard (<https://web.paradigmh2o.com/smc-gi/onewatershed>) is a web-based tracking and visualization tool that has been developed to facilitate development of watershed-specific OneWatershed Climate Resilience Plans. The Dashboard provides climate change hazard exposure data for the four OneWatershed climate scenarios as well as social vulnerability data throughout the County. The Dashboard and integrated visualization tools are intended to be used for future watershed-scale climate resilience planning efforts.

The primary user interface of the Dashboard is a web map (see web page in Figure 5) that displays locations of OneWatershed assets and the OneWatershed infrastructure network unit boundaries along with the climate exposure layers and social vulnerability layers. The map will allow a user to visualize the location of assets in relation to the climate change hazard assessment layers. Additionally, clicking on an asset area results produces a popup showing a basic description of the asset and the option to add notes specific to that asset.

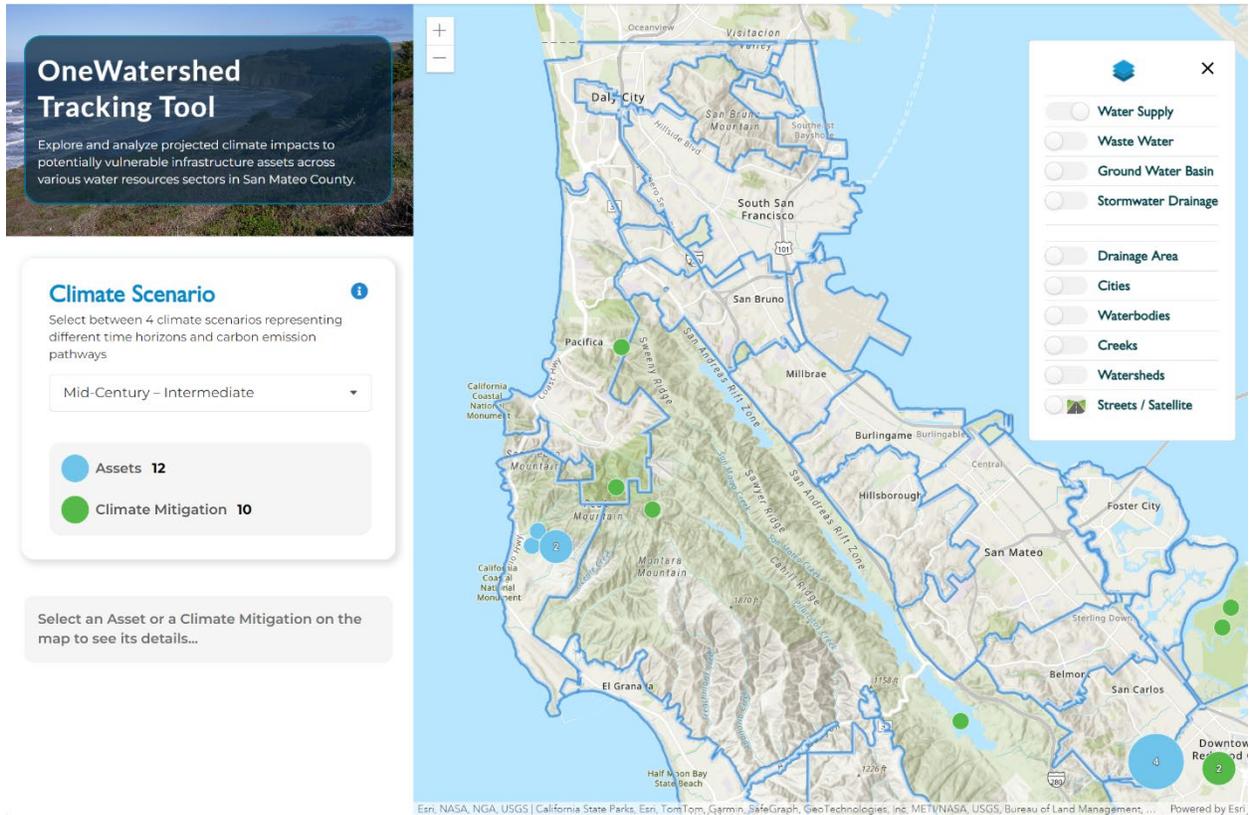


Figure 5: OneWatershed Dashboard Primary User Mapping Interface

Clicking on an asset and the resulting button for more information directs the user to a separate web page for that asset (the web page is shown in Figure 6). When an asset is added to the Dashboard, the tool generates a unique URL that can be easily shared with other agencies for planning purposes. The web page shows more information about an asset, including type of water infrastructure or water resource, and a basic description about the asset. This Dashboard

will be maintained on C/CAG’s Flows To Bay website as part of its Green Infrastructure Mapping and Tracking Tool and will continue to evolve with the development of the OneWatershed Framework, the creation of future OneWatershed Climate Resilience Plans, and C/CAG’s and its partners’ associated integrated watershed management and climate resilience planning efforts.

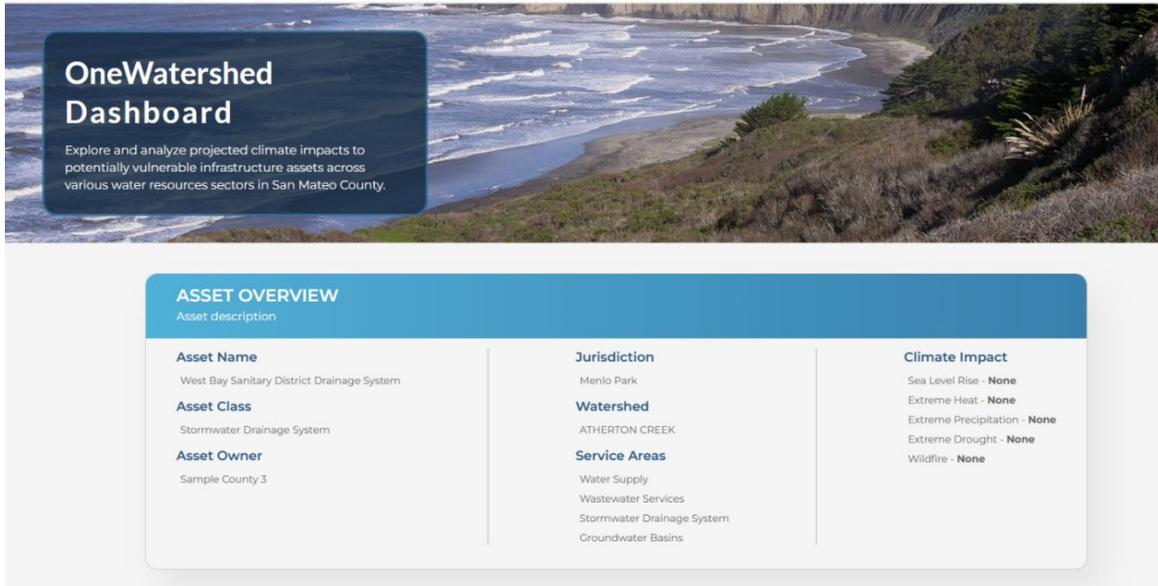


Figure 6: Asset-Specific Summary Interface

The OneWatershed Dashboard includes a similar pop up for climate resilience projects that are added to the map (Figure 7).



Figure 7: Climate Resilience Project Summary Interface

8. REFERENCES

- Ackerly, D., A. Jones, M. Stacy, and B. Riordan. 2018. *San Francisco Bay Area Summary Report*. California’s Fourth Climate Change Assessment. Publication number: CCCA4-SM-2018-005. Available at: https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-005_SanFranciscoBayArea_ADA.pdf.
- Barnard, P.L., L.H. Erikson, A.C. Foxgrover, J.A. Finzi Hart, P. Limber, A.C. O’Neill, M van Ormondt, S. Vitousek, N. Wood, M.K. Hayden, and J.M. Jones. 2019. Dynamic flood modeling essential to assess the coastal impacts of climate change. *Scientific Reports*, Volume 9, Article #4309, 13 pp., <http://dx.doi.org/10.1038/s41598-019-40742-z>.
- Bay City News. 2023. “San Mateo County declares local state of emergency, as major storm draws near.” RWC Pulse. January 3, 2023, updated on June 26, 2023. Available at: <https://www.rwcpulse.com/local-news/weather/flood-watch-extended-to-entire-bay-area-warning-includes-threat-to-lives-6320274>.
- BCDC. 2021. “Adapting to Rising Tides Bay Shoreline Flood Explorer.” San Francisco Bay Conservation and Development Commission. Available within the BCDC open data portal at <https://data-bcdc.opendata.arcgis.com/apps/e0d2cb43dfd243f287b141f476556176/explore>. November 9.
- BCDC. 2023. “Community Vulnerability Map.” Data. Available at https://data-bcdc.opendata.arcgis.com/datasets/4754f012d32f4a2d881b9816af0832c7_0/explore.
- BCDC. 2024. *Regional Shoreline Adaptation Plan: One Bay Vision, Strategic Regional Priorities, and Subregional Shoreline Adaptation Plan Guidelines*. December. Available at: <https://bcdc.ca.gov/wp-content/uploads/sites/354/2024/12/regional-shoreline-adaptation-plan-spreads.pdf>.
- C/CAG. 2021. *San Mateo Countywide Sustainable Streets Master Plan*. City/County Association of Governments of San Mateo County. February 21. Available at: <https://ccag.ca.gov/countywide-sustainable-streets-master-plan>.
- C/CAG. 2023. *Interim MOU-Based Regional Collaborative Program Summary Report*. City/County Association of Governments of San Mateo County. September.
- Cal-Adapt. 2024a. “Extreme Precipitation Events.” Web-Tool and Data. Available at <https://cal-adapt.org/tools/extreme-precipitation>.
- Cal-Adapt. 2024b. “Wildfire.” Web-Tool and Data. Available at <https://cal-adapt.org/tools/wildfire/>.
- Cal Fire. 2025. “Local Responsibility Area Fire Hazard Severity Zones.” Recommended February 24, 2025. Available at <https://experience.arcgis.com/experience/6a9cb66bb1824cd98756812af41292a0>.

- California Coastal Commission. 2024. *Sea Level Rise Policy Guidance 2024 Update*. Available at: <https://www.coastal.ca.gov/climate/slrguidance.html>.
- California DWR. n.d. “SGMA Basin Prioritization Tool.” Department of Water Resources. Accessed November 8, 2024, at <https://gis.water.ca.gov/app/bp-dashboard/final/>.
- California DWR. 2024. *Groundwater Well Permitting: Observations and Analysis of Executive Orders N-7-22 and N-3-23*. Department of Water Resources. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Wells/Files/DWR-Well-Permitting-Analysis-Final_March2024.pdf.
- California Governor’s Office of Land Use and Climate Innovation. 2025. Extreme Heat and Community Resilience Program. Available at <https://lci.ca.gov/climate/icarp/grants/extreme-heat-community-resilience.html>
- California Ocean Protection Council. 2024. *California Sea Level Rise Guidance: 2024 Science and Policy Update. 2024*. California Sea Level Rise Science Task Force, California Ocean Protection Council, California Ocean Science Trust. <https://opc.ca.gov/wp-content/uploads/2024/05/California-Sea-Level-Rise-Guidance-2024-508.pdf>.
- California Office of Environmental Health Hazard Assessment. 2021. “CalEnviroScreen 4.0.” Web-Tool and Data. Available at <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40>.
- California State Legislature. 2023. *Senate Bill No. 272: Sea level rise: planning and adaptation*. Chapter 384, Statutes of 2023. Accessed February 24, 2025. Available at: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240SB272.
- California State Water Resources Control Board. 2018. *Water Quality Control Policy for Recycled Water*. December. Available at https://www.waterboards.ca.gov/water_issues/programs/recycled_water/policy.html.
- California State Water Resources Control Board. 2023a. “Direct Potable Reuse Regulations (SBDDW-23-001).” Available at https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/dpr-regs.html.
- California State Water Resources Control Board. 2024a. “Regulations for Onsite Treatment and Reuse of Nonpotable Water (SBDDW-22-001).” Updated July 9, 2024. Available at: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/onsite_nonpotable_reuse_regulations.html.
- California State Water Resources Control Board. 2024b. “Urban Stormwater Infiltration Policy.” Available at https://www.waterboards.ca.gov/water_issues/programs/stormwater/storms/projects/urban_stormwater_infiltration_policy.html.

- Cal OES. 2020. *California Adaptation Planning Guide*. California Governor's Office of Emergency Services. June.
- Caltrans. 2021. *Caltrans Climate Change Vulnerability Assessment Statewide Summary Report*. California Department of Transportation. February.
- City of Oakland. 2020. *Racial Equity Impact Assessment & Implementation Guide*.
- City of San Bruno. 2012. *City of San Bruno Climate Action Plan Public Review Draft*. October.
- City of San Bruno. 2014. *Storm Drain Master Plan Final Report*. Prepared by GHD, Inc. for the City of San Bruno. June.
- City of San Bruno. 2016. *City of San Bruno Walk 'n Bike Plan*. Prepared by Eisen | Letunic with Parisi Transportation Consulting. July 26.
- City of San Bruno. 2019. *City of San Bruno Green Infrastructure Plan*. August.
- City of Toronto. 2019. *Climate Resilience Framework and Recommendations Report*. Prepared by SSG. March.
- City Systems. 2023. San Mateo County Extreme Heat Dashboard [Web-Tool]. Available at https://city.systems/app_direct/smc_heat/.
- Climate Ready San Mateo County. n.d. "Wildfire & Climate Change Factsheet." Available at: <https://www.smcsustainability.org/wp-content/uploads/Climate-Ready-SMC-Hazard-Factsheet-Wildfire-1.pdf>.
- Climate Ready San Mateo County. n.d. "Extreme Heat and Public Health: Impacts & Adaptive Solutions." Available at: <https://www.smcsustainability.org/wp-content/uploads/Climate-Ready-SMC-Hazard-Factsheet-Extreme-Heat-and-Health-1.pdf>.
- California Governor's Office. 2022. *California's Water Supply Strategy Adapting to a Hotter, Drier Future*. California Natural Resources Agency. August.
- CNRA. 2023. *California Water Plan 2023 Update*. California Natural Resources Agency. December.
- CNRA. 2024. *DRAFT California Climate Adaptation Strategy*. California Natural Resources Agency. May.
- Flint, L.E., and A.L. Flint. 2014. *California Basin Characterization Model: A Dataset of Historical and Future Hydrologic Response to Climate Change*. (ver. 1.1, May 2017): U.S. Geological Survey Data Release, <https://doi.org/10.5066/F76T0JPB>.

Flows to Bay. 2024. “Regional-Scale Stormwater Management in San Mateo County.” Available at: <https://www.flowstobay.org/regional-collaborative>.

Francois, B., A. Bruce, K. Nguyen, D.K Park, D. Rheinheimer, M. Taner, S. Wi, H.F. Khan, D. Yates, C. Ammann, M. Haasnoot, A. Dufour, D. Behar, and C. Brown. 2021. *Long-Term Vulnerability Assessment and Adaptation Plan for the San Francisco Public Utilities Commission Water Enterprise - Phase I*. Prepared for San Francisco Public Utilities Commission.

Geospatial Innovation Facility, University of California, Berkeley. “Cal-Adapt.” Available at <https://cal-adapt.org>. Accessed 2020.

Green Infrastructure Leadership Exchange. 2019. *Implementing Green Stormwater Infrastructure on Schoolyards*.

Green Infrastructure Leadership Exchange and Geosyntec Consultants, Inc. 2023. “Climate Resilience Resources Guide.” December. Available at: <https://drive.google.com/file/d/1QbHwo35B0b8cY2LXj55abvHgihpMhcRa/view>.

Greenbelt Alliance. 2020. “Resilience Playbook.” Accessible at <https://resilienceplaybook.org/>

Metropolitan Transportation Commission and Associate of Bay Area Governments. 2024. “Equity Priority Communities Plan Bay Area 2050+.” Available at https://mtc.ca.gov/sites/default/files/meetings/attachments/6161/7aiii_24_1232_Attachment_B_2024_Equity_Priority_Communities_Map.pdf.

Point Blue Conservation Science and USGS. 2021. “Our Coast, Our Future Hazard Map web tool.” Available at <https://ourcoastourfuture.org/hazard-map/>

San Francisco Bay Shoreline Contamination Cleanup Coalition. n.d. *Complete Cleanup of Contaminated Sites on the San Francisco Bay Shoreline*.

San Francisco International Airport. 2015. *San Bruno Creek/Colma Creek Resiliency Study Final Report*. Prepared by Moffat & Nichol and AGS for SFO. August.

San Mateo County Sustainability Department. n.d. “San Mateo County Sea Level Rise Hazard Map Viewer.” Available at <https://experience.arcgis.com/experience/1946d443e24b490a8f2ac9d785534f3d/page/Page?org=smcmaps&views=View>.

San Mateo County. 2018. *County of San Mateo Sea Level Risk Vulnerability Assessment*. Office of Sustainability, Sea Change, and Coastal Conservancy. Final Report. March.

San Mateo County Office of Sustainability. 2018. *County of San Mateo: Sea Level Rise Vulnerability Assessment*. Available at: https://www.smcsustainability.org/wp-content/uploads/2018-03-12_SLR_VA_Report_2.2018_WEB_FINAL.pdf.

SFEI. 2022. *Shallow Groundwater Response to Sea-level Rise: Alameda, Marin, San Francisco, and San Mateo Counties*. Prepared by Pathways Climate Institute and SFEI. Available at <https://www.sfei.org/data/shallow-groundwater-mapping#sthash.u2SPmTUH.Wsd2BXzD.dpbs>.

SFEI & SPUR. 2019. *The San Francisco Estuary Institute's San Francisco Bay Shoreline Adaptation Atlas*. San Francisco Estuary Institute and San Francisco Bay Area Planning and Urban Research Association. Publication #915, SFEI, Richmond, CA. April.

SFPUC. 2023. *San Francisco's Climate Action Plan Water Supply Addendum*. San Francisco Environment & San Francisco Public Utilities Commission

SMCWPPP. 2017. *Stormwater Resource Plan for San Mateo County*. San Mateo Countywide Water Pollution Prevention Program, Prepared by Paradigm Environmental and Larry Walker Associates, Inc. for City/County Association of Governments, SMCWPPP, Redwood City, CA. February.

SMCWPPP. 2022. *Advancing Regional-Scale Stormwater Management in San Mateo County: Regional Collaborative Program Framework White Paper – FINAL*. Prepared by Geosyntec Consultants, Inc. and Kieser & Associates, LLC for City/County Association of Governments, SMCWPPP, Redwood City, CA. January.

Sonoma Water. 2021. *Sonoma Water Climate Adaptation Plan*. Prepared by Jacobs. October.

SPUR. 2024. *Look Out Below: Groundwater Rise Impacts on East Palo Alto — a Case Study for Equitable Adaptation*. San Francisco Bay Area Planning and Urban Research Association May.

Statesman Journal. 2024. "San Mateo, CA Drought Monitor." Updated November 2024. Available at: <https://data.statesmanjournal.com/drought/california/san-mateo-county/06081>.

APPENDIX A
**San Mateo County OneWatershed Climate
Resilience Framework and San Bruno Creek
OneWatershed Pilot Study Community
Engagement Plan**

APPENDIX B

OneWatershed Framework Development Approach Memorandum

APPENDIX C

OneWatershed Data Inventory

APPENDIX D

Community Vulnerability Assessment Short-Term Plan for San Bruno

APPENDIX E

Composite Exposure Score Example Analysis

APPENDIX A
**San Mateo County OneWatershed Climate
Resilience Framework and San Bruno Creek
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**San Mateo County OneWatershed Climate Resilience Framework and
San Bruno Creek Watershed Climate Resilience Plan
Community Engagement Plan**

**FINAL
June 2024**

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1.0 INTRODUCTION

This Community Engagement Plan (CEP) has been written for the San Mateo County OneWatershed Project, a project funded through the California Integrated Climate Adaptation and Resilience Program (ICARP), an Adaptation Planning Grant Program implemented by the Governor’s Office of Planning and Research. This CEP is designed to identify a diverse group of stakeholders to support developing the OneWatershed Climate Resilience Framework (OneWatershed Framework) and San Bruno Creek Watershed Climate Resilience Community-Led Plan (San Bruno Community-Led Plan) and set forth goals, supporting strategies, and outreach activities for gaining deep and meaningful participation in the OneWatershed Project.

1.1 Goals

The CEP is designed to achieve the following goals:

- Establish committees to provide community-centered input on climate resilience improvements for water-related infrastructure in San Mateo County under the OneWatershed Framework Project.
- Empower committee members to provide information to the larger public on the development of the OneWatershed Framework and San Bruno Community-Led Plan.
- Provide the public with equitable and easy access to program information and decision-makers.
- Respond to questions and concerns from a diverse group of community representatives and stakeholders in a timely fashion and incorporate feedback into the development of the OneWatershed Framework and San Bruno Community-Led Plan.

1.2 OneWatershed Project Lead and Partners

The City/County Association of Governments of San Mateo County (C/CAG) is a Joint Powers Authority of the 20 incorporated towns and cities and the County of San Mateo with responsibilities including transportation, land use planning and funding, and managing the San Mateo Countywide Water Pollution Prevention Program, which supports its member agencies in complying with state and federally mandated stormwater management requirements and advances regional-scale coordinated stormwater management in the county. C/CAG is the lead entity overseeing many countywide stormwater runoff, air quality, transportation, and other quality of life issues in San Mateo County. C/CAG is also the lead agency for the OneWatershed Project and the central point of contact coordinating with the project partners.

In addition to C/CAG, a group of organizations and agencies in San Mateo County, collectively referred to as the “Partners,” will collaborate on the OneWatershed Project. Partners include C/CAG’s San Mateo Countywide Water Pollution Prevention Program, the Bay Area Water Supply Conservation Agency (BAWSCA), City of San Bruno, City of South San Francisco (South San Francisco-San Bruno Regional Water Quality Control Plant), Climate Resilient Communities, San Mateo County Flood & Sea Level Rise Resiliency District (OneShoreline), and San Mateo County’s Sustainability Department. The Partners will work collectively to develop an

integrated approach to water related resilience and address shared risks to overlapping climate hazards.

Out of these partners, C/CAG has identified Climate Resilient Communities (CRC) as the lead organization responsible for establishing committees to secure community-driven feedback on the OneWatershed Project and to ensure the participation of community members and representatives in the development of the OneWatershed Framework and San Bruno Community-Led Plan. CRC is a recognized leader in building community-oriented solutions to environmental problems, including connecting residents to resources to support their knowledge of ways to conserve energy and water in the home. Since 2016, CRC has been working to address the specific needs of the diverse communities of East Palo Alto and Belle Haven in Menlo Park to organize environmental awareness and give residents information and agency around environmental injustices, so they have a voice in climate change resilience planning and adaptation.

1.3 OneWatershed Project Management Team

To ensure the successful implementation of the OneWatershed Project and supporting community engagement, the C/CAG has formed a Project Management Team (PMT) shown in Table 1.

Table 1 – Project Management Team

Organization	Role/Responsibility
City/County Association of Governments of San Mateo County (C/CAG)	Countywide public agency overseeing the management and implementation of the OneWatershed Project and the management of the PMT.
City of San Bruno	PMT member.
San Mateo County Office of Sustainability	PMT member.
OneShoreline	PMT member.
Bay Area Water Supply Conservation Agency (BAWSCA)	PMT member.
City of South San Francisco South San Francisco-San Bruno Regional Water Quality Control Plant	PMT member.
Climate Resilient Communities (CRC)	Community-based organization in charge of the implementation of the community outreach associated with the OneWatershed Project and management/facilitation of the Equity Priority Community group and Climate Change Community Team. CRC will serve as the community point-of-contact and manage workshops with the San Bruno Creek Watershed

	community in close collaboration with partner CBO Rise South City. CRC is also a PMT member.
Governor’s Office of Planning and Research	State of California granting agency and PMT member.
Geosyntec Consultants, Inc. (Geosyntec) and technical subconsultants Paradigm Environmental, Hazen, EOA, Inc., and Carollo	Assisting C/CAG and CRC with technical expertise to develop the OneWatershed database inventory, Framework, and San Bruno Community-Led Plan. Geosyntec is also leading Technical Advisory meetings and supporting Equity Priority Community group meetings.
Craig Communications	Assists C/CAG and CRC with community outreach support including developing engagement strategies, meeting logistics and facilitation assistance.

2.0 ONEWATERSHED PROJECT

San Mateo County is the most vulnerable county in the state with respect to the projected impacts from sea level rise due particularly to its geography on the San Francisco Peninsula nested between the Pacific Ocean to the west and the San Francisco Bay to the east, as well as the density of communities in low-lying areas adjacent to the shoreline. The county also faces severe climate hazards across the board, including flooding from high-intensity atmospheric rivers (as seen in recent years) punctuated by more frequent and prolonged droughts, which can lead to increased risk of wildfires and health impacts resulting from more frequent and more extreme high heat conditions as the climate continues to get hotter and drier on average. Compounding impacts include aging infrastructure in low-lying areas that are also predominantly underserved; under-represented communities are at higher risk to climate related hazards. The One Watershed project will build on previous County and City climate resilience efforts to provide a holistic integrated and watershed-scale approach to address the overlapping risks to water-related infrastructure and resources from relevant climate change hazards, including sea level rise, flooding, heat and drought. The project will accomplish the following goals:

- 1) Develop a high-level countywide database inventory of priority water infrastructure assets at risk from climate-related hazards such as sea level rise, storm surges, groundwater inundation, heat, drought, etc. Assets will focus on stormwater/flood control, wastewater and sewer system components. The database will also highlight community vulnerability data.
- 2) Create an institutional and risk-based prioritization framework that considers existing infrastructure, possible climate hazards, community engagement, and social vulnerability criteria for prioritizing OneWatershed Climate Resilience Infrastructure projects through a collaborative process with the Partners and other stakeholders within the county; and
- 3) In collaboration with the Partners and local communities within the San Bruno Creek Watershed area, apply the Framework to the flood-prone San Bruno Creek watershed and co-create a Community-Led Climate Resilience Plan including at least one conceptual design for a multi-benefit green stormwater infrastructure project and recommendations for additional policy updates, funding options (including consideration of long-term capital and operations needs as well as funding mechanisms that account for potential impacts on low-income residents), and/or program opportunities.

To support the longer-term vision of a OneWatershed approach to integrated climate resilience infrastructure in San Mateo County, C/CAG and its Partners (including an expanded group of agencies and organizations) developed a grant proposal for the National Oceanic and Atmospheric Administration's February 2024 Climate Resilience Regional Challenge Grant program. This grant would help fund:

- A range of design, permitting/environmental compliance, and construction costs for seven proposed OneWatershed Climate Resilience Infrastructure Projects in various stages of development;

- Advance C/CAG's existing programmatic approach of regional-scale implementation of multi-benefit stormwater capture projects in coordination with its Partners, including further development of the Regional Collaborative Program and integration with the OneWatershed Framework;
- Scale the adaptive capacity model established by the creation of the OneWatershed Framework; and
- Develop a multi-year Workforce Development Pilot Program focused on supporting local green job needs and communities with green stormwater infrastructure and related project operations and maintenance needs.

1. The grant application was submitted to NOAA on February 13, 2024, and award notices will be released in summer 2024.

2.1 Countywide OneWatershed Asset and Community Data Inventory

Geosyntec, with assistance and guidance from C/CAG, CRC and the other OneWatershed Partners, will develop an enhanced web-based OneWatershed database and dashboard, which may ultimately be integrated into the existing [Green Infrastructure Tracking Tool](#) managed by C/CAG. This tool will aggregate data into a format accessible to C/CAG and its Partners to support the development of the OneWatershed Framework and San Bruno Community-Led Plan, as well as for future OneWatershed planning efforts. The inventory will include baseline water infrastructure assets (stormwater, drinking water, wastewater, potential utilities, and transportation); relevant geological, hydrological, water, and land use characteristics; relevant climate hazards; and community vulnerability factors.

Recommended additions to this inventory:

- Toxic sites at risk of sea level rise or groundwater rise inundation (Including both open and closed sites from DTSC, Water Board & EPA databases)
- Increased liquefaction risk with sea level rise (USGS)
- The ability of storm systems to function under future extreme storm conditions
- Depth of water infrastructure assets underground and how they will be impacted by groundwater rise

2.2 Countywide OneWatershed Framework

The OneWatershed Framework will build on prior resilience related planning efforts to develop an enhanced framework to identify water infrastructure assets that are at greater risk of being affected by climate hazards within vulnerable communities in San Mateo County. Key community leaders in vulnerable communities as well as city, county and third-party technical experts from across the county and beyond will provide input into the development of this framework. The following will be conducted to develop the framework:

- Complete a high-level, countywide risk-based assessment that identifies, prioritizes and quantifies the potential risks to water infrastructure assets from identified climate hazards and community vulnerability data. This will include new GIS maps that show areas of shared-risk and the greatest needs and opportunities for multi-benefit

stormwater projects leveraging existing planned and new project opportunities.

- Using information from the high-level shared-risk analysis and input from C/CAG, its Partners and key community stakeholders, Geosyntec will prepare the OneWatershed Framework. The Framework will include the technical approach to evaluate risk exposure, community sensitivities and potential climate change impacts of OneWatershed assets, and provide policy guidance and recommendations for prioritizing sites and planning measures to protect key watershed infrastructure and resources based on the OneWatershed Framework objectives and principles.
- Develop a visualization dashboard that will be publicly available and used to support future discussions by C/CAG, its Partners and the larger community.
- C/CAG will plan to host a public webinar presenting the draft OneWatershed Framework to a broader group of interested parties and offer an opportunity for public comment on the Framework development.

2.3 San Bruno Creek OneWatershed Climate Resilience Plan (San Bruno Creek Community-Led Plan)

Using the OneWatershed Framework and additional Adaptive Capacity Planning tools created by CRC, C/CAG, Geosyntec and the OneWatershed Committees (see Section 2.4) will prepare the San Bruno Creek Community-Led Plan. Work will include:

- Conducting a San Bruno Creek Watershed-specific community vulnerability assessment that establishes specific vulnerabilities, possible climate change impacts and the capacity of the area in its current state to adapt to said impacts by directly engaging residents.
- Identifying and prioritizing vulnerable water-related infrastructure assets in the watershed for future climate resilience planning.
- Developing at least one multi-benefit green stormwater infrastructure project concept design for the watershed area, along with other priority program and policy recommendations to support OneWatershed climate resilience implementation.

To ensure that this is a community-led process there will be several community meetings and interactive workshops with the watershed community, which is further detailed in Section 4.0.

2.4 OneWatershed Committees

The following groups will be established by the PMT to provide a community-focused approach with additional technical oversight from local agency staff and regional climate resilience experts throughout this project.

Table 2 – OneWatershed Committees

Group	Comprised of	Role	PMT Lead
Equity Priority Community (EPC) Group	Community-based organizations, non-profits, and residents from around the County, interested County residents and members of the San Bruno Climate Change Community team.	Provide community-centered input and perspective on climate resilience for water infrastructure within San Mateo County, including identifying priority climate hazards, community vulnerability data, and prioritization criteria and metrics. This information will be incorporated into the development of the OneWatershed Framework and San Bruno Community-Led Plan. The EPC will be particularly focused on creating a vision for long-term adaptive capacity and integrating this vision into the OneWatershed Framework.	Climate Resilient Communities
Climate Change Community (CCC) Team	Motivated and interested residents and/or community organization representatives from the San Bruno Creek Watershed, with a focus in the highly impacted Belle Air neighborhood.	This is freestanding community organizing infrastructure that will allow representatives from this prioritized flood-prone area to address community priorities and participate in the OneWatershed Framework development and apply the framework through the development of the San Bruno Community-Led Plan.	Climate Resilient Communities
Technical Advisory Committee (TAC)	County agencies, regional partners, and other interested parties with technical knowledge of climate resilience, water, and/or emergency planning	Ensure the OneWatershed Framework effectively evaluates the shared risk of water related climate change impacts in the county and supports the integration of resilience in planning among public agencies and stakeholder organizations to effectively support the implementation of OneWatershed Climate Resilience Infrastructure within key affected watersheds, such as the San Bruno Creek watershed.	Geosyntec

C/CAG, Geosyntec, and technical subconsultants, and Craig Communications, as members of the PMT, will provide assistance to support effective communication and decision-making by the committees described above. This will include:

- Establishing meeting agendas, assisting in coordinating logistics, and supporting meeting facilitation.
- Developing presentations on technical aspects of the project and having subject matter experts on hand to answer community questions in an easily understandable manner.
- Preparing meeting notes and clearly identifying action items to be addressed before the next meeting.

3.0 COMMUNITY PROFILE

3.1 San Mateo County

San Mateo County covers most of the San Francisco Peninsula and is one of the nine counties in the San Francisco Bay Area. San Mateo County is a geographically and culturally diverse county, covering between the City/County of San Francisco to the north and Santa Clara County to the south. By land area, the county consists of primarily open space and agricultural land (approximately 70%), with the remaining land areas predominantly being residential land-use. The most densely urbanized areas are concentrated on the eastern side of the county along San Francisco Bay. The three largest cities are Daly City, San Mateo and Redwood City. As of the 2022 American Community Survey 1-Year Estimate Data Profiles, the population of the County is 729,181¹. Below is a list of demographic information for the County of San Mateo.

Table 3 – San Mateo County Demographic Data²

Category	Count	Percent
Total Population	729,181	-
White	277,989	38.1%
Asian	231,998	31.8%
Hispanic or Latinx	173,296	23.8%
Black	15,916	2.2%
American Indian and Alaska Native	8,007	1.1%
Pacific Islander	9,670	1.3%
Two or More Races	108,655	14.9%
Other	152,830	21.0%
Median age	41	-
Household income	\$149,907	-
High school graduate or higher	660,637	90.6%
Bachelor’s degree or higher	385,736	52.9%
Median value of owner-occupied housing units	\$1,441,300	-
Foreign born	261,472	35.9%

¹ U.S. Census Bureau. American Community Survey. Demographic and Housing Estimates. Retrieved from <https://data.census.gov/table/ACSDP1Y2022.DP05?q=San%20Mateo%20County,%20California>.

² U.S. Census Bureau. American Community Survey. Demographic and Housing Estimates. Retrieved from <https://data.census.gov/table/ACSDP1Y2022.DP05?q=San%20Mateo%20County,%20California>;

U.S. Census Bureau. Quick Facts. Retrieved from <https://www.census.gov/quickfacts/fact/table/sanmateocountycalifornia/PST045222>.

U.S. Census Bureau. American Community Survey. Selected Population Profile in the United States. Retrieved from <https://data.census.gov/table?q=san%20mateo%20county%20foreign%20born>.

U.S. Census Bureau. American Community Survey. Language Spoken at Home. Retrieved from <https://data.census.gov/table/ACSST1Y2022.S1601?q=san%20mateo%20county%20language>.

County of San Mateo. San Mateo County Demographics. Retrieved from <https://www.smcgov.org/ceo/san-mateo-county-demographics-0>.

Speak a language other than English at home	307,220	42.1%
Speak English less than “very well”	104,306	14.3%

The San Mateo County Board of Supervisors is composed of 5 district-elected supervisors: Dave Pine, District 1; Noelia Corzo, District 2; Ray Mueller, District 3; Warren Slocum, District 4/President; and David Canepa, District 5/Vice President. Board Meetings are held on the second and fourth Tuesdays of every month at 9:00 a.m. at the San Mateo County Government Center located at 400 County Center in Redwood City.

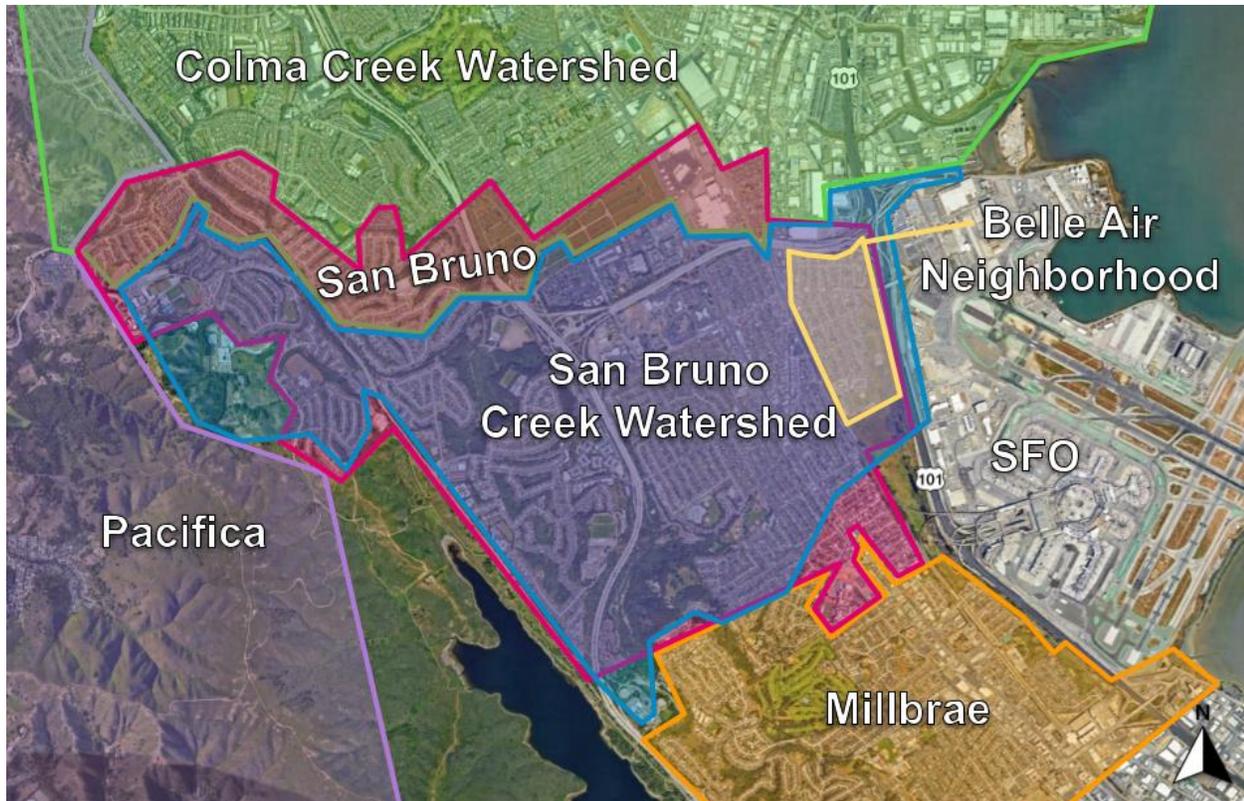
San Mateo County is one of the top hotspots for sea level rise in the country. It has the greatest population of any county in California living within projected inundation areas and the greatest economic assets at risk of flooding in the next 50-100 years. As seen in recent years, extreme weather events are putting vulnerable and historically underserved communities at a disproportionate risk. The most vulnerable communities in San Mateo County include communities in the Cities of East Palo Alto, Daly City, Colma, San Bruno, Redwood City, South San Francisco and pockets of Unincorporated San Mateo County experience the greatest impacts during large storms due to their locations in low-lying geographies where aging, undersized, and underfunded storm drainage systems are failing. These impacts are expected to increase with projected future changes in precipitation from climate change. C/CAG and its Partners have already completed and continue to develop progressive climate resilience related planning and infrastructure implementation to advance adaptation and ensure resilience to climate impacts in the county. Examples include C/CAG’s Sustainable Stormwater Resource Plan, Streets Master Plan, Regional Collaborative Program development and multi-scale approach to green stormwater infrastructure; BAWSCA’s One Water Roundtable and Long-term Reliable Water Supply Strategy Update; OneShoreline’s multi-jurisdictional shoreline resilience projects, countywide flood early warning system, and recent Planning Policy Guidance to Protect and Enhance Bay Shoreline Areas in San Mateo County; the County of San Mateo’s Sea Level Rise Vulnerability Assessment (including the additional South Coast Sea Level Rise Vulnerability Assessment) and leadership in the Multi-jurisdictional Hazard Mitigation Plan Update; and the Lower Colma Creek Coastal Flood Risk Management Project for the South San Francisco - San Bruno Water Quality Control Plant, among others. The OneWatershed Framework Project will build on and leverage these efforts to create a better coordinated approach to overall watershed resilience.

3.2 San Bruno Creek Watershed

The San Bruno Creek Watershed encompasses an area of approximately 4.5 square miles. It is located south of the Colma Creek drainage basin, west of the San Francisco International Airport (SFO) and Caltrain tracks, north of Millbrae, and east of Pacifica (see Figure 1). Most of the San Bruno Creek watershed drains through pipes to the City’s storm drain system. The watershed is defined by San Bruno Creek which runs through the city. The lower reaches of the creek run west and north of SFO. The creek collects runoff from the City’s storm drain system and

discharges it into San Francisco Bay via tide gates at the mouth of the creek.

Figure 1- San Bruno Creek Watershed



Local Government: Portions of the San Bruno Creek Watershed encompass San Mateo County District 1 and District 5. District 1 Supervisor Dave Pine was first elected to the Board of Supervisors in 2011. As a board member for the San Francisco Bay Conservation and Development Commission (BCDC), the SF Bay Restoration Authority, the San Francisquito Creek Joint Powers Authority and Chair of the OneShoreline Board of Directors, Supervisor Pine has worked extensively on the intersecting issues of flood control, sea level rise and tidal land restoration. District 5 Supervisor David Canepa is a former Daly City mayor and was elected to the Board of Supervisors in 2016. He also sits on the San Mateo Health Commission (HPSM), Metropolitan Transportation Commission (MTC), Peninsula Traffic Congestion Relief Alliance, San Mateo County Transit District (SamTrans) Board of Directors, Urban Counties of California (UCC) Board of Directors.

San Bruno has an elected five-member City Council, which consists of two by-district councilmembers, two general councilmembers, and a Mayor. The City Council adopted its first district map for City Council elections in March 2022 and the first by-district election began with representatives for Districts 1 and 4 during the November 2022 election. District 2 and 3 Councilmembers will be elected in November 2024. Councilmembers serve four-year terms and the Mayor serves a two-year term and will be up for election in January 2024. The current City

Council consists of: Rico Medina, Mayor; Michael Salazar, Vice Mayor; Sandy Alvarez, District 1; Marty Medina, District 4; and Tom Hamilton, general Councilmember. City Council meetings are held on the second and fourth Tuesdays of every month at 7:00 p.m. at the San Bruno Senior Center located at 1555 Crystal Springs Road in San Bruno.

The following provides demographic information for the City of San Bruno.

Table 4 – City of San Bruno Demographic Data³

Category	Count	Percent
Total Population	43,218	-
White	16,090	37.2%
Asian	14,002	32.4%
Hispanic or Latinx	12,747	29.5%
Black	450	1.0%
American Indian and Alaska Native	61	0.1%
Pacific Islander	1,341	3.1%
Two or More Races	4,745	11.0%
Other	6,529	15.1%
Median age	39	-
Household income	\$131,669	-
High school graduate or higher	38,766	89.7%
Bachelor’s degree or higher	18,972	43.9%
Median value of owner-occupied housing units	\$1,187,600	-
Foreign born	16,077	37.2%
Speak a language other than English at home	21,306	49.3%

Of the 20,315 people that speak a language other than English at home, 41.8% speak Spanish and 40.4% speak Asian and Pacific Island languages, which include Chinese (including Mandarin and Cantonese) and Tagalog (including Filipino).⁴

Belle Air Neighborhood: A significant portion of the San Bruno Creek Watershed east of the Caltrain tracks is considered a high-risk flood zone. Encompassed in this area between Caltrain tracks and Hwy-101 and south of Interstate-380 is the Belle Air neighborhood, which is the neighborhood most impacted by flood risk in the San Bruno Creek Watershed. Belle Air residents are walking distance from San Bruno’s downtown, San Bruno Caltrain Station, and SFO. The median price for homes in the neighborhood is \$1,045,000, they range in size from

³ U.S. Census Bureau. American Community Survey. Demographic and Housing Estimates. Retrieved from <https://data.census.gov/table/ACSDP5Y2022.DP05?q=san%20bruno%20city%20ca%20population>.

U.S. Census Bureau. Quick Facts. Retrieved from <https://www.census.gov/quickfacts/fact/table/sanbrunocitycalifornia/PST040222>.

⁴ U.S. Census Bureau. American Community Survey. Language Spoken at Home. Retrieved from <https://data.census.gov/table?q=san%20bruno%20city%20ca%20language>.

730 to 2080 square feet, and they typically have two to five bedrooms.⁵

There is one elementary school in Belle Air, K-6 Belle Air Elementary, which has 240 students. 67.5% are Hispanic/Latinx; 16.3% are Pacific Islander; 5.8% are Filipino; 5.4% are Asian; 0.8% are White; and 0.8% are Black.⁶ 55.4% are English learners⁷ and 60.0% are enrolled for free and reduced-price meals.⁸

The Belle Air neighborhood has faced chronic and substantial localized flooding for years and long-time residents have reported that recent storms resulted in some of the the worst flooding they have seen in 40 years. In 2015, the Federal Emergency Management Agency (FEMA) conducted its most recent preliminary Flood Insurance Rate Mapping (FIRM) for San Mateo County. Though the prior FEMA mapping had already included Belle Air in the 100-year flood zone, the FIRM dramatically increased the flood zone to surrounding communities and identified numerous residential properties within the Belle Air neighborhood as Special Flood Hazard Areas, which will result in significant insurance cost increases for already impacted communities. The City of San Bruno submitted several appeals to this finding, citing analyses conducted by the County's technical experts showing the flooding area is significantly smaller than the area FEMA identified and thus will unnecessarily require many homeowners to purchase flood insurance⁸ where there are smaller risks of flooding.

The Belle Air neighborhood is within San Bruno City Council District 4, which is represented by Councilmember Marty Medina. Prior to joining City Council, Councilmember Medina was the Public Works Inspector for San Bruno and worked at the Alameda County Water District. His priorities include fiscal responsibility, upgrading infrastructure and community centers, supporting schools, and improving Downtown San Bruno.

⁵ Neighborhoods.com. Belle Air Park. Retrieved from <https://www.neighborhoods.com/belle-air-park-san-bruno-ca>.

⁶ California Department of Education. 2022-23 Enrollment by Ethnicity and Grade Belle Air Elementary Report. Retrieved from <https://dq.cde.ca.gov/dataquest/dqcensus/EnrEthGrd.aspx?cde=41690136044614&aggllevel=school&year=2022-23>.

⁷ California Department of Education. 2022-23 Enrollment by English Language Acquisition Status (ELAS) and Grade Belle Air Elementary Report. Retrieved from <https://dq.cde.ca.gov/dataquest/DQCensus/EnrELAS.aspx?cde=41690136044614&aggllevel=School&year=2022-23>.

⁸ California Department of Education. 2022-23 Selected School Level Data Belle Air Elementary Report. Retrieved from <https://dq.cde.ca.gov/dataquest/Cbeds4.asp?FreeLunch=on&cSelect=Belle%5EAir%5EElementary--San%5EBruno%5EPark%5E--4169013-6044614&cChoice=SchProf2&cYear=2022-23&cLevel=School&cTopic=FRPM&myTimeFrame=S&submit1=Submit>.

3.3 Key Stakeholders

The following key stakeholders have been identified as having a possible interest in the countywide OneWatershed Framework and the San Bruno Creek Community Led-Plan based on their organizational focus and/or geographic location in proximity to one of the communities disproportionately affected by climate change and sea level rise in San Mateo County.

Countywide OneWatershed Framework Stakeholders

Government Organizations	Business Associations	Educational Organizations	Non-Profit Organizations	Faith-based Organizations	Community Leaders
City/County Association of Governments of San Mateo County	San Mateo Area Chamber of Commerce	San Mateo County Office of Education	Trust for Public Land	Peninsula Interfaith Climate Action	Pescadero Municipal Advisory Council
San Mateo County Parks	Chamber San Mateo County	Ravenswood City School District	Shape South SF		Gregg Castro
San Mateo County Flood and Sea Level Rise Resiliency District (OneShoreline)	San Bruno Chamber of Commerce	Sequoia Union High School District	Sustainable San Mateo		Melissa Jones (PCRC)
San Mateo County Resource Conservation District	Daly City Colma Chamber of Commerce	South San Francisco Unified School District	Peninsula Conflict Resolution Center		Raul Alvarez
San Mateo County Health	South San Francisco Chamber of Commerce	San Bruno Park Elementary School District	Hip Housing Development Corp		Robert Riechel
San Mateo County Pride Center (LGBT community center)	San Mateo County Economic Development Association	Redwood City School District	Foster City Village		Alex McIntyre (City Manager)

Government Organizations	Business Associations	Educational Organizations	Non-Profit Organizations	Faith-based Organizations	Community Leaders
San Francisco Public Utilities Commission (SFPUC)	Redwood City Improvement Association	Jefferson Union High School District	Thrive Alliance		
CalWater	Halfmoon Bay/Coastside Chamber of Commerce	Jefferson Union Elementary School District	Association of Ramaytush Ohlone (ARO)		
San Mateo County Public Utilities Department			Save the Bay		
Bay Area Regional Collaborative (BARC)			Grass Roots Ecology		
Sewer Maintenance Districts within San Mateo County			Rise South City		
Sanitation Districts within San Mateo County			San Francisco Estuary Institute (SFEI)		
Water Supply Districts within San Mateo County			South Coast Sustainable		
Special Districts managing water infrastructure utilities within San Mateo County			Nuestra Casa		

Government Organizations	Business Associations	Educational Organizations	Non-Profit Organizations	Faith-based Organizations	Community Leaders
Silicon Valley Clean Water			Youth United for Community Action (YUCA)		
Caltrans			SPUR		
San Mateo County Harbor District			Green Schoolyards America		
San Francisquito JPA			Greenbelt Alliance		
Small scale/private water systems in the unincorporated areas (Butano, Loma Mar, Dearborn)			Green Foothills		
			Belle Haven Empowered		

San Bruno Creek Community-Led Plan Stakeholders

Government Organizations	Business Associations	Educational Organizations	Non-Profit Organizations	Faith-based Organizations	Community Leaders
City/County Association of Governments of San Mateo County	San Bruno Chamber of Commerce	San Bruno Park Elementary School District	Shape South SF	San Bruno Baptist Church	Desiree Munoz & Carla Marie
OneShoreline	South San Francisco Chamber of Commerce	South San Francisco Unified School District	San Bruno Mountain Watch	International Christian Center San Bruno	

Government Organizations	Business Associations	Educational Organizations	Non-Profit Organizations	Faith-based Organizations	Community Leaders
City of San Bruno		Belle Air Elementary School	Sustainable San Mateo	Pentecostal Missionary Church of Christ	
City of South San Francisco			Shinnyo-en Foundation	First Tongan United Methodist Church	
SFPUC				Brazilian Church – Igreja Brasileira	
San Bruno/South San Francisco Sewer Maintenance Districts				The Church of Jesus Christ of Latter-day Saints	
San Bruno/South San Francisco Sanitary Districts				SEA Episcopal Church: South Campus	
San Bruno/South San Francisco Water Supply Districts				Congregation B’nai Tikvah	
PG&E				Saint Robert’s Catholic Church and School	
Caltrain				San Bruno Catholic Church	
Caltrans					
SFO International Airport					

4.0 OUTREACH ACTIVITIES

The following activities are scoped to provide effective communication between the PMT and EPC, CCC, and TAC groups as well as the larger community to support the OneWatershed Project. See Section 5.0 for a schedule of how outreach activities will be implemented.

- **PMT Coordination Meetings:** Regular Meetings between PMT members will be held to check in on Project status, coordinate outreach approach, and prepare for meetings with the Equity Priority Community (EPC) group, Climate Change Community (CCC) Team, and Technical Advisory Committee (TAC) groups. PMT members are included in Appendix A.
- **Equity Priority Community (EPC) group Meetings:** CRC, in coordination with Craig Communications and Geosyntec and their subconsultants, will host 3 meetings for the EPC. The first meeting will be a kick-off meeting held in April 2024 focused on reviewing the Draft Project Work Plan (the Work Plan reflects the overarching project timeframe, milestones, process, challenges and opportunities for a successful project) and the Draft Community Engagement Plan as well as to begin discussions about data collection needs. The second meeting will occur in May 2024 and will review data collection, inventory creation, and approach to vulnerability/risk analysis at a countywide scale to support the development of the OneWatershed Framework. The third meeting will take place in October 2024 to present and get feedback on the analysis, draft framework, and development of OneWatershed Framework and visualization dashboard. While the kick-off meeting will be held virtually, the other two meetings may be in a hybrid in-person/virtual format. The EPC roster is included as Appendix B. Eligible EPC workgroup members may receive a stipend for one member of each organization attending EPC meetings.
- **Climate Change Community (CCC) Team Meetings:** CRC and RISE South City will co-lead 9 CCCT meetings in year 1, and 11 more in year 2, for a total of 20 CCCT meetings. The Geosyntec Team and C/CAG will attend 6 of these meetings. During the kick-off meeting with the OneWatershed Project team, team members will identify discussion topics, review a summary of current data on the San Bruno Creek Watershed and the proposed approach to develop the OneWatershed Framework. Following the kick-off meeting, there will be 5 additional CCC Team in-person meetings that the PMT and/or Geosyntec and subconsultants will participate in over the course of the 2-year project on a range of topics including the development of the OneWatershed Framework and dashboard, San Bruno Creek shared risk results, the San Bruno Creek vulnerable OneWatershed assets, possible OneWatershed Climate Resilience Projects and a review of the draft San Bruno Creek Community-Led plan and project charette. Compensation will be provided to community members attending the CCC Team meetings.
- **Technical Advisory Committee (TAC) Meetings:** Geosyntec, with assistance from other members of the PMT, will facilitate 3 virtual TAC meetings. The first kick-off meeting will occur in March 2024 to identify additional goals, modify existing goals, discuss possible data gaps and collection needs, and review/comment on the Draft Project Work Plan

and the Draft Community Engagement Plan. Following the kick-off meeting, there will be a second TAC meeting in May 2024 to review the data summary and approach to develop the OneWatershed Framework. The final TAC meeting will occur in October 2024 to review the draft OneWatershed Framework, associated dashboard and the Countywide Shared Risk Results. The TAC roster is included as Appendix C.

- **Community Workshops:** CRC and the CCC Team will lead four in-person community workshops for community members and EPC group members to support the development of the San Bruno Creek Community-Led Plan. Two of the workshops will be listening sessions to support the development of the Community Vulnerability Assessment. This information will be incorporated into the draft Plan and an additional two workshops will be held to review the draft Plan and discuss the Final Plan. CRC will use their existing stakeholder network to advertise the meeting, handle meeting logistics and facilitate the meetings. Craig Communications will assist CRC with meeting scheduling, logistics and associated note taking. Geosyntec will provide presentation materials.

C/CAG and/or CRC will complete the following activities to support the successful completion of the project:

- **Stakeholder Lists:** CRC has found that traditional mailings have not been effective in soliciting community input and participation and will rely instead on working with their network of community organizations and leaders to spread the word to establish the EPC and CCC member groups, share project information, and announce upcoming workshops. The project team will maintain a key contact list that includes all relevant stakeholders as well as member roster lists for the EPC, CCC and TAC groups. Community compensation will be provided to those who participate in these groups. A key stakeholder list is included as Appendix E.
- **Government Outreach:** C/CAG will prepare regular project updates for elected officials and key city staff for the 20 cities within San Mateo County as the project develops. At minimum, updates and solicitations for input will be provided to agency staff at key project milestones or in advance of any public workshops offering staff, elected officials and community representatives the opportunity to attend.
- **Phone call/Email Outreach:** To encourage development and participation in the EPC and CCC groups as well as attendance at community workshops, CRC will conduct phone and email outreach to key community leaders and community-based organizations. Once the member roster is developed, the expectation is that those stakeholders will share updates on the meetings and the overall OneWatershed process with their larger stakeholder networks and take any community questions/issues raised back to the EPC, CCC, TAC, and PMT teams for further discussion.

- **Monitor Community:** CRC will monitor community interest by tracking calls, emails, and other communications with interested stakeholders. All inquiries will be responded to in a timely fashion in coordination with the larger PMT.
- **Additional Outreach:** Additional outreach activities may be conducted based on community interest. These may include additional meetings, issuance of project fact sheets, email updates, or other outreach activities. C/CAG staff will also host a dedicated web page for the OneWatershed Project on its www.flowstobay.org website with updates and materials related to project deliverables and workshops and will promote these web-based resources through its social media channels. C/CAG is planning to host a webinar during the Draft OneWatershed Framework development to solicit input from the broader public audience and community of stakeholders interested in climate resilience in San Mateo County.

Geosyntec and Craig Communications will assist C/CAG and CRC with the following activities:

- **Stakeholder Lists:** Craig Communications will assist in identifying and collaborating with key area stakeholders, as requested.
- **Government Outreach:** If needed, Geosyntec and Craig Communications will assist C/CAG in preparing content for updates to government officials/staff.
- **Meeting Collateral:** Geosyntec and/or Craig Communications will assist in the development of meeting collateral. This can include presentations on the status of various deliverables of the OneWatershed Project and technical knowledge necessary to allow EPC, CCC, and TAC members to make informed decisions; fact sheets summarizing key aspects of the project; meeting agendas, notes, and action items lists; etc. Public facing communications will be translated in order to meet accessibility needs of the relevant audiences.
- **Media Monitoring:** Craig Communications will track project-related media and share relevant articles with the PMT. Craig Communications will also identify opportunities to pitch to media outlets and coordinate with C/CAG and CRC to support preparing and delivering pitches on outcome progress.
- **Contact Log:** Craig Communications, in coordination with CRC and C/CAG, will maintain a project contact log documenting all inquiries, concerns and responses/actions.

5.0 PROJECT SCHEDULE

The table below lists the planned deliverables, the purpose of these activities, PMT lead, and the month in which they should be completed.

Table 5 – Project Schedule

Deliverable	Purpose	Lead	Timeframe
CCC Introductory Meetings	Solidify CCC Team members	CRC	January – March 2024
Prepare Draft Project Work Plan	Explain how Geosyntec will conduct tasks, identify deliverables, and propose a Project schedule	Geosyntec	December 2023 – February 2024
Prepare Draft Community Engagement Plan	Identify stakeholders and set goals for developing participation in the Project	Craig Communications	January – February 2024
TAC Kick-Off Meeting	Review Draft Work Plan and Community Engagement Plan, identify additional or modified goals, and initiate discussion of information gaps and data collection needs	Geosyntec	March 2024
EPC Kick-Off Meeting	Review Draft Work Plan and Community Engagement Plan	CRC	April 2024
Finalize online GIS Map Viewer	Illustrate community gathered data, areas of high overlapping asset risk, and key areas for project opportunities	Geosyntec	April 2024
TAC Meeting #2	Review data inventory and approach to risk analysis	CRC	May 2024
EPC Meeting #2	Review data inventory and approach to risk analysis- Materials to be made available 2 weeks in advance	CRC	May 2024
CCC Meeting #1	Introductions, review San Bruno-specific data and the approach to develop the OneWatershed Framework	CRC	March 2024
Submit Final OneWatershed Framework Approach Memo	To be reviewed by C/CAG, PMT, EPC, CCC and TAC	Geosyntec	June 2024

Deliverable	Purpose	Lead	Timeframe
TAC Meeting #3	Collect comments on OneWatershed Framework	CRC	November 2024
EPC Meeting #3	Collect comments on OneWatershed Framework- Materials to be made 2 weeks in advance	CRC	November 2024
CCC Meeting #2	Collect comments on OneWatershed Framework	CRC	November 2024
Community Workshops #1 and #2	Listening Sessions on what to include in the Community Vulnerability Assessment	CRC	October 2024 – January 2025
Submit Final OneWatershed Framework Approach	Create a plan for the development of the OneWatershed Framework	Geosyntec	January 2025
Finalize OneWatershed Dashboard	Provide a means to visualize priority shared-risk areas and project opportunities through an accessible resource that can be maintained by C/CAG beyond the scope of the Project	Geosyntec	January 2025
Complete San Bruno Creek Community Vulnerability Assessment	Evaluate the San Bruno Belle Air neighborhood adaptive capacity	Geosyntec	January 2025
CCC Meeting #3	Review the San Bruno Creek vulnerable OneWatershed assets	CRC	March 2025
CCC Meeting #4	Review possible OneWatershed Climate Resilience Projects	CRC	June 2025
CCC Meeting #5	Review the draft San Bruno Creek Community-Led Plan and mini project charette	CRC	October 2025
Community Workshops #3 and #4	Summarize the final San Bruno Creek Community-Led Plan highlighting how community input was incorporated into the plan	CRC	November – December 2025
Finalize San Bruno Creek Community-Led Plan	Demonstrate how the Framework can be applied locally for the San Bruno Creek	Geosyntec	December 2025

Deliverable	Purpose	Lead	Timeframe
	Watershed as a pilot sub watershed area		
Complete Final OneWatershed Pilot Project Concept Design	Describe the OneWatershed Climate Resilience Pilot Project selected using the OneWatershed risk reduction prioritization framework	Geosyntec	December 2025
APGP Final Grant Report	Detail how the Project was completed and fulfilled the terms of the Grant Agreement	All	January 2026

2. APPENDIX

Appendix A – PMT Roster

Organization	Name	Title	Email
C/CAG	Reid Bogert	NPDES Stormwater Runoff Program	rbogert@smcgov.org
City of San Bruno	Hae Won Ritchie	Deputy Public Works Director	hritchie@sanbruno.ca.gov
San Mateo County Office of Sustainability	Sultan Henson	Sustainability Specialist	shenson@smcgov.org
OneShoreline	Makena Wong	Project Manager	mwong@oneshoreline.org
BAWSCA	Tom Francis	Water Resources Manager	tfrancis@bawsca.org
South San Francisco	Brian Schumaker	Plant Superintendent	brian.schumacker@ssf.net
Governor’s Office of Planning and Research	Brandon Harrell	Senior Planner	brandon.harrell@opr.ca.gov
	Sarah Samdin	Associate Planner	sarah.samdin@opr.ca.gov
	Abby Edwards	Adaptation Planning Grant Program Manager	abby.edwards@opr.ca.gov
Climate Resilient Communities	Cade Cannedy	Director of Programs	cade.cannedy@crcommunities.org
	Kae Jensen	Resilient Adaptation Program Manager	kaelynn.jensen@crcommunities.org
Geosyntec	Kelly Havens	Senior Engineer	khavens@geosyntec.com

Craig Communications	Tracy Craig	Principal	tracy@craig-communications.com
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Appendix B – EPC Roster

Organization	Name	Email
CCCT Representative	Julio Garcia	julio@rise-southcity.org
SFEI	Melissa Foley/Lauren Stoneburner	melissaf@sfei.org ; laurens@sfei.org
Pescadero Municipal Advisory Council	Patrick Horn	phorn@pescaderocouncil.org
South Coast Sustainable	Irma Rodriguez Mitton	irma@south-coast-sustainable.org
Nuestra Casa	Osvaldo Macias	omacias@nuestracasa.org
Youth United for Community Action (YUCA)	Fili Zaragoza	fili@youthunited.net
Save the Bay	Erin Pang	epang@savesfbay.org
Grass Roots Ecology	Junko Bryan/Kit Gordon	junko@grassrootsecology.org ; kitgordon@me.com
SPUR	Sarah Atkinson	satkinson@spur.org
Green Schoolyards America	Sharon Danks	sharon@greenschoolyards.org
Grief at Work and Inner & Outer Engagement	Ari Simon	ari@ari.fyi

Appendix C – TAC Roster

Organization	Name	Title	Email
C/CAG Stormwater Committee Reps from WARP + County			
San Bruno	Matt Lee	Public Works Director	MLee@sanbruno.ca.gov
Redwood City	James O'Connell	Senior Civil Engineer	joconnell@redwoodcity.org
Belmont	Elizabeth Wada	Associate Civil Engineer	EWada@belmont.gov
County Health (groundwater)	Gregory Smith	Supervisor, Water Protection and Land Use Programs	GJSmith@smcgov.org
Silicon Valley Clean Water	Arvind Akela	Engineering Director	AAkela@svcw.org
County DEM	Ryan Reynolds	Program Services Manager	rreynolds@smcgov.org
Caltrans D4 NPDES	Brian Rowley	Branch Chief, Stormwater Design C	Brian.Rowley@dot.ca.gov
San Mateo Resource Conservation District	Joe Issel	Director of Stewardship	joe@sanmateorcd.org
Supervisor Dave Pine's Office	Michael Barber		MBarber@smcgov.org
San Mateo County Harbor District	Jim Pruett	General Manager	jpruett@smharbor.com
San Mateo County Harbor District	John Moren	Director of Operations	jmoren@smharbor.com
San Francisquito JPA	Tess Byler	Senior Project Manager	tbyler@sfcjpa.org
SFEI Resilient Landscapes	Melissa Foley	Science Director	melissaf@sfei.org
Rise South City/ Climate Change Community Team	Julio Garcia	Executive Director	julio@rise-southcity.org
PG&E	David Swartz	Senior Environmental Scientist	david.swartz@pge.com
OneWatershed PMT members			
C/CAG	Reid Bogert	Program Director	rbogert@smcgov.org
San Bruno	Hae Won Ritchie	Deputy Public Works Director	HRitchie@sanbruno.ca.gov

Organization	Name	Title	Email
San Mateo County Office of Sustainability	Sultan Henson	Sustainability Specialist	shenson@smcgov.org
OneShoreline	Makena Wong	Project Manager	mwong@oneshoreline.org
BAWSCA	Tom Francis	Water Resources Manager	tfrancis@bawsc.org
South San Francisco	Brian Schumaker	Plant Superintendent	brian.schumacker@ssf.net
Climate Resilient Communities	Cade Cannedy	Director of Programs	cade.cannedy@crcommunities.org
OneWatershed Consultant Team members			
Geosyntec Consultants	Kelly Havens	Senior Engineer	khavens@geosyntec.com
Geosyntec Consultants	Ken Susilo	Vice President	ksusilo@geosyntec.com
Paradigm Environmental	Chris Carandang	Water Resources Engineer	chris.carandang@paradigmh2o.com
Paradigm Environmental	Steve Carter	Director	steve.carter@paradigmh2o.com
Hazen and Sawyer	Luke Wang	West Region Water Resources Management Lead	lwang@hazenandsawyer.com
EOA, Inc.	Jill Bicknell	Senior Managing Engineer	jcbicknell@eoainc.com
Carollo	Julia Schmitt	Senior Environmental Engineer	jschmitt@carollo.com

APPENDIX B

OneWatershed Framework Development Approach Memorandum

Memorandum

Date: July 3, 2024
To: OneWatershed Project Technical Advisory Committee and Equity Priority Community Workgroup
Copies to: Reid Bogert, C/CAG, OneWatershed Project Management Team
From: Kelly Havens, Principal, and Megan Otto, Principal, Geosyntec Consultants
Subject: OneWatershed Framework Development Approach Memorandum
Geosyntec Project Number: CWR0888

1. OBJECTIVE OF MEMORANDUM

In 2023, the City/County Association of Governments of San Mateo County (C/CAG) received a California Integrated Climate Adaptation and Resilience Program (ICARP) Adaptation Planning Grant Program grant to develop and pilot the OneWatershed Framework, an equitable climate adaptation approach focused on integrated watershed management.

Watershed-related climate risks in San Mateo County include flooding due to sea level rise and extreme precipitation, water supply stress due to hydrologic drought, rising groundwater, and urban heat. Underserved and vulnerable communities in San Mateo County are at disproportionate risk of climate impacts.

In collaboration with the OneWatershed Project partners, C/CAG is developing the OneWatershed Framework as a method to assess the regional and shared-risk of climate change to water infrastructure and resources (sewer, water, and stormwater) and develop opportunities to build adaptive capacity to climate impacts for the most vulnerable communities to climate impacts for the most vulnerable communities through climate resilience focused programs, policies, and green and/or grey infrastructure projects. The OneWatershed Framework is intended to define a collaborative structure with agency and community representatives that can be used on a longer-term basis to advance equitable watershed-based climate resilience in San Mateo County. The OneWatershed Framework Report, to be developed through the ICARP grant funding by the end of 2024, will conceptually define the goals, processes, data analyses, and stakeholder communication/outreach needs that can be used to understand the shared risk of climate impacts for water infrastructure at the watershed scale and develop and advance climate resilience projects that target those impacts. The Report will be developed with input from the OneWatershed Project Technical Advisory and Equity Priority Committees, C/CAG's advisory committees and Board of Directors, and the general public, as feasible within staff resources.

The approach presented in the OneWatershed Framework Report will be piloted in the San Bruno Creek Watershed and used to develop the San Bruno Creek Community-Led OneWatershed Climate Resilience Plan.

This OneWatershed Framework Development Approach Memorandum describes the data, statewide guidance, local plans, and other assessment frameworks that will be used to inform the process of developing the OneWatershed Framework and documenting the approach in the OneWatershed Framework Report.

2. INPUTS TO ONEWATERSHED FRAMEWORK DEVELOPMENT

The data, guidance and plans, and proposed community vulnerability assessment approach (led by Climate Resilient Communities) that will guide the development of the OneWatershed Framework are each summarized in the following subsections.

2.1 Data Used

To evaluate Countywide climate-related “shared risk” or risk exposure of OneWatershed assets (focusing on stormwater, flood, sewer, and water supply infrastructure), a geospatial analysis will be conducted to identify where assets are co-located with climate impact risk factors. This analysis requires geospatial information system (GIS) data to complete. GIS data compiled for the OneWatershed Framework includes stormwater infrastructure (e.g., storm drains, catchments, outfalls, watershed boundaries), groundwater resources (e.g., groundwater basins), wastewater infrastructure (e.g., wastewater treatment facilities), water reclamation facilities, water supply infrastructure (e.g., reservoirs, dams), social vulnerability (e.g., disadvantaged/underserved communities), and climate impact projections (e.g., extreme heat, hazard risk data, erosion hazard, sea level rise, etc.). The data are being compiled in the OneWatershed [Web Viewer](#). The data and Web Viewer are described in the OneWatershed Data Inventory attached to this memorandum (Attachment A).

The data coverage will inform the geographic extent of the Countywide data analyses used to develop the OneWatershed Framework. The available geospatial coverage of climate risk data and impact probabilities and magnitude available in associated studies will inform the climate shared-risk logic-based analyses approach. A OneWatershed Infrastructure Shared-risk Analysis approach will describe the methods proposed to estimate climate impact shared risk based on identified and available prioritized asset, community, and climate risk data. This will be developed as a section of the OneWatershed Framework Report.

The geospatial data compiled in the Web Viewer and described in Attachment A will be used to complete the Countywide climate shared-risk analyses. Note that the OneWatershed Framework is intended to create a high-level assessment of shared climate risks to watershed infrastructure and vulnerable communities throughout San Mateo County. As outlined in the project scope of work, the OneWatershed Framework will be piloted in the San Bruno Creek watershed, and separate watershed-specific data is expected to be researched, requested, and compiled as part of

the pilot application. The watershed-specific data gathering exercise will attempt to fill some of the data gaps identified at the countywide scale.

2.2 Guidance and Plans

In addition to geospatial data described in the previous section, existing guidance, plans, and studies will be reviewed to inform the OneWatershed Framework. This will entail review of completed climate adaptation and resilience planning efforts, especially those that are collaborative across multiple departments, agencies, jurisdictions, and/or community groups and developed to drive community-scale integrated resilience planning and implementation. The OneWatershed Framework approach development will incorporate relevant methods, information, and processes from completed, relevant climate risk analysis studies that examine OneWatershed infrastructure Countywide or include climate risk-related strategies.

The Guidance and Plans that will be reviewed include:

- San Mateo County Sea Level Rise Vulnerability Assessment (San Mateo County 2018)
- San Mateo County Multijurisdictional Local Hazard Mitigation Plan (San Mateo County 2021)
- San Mateo County Community Climate Action Plan (San Mateo County 2022)
- San Mateo County Sustainable Streets Master Plan (C/CAG 2021)
- SF Environment and SFPUC Climate Action Plan Water Supply Addendum (SF Environment & SFPUC 2023)
- BAWSCA's Long-Term Reliable Water Supply Strategy (BAWSCA 2015)
- Publicly Owned Treatment Works Climate Resilience Survey (San Francisco Regional Water Quality Control Board 2021)
- San Francisco Bay Conservation and Development Commission (BCDC) Adapting to Rising Tides Portfolio (BCDC 2020)
- BCDC's Regional Shoreline Adaptation Plan Guidance (not yet available publicly) (BCDC 2024)
- Racial Equity Impact & Implementation Guide (City of Oakland 2020)
- Look Out Below: Groundwater Rise Impacts on East Palo Alto – a Case Study for Equitable Adaptation (SPUR 2024)
- Complete Cleanup of Contaminated Sites on the San Francisco Shoreline Statement (San Francisco Bay Shoreline Contamination Cleanup Coalition N.d.)
- Shallow Groundwater Response to Sea Level Rise (SFEI 2022)

- California Adaptation Planning Guide (California Governor’s Office of Emergency Services 2020)
- California’s Water Supply Strategy (CNRA et al. 2022)
- California Water Plan Update (CNRA et al. 2023)
- Draft California Sea Level Rise Guidance (CA OPC et al. 2024)
- Draft California Climate Adaptation Strategy (CNRA 2024)
- Caltrans Climate Change Vulnerability Assessment Statewide Summary Report (Caltrans 2024)
- 2023 Drinking Water Needs Assessment (SWRCB 2023)
- Implementing Green Stormwater Infrastructure on Schoolyards (Green Infrastructure Leadership Exchange 2019)
- Climate Resilience Framework Recommendations Report (City of Toronto 2019)
- Sonoma Water Climate Adaptation Plan (Sonoma Water 2021)
- Resilience Playbook Website (Greenbelt Alliance 2020)

In addition to the guidance and plans that will inform the OneWatershed Framework approach, watershed-based plans will be referenced for the San Bruno Creek pilot to compile previously identified project opportunities. These will include but not be limited to:

- City of San Bruno Green Infrastructure Plan (City of San Bruno 2019)
- Draft City of San Bruno Climate Action Plan (City of San Bruno 2012)
- City of San Bruno Storm Drain Master Plan (City of San Bruno 2014)
- San Bruno Creek/Colma Creek Resiliency Study (SFO 2015)
- City of San Bruno Walk ‘n Bike Plan (City of San Bruno 2016)
- The San Francisco Estuary Institute’s San Francisco Bay Shoreline Adaptation Atlas (SFEI & SPUR 2019)
- San Mateo County Stormwater Resource Plan (SMCWPPP 2017)
- Advancing Regional-Scale Stormwater Management in San Mateo County (SMCWPPP 2022)

These guidance, plans, and studies will be reviewed to incorporate the analyses that have been completed thus far. The project team will work with the OneWatershed Technical Advisory

Committee (TAC) and Equity Priority Community (EPC) Workgroup to develop the “next steps” that could be implemented through the OneWatershed Framework to progress completed planning and analysis efforts towards implementation of OneWatershed climate resilience solutions.

2.3 Community Vulnerability Assessment Approach

The OneWatershed Framework will incorporate a Community Vulnerability Assessment to gather information from community members and provide the community-scale front line data on risk and exposure to inform the OneWatershed Community-Led Plan in the San Bruno Creek Watershed. The Community Vulnerability Assessment output will be used to understand community sensitivity to climate risks, potential impacts from climate risks, and the community’s existing adaptive capacity. The Community Vulnerability Assessment is a key component of the overall proposed OneWatershed Framework approach.

Project team member Climate Resilient Communities (CRC) will conduct a Community Vulnerability Assessment for the pilot application in the San Bruno Creek Watershed. The Community Vulnerability Assessment will delve more deeply into climate- and water-related impacts and concerns in the community through engagement with community members and the Climate Change Community Team established for the watershed. Information will be gathered through the assessment, including population characteristics; work, travel, and water consumption patterns; water-related environmental exposures and risks; and geographic and water infrastructure amenities.

The Geosyntec Team will consult with CRC during the development of the OneWatershed Framework to establish how the Community Vulnerability Assessment results will be integrated with the climate shared-risk analyses. During the pilot phase, the output specific to the San Bruno Creek watershed will also be discussed with CRC to determine how best to integrate the geospatial output with the community information.

3. NEXT STEPS

This Revised Draft OneWatershed Framework Approach memorandum, [Web Viewer](#), and Data Inventory (Attachment A) will be reviewed by the Technical Advisory Committee and the Equity Priority Community Workgroup. Comments from these committee members will be integrated into in a Final version of this memorandum, and considered as the OneWatershed Infrastructure Shared-risk Analysis report section is developed in Summer 2024.

The OneWatershed Framework will be fully described in the OneWatershed Framework Report, scheduled to be completed in Fall of 2024. This Report will describe the development of the OneWatershed Framework, how vulnerable OneWatershed infrastructure assets will be identified and recommendations for how agencies in San Mateo County can better work across sectors and with local communities to identify and prioritize watershed-specific mitigation measures, or

OneWatershed Climate Resilience Projects through locally developed OneWatershed studies and action plans.

4. REFERENCES

- Bay Area Water Supply & Conservation Agency (BAWSCA). 2015. *Long-Term Reliable Water Supply Strategy Phase II Final Report*. Prepared by CDM Smith for BAWSCA. February.
- Bay Conservation and Development Commission (BCDC). 2020. *Adapting to Rising Tides Bay Area Regional Sea Level Rise Vulnerability and Adaptation Study*. March.
- California Department of Transportation (Caltrans). 2021. *Caltrans Climate Change Vulnerability Assessment Statewide Summary Report*. February.
- California Governor’s Office of Emergency Services. 2020. *California Adaptation Planning Guide*. June.
- California Natural Resources Agency (CNRA) et al. 2022. *California’s Water Supply Strategy Adapting to a Hotter, Drier Future*. August.
- CNRA. 2023. *California Water Plan 2023 Update*. December.
- CNRA. 2024. *DRAFT California Climate Adaptation Strategy*. May.
- California Ocean Protection Council (CA OPC) et al. 2024. *DRAFT: State of California Sea Level Rise Guidance: 2024 Science and Policy Update*. January.
- California State Water Resources Control Board. 2023. *2023 Drinking Water Needs Assessment*.
- City of Oakland. 2020. *Racial Equity Impact Assessment & Implementation Guide*.
- City/County Association of Governments of San Mateo County (C/CAG). 2021. *San Mateo Countywide Sustainable Streets Master Plan*. January.
- City of San Bruno. 2012. *City of San Bruno Climate Action Plan Public Review Draft*. October.
- City of San Bruno. 2014. *Storm Drain Master Plan Final Report*. Prepared by GHD, Inc. for the City of San Bruno. June.
- City of San Bruno. 2016. *City of San Bruno Walk ‘n Bike Plan*. Prepared by Eisen | Letunic with Parisi Transportation Consulting. July 26.
- City of San Bruno. 2019. *City of San Bruno Green Infrastructure Plan*. August.
- City of Toronto. 2019. *Climate Resilience Framework and Recommendations Report*. Prepared by SSG. March.

- Green Infrastructure Leadership Exchange. 2019. *Implementing Green Stormwater Infrastructure in Schoolyards*.
- Greenbelt Alliance. 2020. *Resilience Playbook*. Accessible at <https://resilienceplaybook.org/>
- San Francisco Bay Regional Water Quality Control Board. 2021. *Climate Change Questionnaire from Bill Johnson Chief, NPDES Wastewater Division to Municipal Wastewater Dischargers*. April 14.
- San Francisco Bay Shoreline Contamination Cleanup Coalition. N.d. *Complete Cleanup of Contaminated Sites on the San Francisco Bay Shoreline*.
- San Francisco Environment Department (SF Environment). 2021. *San Francisco's Climate Action Plan*. December.
- SF Environment & San Francisco Public Utilities Commission (SFPUC). 2023. *San Francisco's Climate Action Plan Water Supply Addendum*.
- San Francisco Estuary Institute (SFEI) & SPUR. 2019. *San Francisco Bay Shoreline Adaptation Atlas: Working with Nature to Plan for Sea Level Rise Using Operational Landscape Units*. Publication #915, SFEI, Richmond, CA. April.
- SFEI. 2022. *Shallow Groundwater Response to Sea-level Rise: Alameda, Marin, San Francisco, and San Mateo Counties*. Prepared by Pathways Climate Institute and SFEI.
- San Francisco International Airport (SFO). 2015. *San Bruno Creek / Colma Creek Resiliency Study Final Report*. Prepared by Moffat & Nichol and AGS for SFO. August.
- San Mateo County. 2018. *County of San Mateo Sea Level Rise Vulnerability Assessment Final Report*. San Mateo County Office of Sustainability.
- San Mateo County. 2021. *Multijurisdictional Local Hazard Mitigation Plan*. Prepared by Tetra Tech for San Mateo County Department of Emergency Management. October.
- San Mateo County. 2022. *San Mateo County Community Climate Action Plan*. San Mateo County Office of Sustainability.
- San Mateo Countywide Water Pollution Prevention Program (SMCWPPP). 2017. *Stormwater Resource Plan for San Mateo County*. Prepared by Paradigm Environmental and Larry Walker Associates, Inc. for City/County Association of Governments, SMCWPPP, Redwood City, CA. February.
- SMCWPPP. 2022. *Advancing Regional-Scale Stormwater Management in San Mateo County: Regional Collaborative Program Framework White Paper – FINAL*. Prepared by Geosyntec Consultants, Inc. and Kieser & Associates, LLC for City/County Association of Governments, SMCWPPP, Redwood City, CA. January.
- Sonoma Water. 2021. *Sonoma Water Climate Adaptation Plan*. Prepared by Jacobs. October.

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San Francisco Bay Area Planning and Urban Research Association (SPUR). 2024. *Look Out Below: Groundwater Rise Impacts on East Palo Alto — a Case Study for Equitable Adaptation*. May.

ATTACHMENT A

Refer To Excel File:

OneWatershed_Data Inventory Log_FINAL_070824. xlsx

APPENDIX C

OneWatershed Data Inventory

Dataset Name	Dataset Type	Dataset Description	Dataset Feature Type	Dataset Spatial Coverage	Dataset Source	Dataset Date / Year	Dataset location (where data is saved)	Other Comments / Notes
Erosion Hazard (Yr 2100)	Climate Impact	Coastside future erosion in Year 2100 developed by the Pacific Institute (and used in the SMC SLR Vulnerability Assessment)	Polygon	San Mateo County	Pacific Institute	Transfer from SMCWPPP on 8/9/2017	San Mateo County Project Privatization	
FEMA 100-yr Flood Plain	Climate Impact	100-yr flood plain (1% chance of being inundated on any given year)	Polygon	San Mateo County	FEMA	Downloaded 5/15/2024	San Mateo County Project Privatization	(Paradigm) Downloaded newer version 5/15/2024
San Mateo County Extreme Heat Dashboard	Climate Impact	This dataset shows the predicted number of high heat days that will occur in San Mateo County in the future. Various scenarios are included based on year, range, carbon pathway, and geography.	Polygon	San Mateo County	San Mateo County Extreme Heat Dashboard (city systems)	2020	San Mateo County Extreme Heat Dashboard Data - Google Drive	San Mateo County Extreme Heat Dashboard Documentation - Google Docs
ABAG Hazard Viewer	Climate Impact	The California Hazard Viewer Plus provides various potential hazards in the general Bay Area. These include Historic Wildfire Perimeters, Fire Hazard Severity Zones, Tsunami Evacuation Zones, FEMA Floodplains, Sea Level Rise, Landslide Hazard (Shallow Induced), Earthquake Fault Zones, Probabilistic Earthquake Shaking Hazard, Earthquake Liquefaction susceptibility, Earthquake Deaggregation, and Earthquake Shakeout Scenarios.	Various	Bay Area	MTI/ABAG Hazard Viewer Map (arcgis.com)	Various		Relevant datasets shown on the ABAG Hazard Viewer have been downloaded and documented in this data inventory log. This resource is kept here as a reference in case of needing geo/hazard databases.
San Mateo County Sea Level Rise Vulnerability Assessment	Climate Impact	The dataset shows the impacted parcels and roadways under sea level rise conditions from 0 (present) to 2.9' (2066-2100).	Various	San Mateo County	Sea Level Rise - SMC Sustainability Department	2022	Protecting the South Coast from Sea Level Rise (arcgis.com)	(Geosyntec)
South Coast Sea Level Rise Risk and Solutions Study	Climate Impact	The report summarizes the impact of SLR on communities, community services and critical facilities, energy networks, transportation systems, flood protection infrastructure, natural and recreational areas, wastewater and stormwater systems, and closed landfills and solid waste facilities. Assess vulnerability maps were created.	Various	Southern Half Moon Bay to the south county line with Santa Cruz	Sea Level Rise - SMC Sustainability Department	2018	2018_03_17_SLR_VA_Report_2018_WEB_FINAL.pdf (smcsustainability.org)	(Geosyntec)
SMC Hazard Risk Data	Climate Impact	Risk data compiled in the 2021 Local Hazard Mitigation Plan. The includes overview of various types of hazards in SMC and the action items across 36 local governments and special districts designed to reduce the risk of hazards. As part of the plan, SMC also created a hazard risk ranking dashboard, Hazard Exposure Dashboard, and Hazard Risk Data viewer.	Various	San Mateo County	County of San Mateo	2021	Multijurisdictional Local Hazard Mitigation Plan Resources County of San Mateo, CA (smc.gov.org)	
Climate Data from California's Fourth Climate Change Assessments	Climate Impact	Official page to download climate data from California's Climate Change Assessments. Data categories include temperature, precipitation, snowpack, sea level rise, and wildfire.	Various	California	Cal-Adapt		Cal-Adapt	
Sea Level Rise 100	Climate Impact - SLR	Mid Level Scenario (3.3 feet SLR) from the SMC SLR Vulnerability Assessment	Polygon	San Mateo County	San Mateo County Sea Level Rise Vulnerability Assessment	Transfer from SMCWPPP on 8/9/2017	San Mateo County Project Privatization	
Sea Level Rise 200	Climate Impact - SLR	High End Scenario (6.6 feet SLR) from the SMC SLR Vulnerability Assessment	Polygon	San Mateo County	San Mateo County Sea Level Rise Vulnerability Assessment	Transfer from SMCWPPP on 8/9/2017	San Mateo County Project Privatization	
Adapting to Rising Tides	Climate Impact - SLR	The dataset shows the impacts of current and future flooding due to sea level rise and storm surges. The data shows the inundation and flooding depths under various sea level rise and storm surge scenarios.	Polygon	Bay Area	AET Bay Shoreline Flood Explorer (adapting)	2017	Geosyntec Local Server	
Groundwater Basins	Groundwater	Bulletin 118 groundwater basins	Polygon	San Mateo County	California Department of Water Resources	Downloaded 04/2024	Geosyntec Local Server	(Paradigm) May have been updated since last download in 2016. (Geosyntec) Checked and confirmed the basin boundaries have been updated. Redownloaded from the DWR website in April 2024.
Well Types	Groundwater	"Well Types" Dataset was compiled as part of the San Mateo Plain Groundwater Basin Assessment Project. It shows the locations of cathodic, environmental, irrigation, private water supply, public water supply and test wells across the San Mateo County.	Point	San Mateo County	San Mateo Plain Groundwater Basin Assessment	2018	Well Types (arcgis.com)	Well Completion Report Map Application (arcgis.com)
Groundwater Levels	Groundwater	"Groundwater Levels" Dataset was compiled as part of the San Mateo Plain Groundwater Basin Assessment Project. It shows the locations of wells across the San Mateo County along with the water levels in the wells (shallow to mid-depth to deep wells).	Point	San Mateo County	San Mateo Plain Groundwater Basin Assessment	2018	Groundwater Levels (arcgis.com)	
San Mateo Plain Groundwater Basin Assessment Geodatabase	Groundwater	Data layers from the San Mateo Plain Subbasin Groundwater project. Includes data on the concentration of specific elements and minerals in wells. Also includes well locations, well construction types, water levels, and well depth. The study covers the San Mateo Plain Subbasin under the bay side of SMC from approximately the City of San Mateo on the north, to approximately the county boundary at San Francisco Creek on the south.	Various	San Mateo Plain Subbasin	San Mateo Plain Groundwater Basin Assessment	2018	San Mateo County (arcgis.com)	Data is saved on the San Mateo County GIS Open data portal. This databases should include the "Well Types" and "Groundwater Level" database.
Private and Municipal Wells	Groundwater	Groundwater well information county wide (Supply wells are included) is publicly available via San Mateo County GIS portal.	Point	San Mateo County	San Mateo County Open GIS Portal	Updated 3/26/2019	San Mateo County Project Privatization	
American Community Survey DAC	Social Vulnerability		Polygon					P:\GIS\CCAG\SMC_Prio_VulnerableCmtya.pdf
CalEnviro Screen 4.0 DACs	Social Vulnerability	The downloaded data shows the combined Population Characteristics scores, which is made up of indicators from the Sensitive Populations and Socioeconomic Factors components of the CalEnviroScreen model. Population Characteristics represent physiological traits, health status, or community characteristics that can result in increased vulnerability to pollution. Percentile >75 will be selected as DACs.	Polygon	California	CalEnviroScreen 4.0 CEHHS	2023	Geosyntec Local Server - VulnerabilityScreenOutput2021.tif and VulnerabilityScreenOutput2021.xlsx	P:\GIS\CCAG\Project\OneWatershed\PDFs\Activity Maps_02.07.2024.pdf
MTI Equity Priority Communities	Social Vulnerability	Formerly called "Communities of Concern," Equity Priority Communities (EPCs) are census tracts that have a significant concentration of underserved populations, such as households with low incomes and people of color. A combination of additional factors, helped in 2018 - 2022 update of the San Mateo County Equity Priority tract level data is used for the 2024 update of MTC's DACs. Detailed methodology is available here: https://bayaremetro.github.io/Spatial-Analysis-Mapping-Projects/Project_Documentation/Equity-Priority-Communities/	Polygon	Bay Area	Help Inform MTC's 2024 Equity Priority Communities Update Metropolitan Transportation Commission (ca.gov)	2024	Draft dataset is shown on MTC's GIS Portal	P:\GIS\CCAG\SMC_Prio_VulnerableCmtya.pdf
SMC County Vulnerability Index	Social Vulnerability	The Community Vulnerability Index (CVI) is an initiative of the County Manager's Office which aims to demonstrate the geographical distribution of the overall vulnerability of the residents of the county. The index utilizes data from the United States Census Bureau's American Community Survey. The index is composed of seven indicators: health insurance coverage, education, supplemental security income, gross rent as a percentage of income, poverty, unemployment, and disability status. The indicators that have been standardized and combined to create dimension scores, on a scale from zero to 100, for each of the census tracts within San Mateo County.	Polygon	San Mateo County	CVI Index County of San Mateo, CA (smc.gov.org)	2018	Geosyntec Local Server - Folder name - CVI Data for Download 2018.gdb	
Climate and Economic Justice Screening Tool	Social Vulnerability	A community is highlighted as disadvantaged on the CEJST map if it is in a census tract that is (1) at or above the threshold for one or more environmental, climate, or other burdens; and (2) at or above the Same of the threshold for an associated socioeconomic burden. Burden categories include climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Detailed explanation for each burden can be found here: https://screeningtool.geoplatform.gov/en/Imethodology#9.03/27.3821/122.1036	Polygon	National	Climate and Economic Justice Screening Tool	2021	Geosyntec Local Server	P:\GIS\CCAG\Project\OneWatershed\PDFs\Activity Maps_02.07.2024.pdf; filename within the geodatabase is "SanMateoCounty_CEJ_Intersect"
SF BCDC Social Vulnerability Ranking	Social Vulnerability	Certain socioeconomic characteristics may reduce one's ability to prepare for, respond to, or recover from a disaster. Census block groups with high concentrations of these characteristics are identified as socially vulnerable, with each block group categorized as highest, high, moderate, or low. Social vulnerability indicators include: 1) Renters, 2) Under 18, 3) Very low income, 4) Not US citizens, 5) People with disability, 6) Single parent families, 7) Communities of color, 8) 65 and over living alone, 9) limited english proficiency, 9) without a high school degree, 10) severely housing cost burdened.	Polygon	California	Community Vulnerability Mapping (ca.gov)	2023	Geosyntec Local Server - filename is - "Community_Vulnerability_08_CDC_2023.tif"	P:\GIS\CCAG\Project\OneWatershed\PDFs\Activity Maps_02.07.2024.pdf; methodology of the community vulnerability data is available here: https://www.adaptinginsights.org/wp-content/uploads/2024/01/CommunityVulnerability_Data_UserGuide_BCDC_2023_Final.pdf
County Stormwater Dataset Outfalls	Stormwater Infrastructure	Storm drain outfalls identified from EOA/FUGRO effort to map storm drain catchments and infrastructure, using a combination of individual city GIS data. The data accuracy, attributes, and completeness varies by city.	Point	San Mateo County	EOA/FUGRO	10/8/2013	San Mateo County Project Privatization	
Streams	Stormwater Infrastructure	The National Hydrography Dataset (NHD) represents the water drainage network of the United States with features such as rivers, streams, canals, levees, ponds, coastlines, dams, and streamgages.	Line	San Mateo County	National Hydrography Dataset	Downloaded 2016	San Mateo County Project Privatization	As of October 1, 2023, the NHD was retired. NHD data will continue to be available, but no longer maintained. The most current data will be available through the 3D Hydrography Program (3DHP)
Flood Prone Streams	Stormwater Infrastructure	Subset of streams from NHD based on list of stream names provided by SMCWPPP in 2016, using the "GNIS_Name" attribute in the NHD Shapefile.	Line	San Mateo County	SMCWPPP/National Hydrography Dataset	Created 2016	San Mateo County Project Privatization	
Storm Drains	Stormwater Infrastructure	Storm drains identified as > 24" from EOA/FUGRO effort to map storm drain catchments and infrastructure, using a combination of individual city GIS data. The data accuracy, attributes, and completeness varies by city.	Line	San Mateo County	EOA/FUGRO	10/8/2013	San Mateo County Project Privatization	
Major Creek Watersheds	Stormwater Infrastructure	(Paradigm) Still looking for source. The boundaries are slightly different from the Oakland Museum layer.	Polygon	San Mateo County			San Mateo County Project Privatization	
Subwatersheds	Stormwater Infrastructure	Present-day subwatershed boundaries. May be more representative of non-urban catchments	Polygon	San Mateo County	Oakland Museum (received from EOA)	2016	San Mateo County Project Privatization	Received a version from EOA that combined SF Peninsula and SOV GIS for full coverage of SMC. The watershed layer is from Oakland Museum of California, and also produced by Janet Sowers of FUGRO. This layer does a poor job of Most of this data was gathered by FUGRO Consultants Inc in 2014 as part of an effort to map all catchments for storm drain lines 24" diameter and larger. As part of this project, FUGRO completed all storm drain lines and outfalls larger than 24" diameter. To do this task, they built on earlier efforts by FUGRO under contract from the Oakland Museum of California to build a series of hydrological maps for the Bay Area. For this earlier project, the effort was put in to digitize pdfs and paper maps, while this level of effort was not needed during the 2014 mapping project. The data accuracy, attributes, and completeness varies by city.
Storm Drain Catchments	Stormwater Infrastructure	Storm drain catchments for storm pipes > 24" (where pipe location and diameter was available). May be more representative of urban catchments	Polygon	San Mateo County	EOA/FUGRO	9/9/2014	San Mateo County Project Privatization	
Publicly Owned Treatment Plants	Wastewater	Received from EOA. See Tab "SMC POTW/RWS Survey_EOA"	Spreadsheet	San Mateo County	EOA	Received on 03/25/2024	Geosyntec Local Server	Geosyntec will convert the addresses into shapefile and utilize the qualitative survey results for vulnerability assessment.
Wastewater Service Area Boundaries	Wastewater	Sewer service area boundaries	Polygon	San Mateo County	San Mateo County Planning and Building Map Viewer	Downloaded 7/12/2024	San Mateo County Project Privatization	Downloaded from third party GIS repository site: https://coordinates.com/layer/97664-san-mateo-county-california-sewer-districts/ Paradigm verified that the boundaries matched what was on the SMC Planning & Building Map Viewer. There was no direct download option from the SMC viewer.

District/Service Area Boundaries	Water Supply	Drinking Water Service System Area Boundaries. Spatial file format of the service area boundaries for drinking water systems, including wholesalers and retailers. Cropped to only include San Mateo County providers.	Polygon	San Mateo County	CA State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW)	created 3/24/2023	Hazen	
Dams	Water Supply	Dams within San Mateo County under the jurisdiction of the Division of Safety of Dams (DSD), not all are dams for water supply purposes (e.g., recreation/irrigation/flood control/other uses). Data includes basic information about the dam including the type of construction, basic dimensions (height, length, maximum storage capacity), owner information, current condition of the dam, indication of if dam is operating at a restricted storage level.	Point	San Mateo County	California Natural Resources Agency	updated 2/16/2022	Hazen	
Water Treatment Plants	Water Supply	CA State Water Resources Control Board (WRCB) Safe Drinking Water Information System drinking water treatment system list.	Point	San Mateo County	CA State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW)	no date provided, data pulled from website 4/24/2024	Hazen	Addresses pulled from SWRCB DDW list of water systems. Geodatabase compiled by Hazen using addresses provided on list and should represent the location of the water treatment facility. A number of smaller systems did not have an exact address listed, which is noted within the attribute table of the shapefile.

Dataset Type	Dataset Description	Other Comments / Notes
Stormwater Infrastructure	Stormwater Inlets/Catch Basins	
Stormwater Infrastructure	Storm drain pipes < 24"	
Stormwater Infrastructure	Pump Stations	These are likely maintained by several different entities; for example, Caltrain has several pump stations they maintain in different jurisdictions.
Water Supply	SF RWS Turnouts	Water supply infrastructure locations are likely to be sensitive and will require specific requests. It's possible some data cannot be made publicly available.
Water Supply	Local Storage Tanks	Water supply infrastructure locations are likely to be sensitive and will require specific requests. It's possible some data cannot be made publicly available.
Water Supply	Interties with other agencies	Water supply infrastructure locations are likely to be sensitive and will require specific requests. It's possible some data cannot be made publicly available.
Water Supply	Water Supply Lines	Water supply infrastructure locations are likely to be sensitive and will require specific requests. It's possible some data cannot be made publicly available.
Wastewater	Sewer Mains	
Wastewater	Sewersheds	
Wastewater	Dry Weather Diversions (as applicable)	
Wastewater	Pump Stations	
Wastewater	Vulnerability Studies	These are WWTP specific.
Wastewater	Water Reclamation Facilities	
Wastewater	Recycled Water Infrastructure	
Utilities	Water-related utilities	Utility data from PG&E
Utilities	Water-related utilities	Utility data from Cal Water

This tab includes known water supply assets, but geospatial data has not been compiled for these assets.

Water Supply Agency	City Served	Asset Type	Known Quantity	Asset Name OR Connection Point	Description	Additional Notes on System
Brisbane [City of Brisbane Water District & Guadalupe Valley Municipal Improvement District (GVMD)]	City of Brisbane	SF RWS Turnouts	5	Crystal Springs Pipeline #1 and #2	City of Brisbane: 3 TO GVMD: 2 TO	SF RWS is only source operated as a combined system
		Local Storage Tank	5	Crocket Tank (GVMD) Glen Park Tank 1 (Brisbane) Glen Park Tank 2 (Brisbane) Guadalupe Tank (Brisbane) Margaret Tank (GVMD)	total 2.9 MG	range from 20,000 to 1,000,000 gallons each
		Interties with other agencies	1 2 3	CWS South San Francisco Daly City GVMD	16 inch diameter 6 inch diameter, 12 inch diameter 12 inch diameter (all)	
		SF RWS Turnouts	6	Crystal Springs #2 and #3 Sunset Pipeline		SF RWS is only source
Burlingame	-City of Burlingame -portions of unincorporated Burlingame Hills area -a few properties in San Mateo & Hillsborough	Local Storage Reservoirs	2	Hillside Reservoir Skyview Reservoir	1,500,000 gallons 170,000 gallons	total 2.941 MG storage
		Local Storage Tanks	5	Alcazar Tanks (dual) Donnelly Tanks (dual) Mills Tank	100,000 gallons 100,000 gallons 1,071,000 gallons	
		Interties with other agencies	3 4	CWS City of San Mateo Hillsborough	(2) 6 inch diameter (1) 8 inch diameter (4) 8 inch diameter (2) 6 inch diameter (3) 8 inch diameter	for emergency water supply only
		Interties with other agencies	8	Millbrae	(1) 10 inch diameter (2) 12 inch diameter	
Daly City	-City of Daly City -some unincorporated portions of San Mateo County	SF RWS Turnouts	11	Crystal Springs #1 and #2 San Andreas #2 Sunset Pipeline Westlake Well 4	410 gpm 426 gpm 340 gpm	blended with GW supply
		Local Groundwater Wells	6	Jeff Well Vale A St. JS Well	693 gpm 524 gpm 550 gpm	Westside Basin blended with SF RWS supply total: 2,943 gpm
		Recycled Water			produced by North San Mateo County Sanitation District (subsidiary of City of Daly City)	for turf irrigation for 3 local golf courses, an athletic field, and landscape medians concrete, steel
		Local Storage	12		total 24.583 MGD	(1) privately owned (285,000 gallons)
East Palo Alto	City of East Palo Alto	Interties with other agencies	1 >1 1	GVMD Brisbane	(1) 12 inch diameter (2) 8 inch diameter (1) 2 inch diameter (2) 4 inch diameter (1) 8 inch diameter (1) 10 inch diameter (1) 6 inch diameter (1) inch diameter (1) 12 inch diameter	for emergency water supply only
		SF RWS Turnouts	3	Westborough BDPL 1 and 2		SF RWS is only source emergency well currently not certified for potable use
		Local Groundwater Wells	1	EPACWD Well (standby)	0.2 gpm	"Gloria Way Well is East Palo Alto's storage facility and is certified for alternate potable water supply sources within the City."
		Local Storage	1	Gloria Way Well		
Hillsborough	-Town of Hillsborough -portions of unincorporated San Mateo County	Interties with other agencies	1	Palo Alto	(1) 6 inch diameter	
		SF RWS Turnouts	9	SF RWS Mains: - Crystal Springs #2 - Sunset Pipeline		SF RWS is only source
		Local Storage Tanks	18		total 7.917 MG (1) 2 inch diameter * (2) 6 inch diameter (1) 8 inch diameter (1) 6 inch diameter (1) 8 inch diameter (1) 10 inch diameter	Steel *2-inch diameter galvanized steel pipe is considered non-functional as an intertie
		Interties with other agencies	4	Burlingame		
Menlo Park	City of Menlo Park	Interties with other agencies	3	CWS San Mateo	(1) 6 inch diameter (1) 8 inch diameter (1) 10 inch diameter	purchase most of water from SF RWS, remainder from East Palo Alto (source is also SF RWS)
		SF RWS Turnouts	5	BDPL 1 and 2 Palo Alto Pipeline		
		Local Storage Reservoirs	2	Reservoir 1 Reservoir 2	2.0 MG 3.5 MG	
		Interties with other agencies	1 1 1 1	East Palo Alto CWS Bear Gulch Redwood City O'Conner Tract Water Coop Palo Alto Park Mutual Water Co	(1) 12 inch diameter (1) 6 inch diameter (1) 8 inch diameter (1) 10 inch diameter (1) 6 inch diameter (1) 6 inch diameter (1) 6 inch diameter	primary emergency water source emergency water source emergency water source emergency water source
Millbrae	-City of Millbrae -Capuchino High School in San Bruno	SF RWS Turnouts	5	SF RWS Mains: - Sunset Pipeline - Sunset Branch Pipeline - Crystal Springs Pipeline #2 and #3		SF RWS is only source Harry Tracy WTP supplies higher elevations Crystal Springs #2 and #3 delivery to lower elevations
		Local Storage Tanks	5 (4 in operation)		total 2.36 MG (?) 6 inch diameter (?) 8 inch diameter (?) 10 inch diameter (?) 12 inch diameter	steel
		Interties with other agencies	8	Burlingame		
Redwood City	-City of Redwood City -portions of the Town of Woodside, the City of San Carlos, and unincorporated areas of the County	SF RWS Turnouts	8 5	BDPL 1 and 2 BDPL 3 and 4		SF RWS is only source
		Local Storage Tanks	10		total 21.24 MG	steel
		Interties with other agencies	2	CWS Bear Gulch	(2) 6 inch diameter	
		Interties with other agencies	4 2 1 1 1	CWS Mid Peninsula CWS Mid Peninsula Mid Peninsula WD Menlo Park Alameda/Edgewood	(3) 8 inch diameter (1) 12 inch diameter (2) Hydrant to Hydrant (1) 12 inch diameter (1) Hydrant to Hydrant (1) Fire Hose	

Water Supply Agency	City Served	Asset Type	Known Quantity	Asset Name OR Connection Point	Description	Additional Notes on System
San Bruno	-City of San Bruno -unincorporated areas of San Mateo County	SF RWS Turnouts	5	Crystal Springs #2 and #3 San Andreas 1, 2 and 3 Sunset Pipeline		
		Local Groundwater Wells	5	Well 15 Well 16 Well 17 Well 18 Well 20	0.26 MG 0.72 MG 0.40 MG 0.29 MG 0.85 MG	total 2.52 MG
		Local Storage Tanks	8		total 8.3 MG	steel and concrete
		Interties with other agencies	2	North Coast County Water District	21 inch diameter	purchase water from North Coast County Water District
			1	CWS - South San Francisco	8 inch diameter	
Coastside County Water District	- City of Half Moon Bay -several unincorporated coastal communities in San Mateo County (including San Mateo Road, Moonridge, El Granada, Miramar, Pillar Point Harbor, Princeton)	SF RWS Turnouts	2	Upper Crystal Springs Intake Pilarcitos Reservoir at Stone Dam		
		Local Surface Water	1	Denniston Creek		
				D1	25 gpm (active)	
				D2	? (inactive)	
				D3	37 gpm (inactive)	
				D4	35 gpm (inactive)	Denniston Well Field
				D5	35 gpm (inactive)	
				D9	45 gpm (active)	
				P1	40 gpm (November 1 - March 31) surface water infiltration well	
				P2	? (inactive) surface water infiltration well	
				P3	? (active) surface water infiltration well	
				P3A	? (active) surface water infiltration well	Pilarcitos Creek Infiltration Well Field
				P4	100 gpm (November 1 - March 31) (Standby) surface water infiltration well	
		P4A	200 gpm (November 1 - March 31) surface water infiltration well			
		P5	65 gpm (November 1-March 31) surface water infiltration well			
		Local Storage Reservoirs	2	Pilarcitos Reservoir at Stone Dam Upper Crystal Springs Reservoir	8.0 MG	Steel
		Local Storage Tanks	10			Raw water from Upper Crystal Springs Reservoir, Pilarcitos Reservoir at Stone Dam, and Pilarcitos Creek Infiltration Wells
		Treatment Plant	2	Nunes Water Treatment Plant	4.5 MGD	
				Denniston Water Treatment Plant	1.0 MGD	Raw Water from Denniston Creek and the Denniston Well Field
Estero Municipal Improvement District	- City of Foster City -part of City of San Mateo	SF RWS Turnouts	1	Crystal Springs #2		SF RWS is only source
		Local Storage Tanks	4		total 20 MG	Steel and Concrete
Mid-Peninsula Water District	-City of Belmont -portions of San Carlos - unincorporated county areas	SF RWS Turnouts	2	BDPL 1 and 2 Crystal Springs Bypass Tunnel		SF RWS is only source
		Local Storage Tanks	11		total 12.5 MG	steel
		Interties with other agencies	1	Estero MID	(1) 12 inch diameter	
			2	Redwood City	(1) 12 inch diameter	
			3	CWS San Mateo CWS San Carlos	(2) 8 inch diameter (3) 8 inch diameter	
North Coast County Water District	City of Pacifica	SF RWS Turnouts	1	San Andreas 3		SF RWS is only source
		Local Surface Water	1	San Pedro Creek	500 GPM max Decemver 1 to April 30 210 GPM max during May	
		Local Storage	13		total 23.55 MG	
		Treatment Plant	2	San Pedro WTP	0.5 MGD	treats water from San Pedro Creek for non-potable uses
			2	Central District San Bruno	0.3 MGD (2) 10 inch diameter	
			2	Daly City	(1) 6 inch diameter (1) 8 inch diameter (1) 8 inch diameter (2) 10 inch diameter	
				Westborough CWD	(1) 8 inch diameter (2) 10 inch diameter	
Westborough Water District	portion of City of South San Francisco	SF RWS Turnouts	1	San Andreas 1, 2, and 3		SF RWS is only source
		Local Storage Reservoirs/ Tanks	4		total 6.5 MG	
		Interties with other agencies	1	North Coast CWD	(1) 8 inch diameter	
			1	Daly City	(1) 12 inch diameter	
California Water Service Company - Bear Gulch	-Atherton -Portola Valley -Woodside -parts of Menlo Park, -parts of unincorporated Redwood City -adjacent unincorporated portions of San Mateo County including: West Menho Park, Ladera, North Fair Oaks, and Menlo Oaks	SF RWS Connections	8	BDPL 1 and 2 BDPL 3 and 4 Palo Alto Pipeline Bay Crossing 1 and 2 (Skyline only)		Bear Gulch District receives 85-95% of daily supply from SF RWS Skyline system not hydraulically connected to Bear Gulch Creek
		Local Surface Water	2	West Union Creek Bear Gulch Creek		
		Local Groundwater			Skyline system only	
		Local Storage Reservoir	1	Bear Gulch Reservoir	215 MG	
		Local Storage Tanks	34		steel, fiberglass-lined redwood, concrete 10,000 to 1,00,000 gallons total 11,177,752 gallons	
		Treatment Plant	1	Station 2 Filter Plant	6 mgd	
		Interties with other agencies	2	Redwood City	Skyline has no interties with other agencies	
			3	Menlo Park	all interties are 6 in diameter	
				Bay Crossing 1 and 2 BDPL 1 and 2	San Carlos Area: 3 TO from BDPL 1 & 2 San Mateo: 5 TO from Crystal Springs #2 and Sunset Supply Lines	
				Crystal Springs #2 Sunset Pipeline		
California Water Service Company - Mid Peninsula	-San Carlos -San Mateo -parts of unincorporated Redwood City	Local Storage Tanks	38		steel, fiberglass-lined redwood, concrete San Carlos Total: 5,303,000 gallons San Mateo total: 14,656,000 gallons total (both): 19,959,000 gallons	

Water Supply Agency	City Served	Asset Type	Known Quantity	Asset Name OR Connection Point	Description	Additional Notes on System		
California Peninsula District	- adjacent unincorporated portions of San Mateo County, including The Highlands and Palomar Park	Interties with other agencies (San Mateo)	3	Burlingame	(2) 4 inch diameter (1) 6 inch diameter			
			2	Hillsborough	(2) 6 inch diameter			
			2	Mid-Peninsula WD	(2) 6 inch diameter			
		Interties with other agencies (San Carlos)	1	Estero MID	(1) 12 inch diameter			
			3	Mid-Peninsula WD	(2) 8 inch diameter (1) 12 inch diameter			
		SF RWS Connections		3	Redwood City	(3) 8 inch diameter		
				11	Crystal Springs #2 San Andreas 1, 2, and 3 Sunset Pipeline			
		California Water Service Company - South San Francisco	-South San Francisco -Colma -small portion of Daly City -Broadmoor (unincorporated area between Colma and Daly City)	Local Groundwater Wells		Well 02 (inactive)	60 gpm	Westside Basin total capacity (active only): 1,505 gpm
						Well 18 (inactive)	340 gpm	
						Well 19	160 gpm	
						Well 20	150 gpm	
	Well 21				220 gpm			
	Well 22				295 gpm			
	Well 23				300 gpm			
	Well 24				300 gpm			
Local Storage Tanks	14				total 8,125,000 gallons			
	1			Brisbane	(1) 16 inch diameter			
	1			San Bruno	(1) 6 inch diameter (1) 2 inch diameter			
	Interties with other agencies			5	Daly City	(2) 4 inch diameter (1) 8 inch diameter (1) 10 inch diameter		
					Water Treatment	Harry Tracy WTP	120 MGD capacity	
					Reservoir	Crystal Springs Reservoir San Andreas Reservoir Pilarcitos Reservoir		
San Francisco								

APPENDIX D
Community Vulnerability Assessment
Short-Term Plan for San Bruno

Community Vulnerability Assessment

Short term plan for San Bruno

Overview

Given the work of RISE South City, Stanford, Geosyntec, and OneShoreline in the community of Belle Air understanding impacts of flooding, air quality concerns, heat, pollution exposure, etc., CRC is planning to start the CVA process by concentrating the information returned to us from these efforts into an educational presentation to share what qualitative and quantitative experiences of vulnerability are currently experienced and expected. These presentations will be shared in a workshop that will have the explicit goal of accruing further experiential data about vulnerability through community discussion. We will also utilize a Focus Group design to acquire information about the resources people utilize post climactic disasters as well as community assets that could be leveraged to address documented vulnerabilities. CRC will then utilize and share this data to understand the gap between vulnerability and adaptive capacity, which will be integrated into San Bruno's Community-Led Resilience plan.

Summary

Date	Feb 4, 2025
Workshops 1-2	<p>Workshop 1 (in English)</p> <p>Aggregate information on climate risk and experiential data collected from Community Based Organizations and Geosyntec, aggregate into educational presentation that informs and leaves space to collect more information through discussions. Focus is on tangible outcomes of high-impact or potential high-impact climate events as well as community assets that could be leveraged to address impacts.</p> <p>In partnership with Stanford, RISE South City and OneShoreline this workshop will be adapted into a short survey format (10-15 minutes). This survey can be distributed during Workshops 1 & 2, community members can capture their thoughts there during the session. Community Ask (Of RSB members especially): Please share this survey with family, friends and colleagues around San Bruno. Please try to have 3 conversations with your community about this issue. Use the survey as guidance to have in depth conversations about the experience of climate change.</p> <hr/> <p>Workshop 2 (in a highly concentrated linguistic group: likely Spanish or another language)</p> <p>Repeat process with Spanish or other linguistic community highly concentrated in San Bruno. This decision will be made in consultation with RSB.</p>
Date	Apr 1, 2025
Focus Groups 1-2	<p>Focus Group 1 (in English)</p> <p>Goal: The goal of the focus group would be to collect data to understand what resources community members both prepare for and recover from environmental impacts. Focus group breakouts would be facilitated and annotated by CRC staff. Focus Groups would start with a presentation on current vulnerability to particular climate impacts (with emphasis on water related impacts). Participants are invited to 3-4 tables around the room to be guided through questions designed to capture what resources community members rely on for prevention and recovery and other community assets that could be leveraged to address climate vulnerabilities. At the end of the questions, attendees are encouraged to write down 3 high priority resources they wish were available to them (on post-its). All of these post-its are placed on posters around the room. All participants are given 3 stickers (color coded for 1, 2 & 3rd priority). They are encouraged to place these stickers to align which resources around the room they would most like to have access to.</p> <p>Focus Group 2 (in Spanish or other highly concentrated linguistic group)</p>

	<p>Repeat process with Spanish or other linguistic community highly concentrated in San Bruno.</p> <p>Data collection:</p> <p>Facilitators & notetakers can be given a guiding data collection/notes worksheet to capture resources & prevention practices mentioned in discussions during the focus groups. Poster boards with community member's written concerns for which resources they would like to see that are not available to them will be</p>
Date	May 15, 2025
Follow-up Analysis	<p>Community Vulnerability Assessment Report</p> <p>The sum of both sets of workshops & focus groups will be culminated in a reporting structure that can easily be integrated into OneWatershed deliverables.</p> <p>Outcomes & Key learnings to be included & translated into relevant languages.</p>
Date	Jun 15, 2025
Final Workshops 1 & 2	<p>Workshop 1 (In English, could be integrated directly into the Resilient San Bruno CCCT)</p> <p>Return findings from report to the community, indicate how the data will be used, where they can get access to it, and get recommendations on how the community hopes it will be used.</p> <p>Goal of this set of workshops- guide the conversation around the CVA and how it will be captured in the Community Led resilience plan. Leave open flexibility to have previous two CVA processes would guide the design of the final workshop: find a way to return tangible steps towards progress through how this workshop is designed.</p> <p>Repeat process in linguistically diverse communities as needed (1 Workshop or translated documents distributed).</p>

Map of intended outcomes

- Data collected on how vulnerability we see in our data models is experienced in San Bruno. Identification of potential data gaps with respect to experienced or anticipated vulnerabilities.
- Data collected on what resources are being used to prevent impacts, recover from impacts, and an analysis of what resources are missing that would improve prevention or recovery. We will also collect data on preexisting community assets.
 - Community Vulnerability Assessment report to be easily integrated into the OneWatershed deliverables and integration of outcomes into the OneWatershed

Framework application.

- Return results of the Vulnerability Assessment to the community.

Approval & Notes for Adjustment



@Cade Cannedy done!



@Violet Wulf-Saena



@OneWatershed PMT

APPENDIX E

Composite Exposure Score Example Analysis

Appendix E: Exposure Analysis

E-1. OVERVIEW

An earlier iteration of the OneWatershed Framework included an analysis that attempted to examine composite climate change hazard exposure for OneWatershed infrastructure networks. The results of this analysis were shared with the Technical Advisory Committee (TAC) and Equity Priority Community (EPC) Workgroup, some of whom had concerns about the optics and utility of the results. The results of the analysis demonstrate those locations in San Mateo County (County) that might experience the largest climate change in the County, but do not provide an estimate of community vulnerability to that change. This initial attempt at one piece of the analysis underlined the understanding that community vulnerability to climate change hazards, and ultimate risk of impacts, is very challenging to assess on a Countywide basis. Vulnerability to climate change hazards can vary on a block-by-block basis and has as much to do with community resources as it does physical land characteristics and infrastructure. Because vulnerability and risk are a composite of exposure, sensitivity, potential consequence, and available resources, those areas that might experience the highest exposure to climate change hazards in the future (based on available projections) could be skewed from those areas that are at greatest risk of impact from that exposure. The data needed to truly assess vulnerability and risk of impact are also neighborhood-specific.

This points to the need for the watershed-specific plans that this framework recommends. This appendix documents the previous exposure-based analysis that was attempted and the results of that analysis. The results could be considered an example of how to consider climate change hazard exposure across many different infrastructure classes and how exposure (and, potentially, ultimate vulnerability or risk) could compound when many infrastructure classes are exposed to multiple hazards in the same location.

E-2. PREVIOUS METHOD CONDUCTED

A Countywide data-driven assessment of climate change hazard exposure for OneWatershed infrastructure networks was developed and conducted. The climate change hazard exposure analysis examined the location and relative magnitude of climate change hazards in relation to OneWatershed infrastructure networks in San Mateo County based on existing studies and reports. Climate change hazards were selected based on California's Fourth Climate Change Assessment San Francisco Bay Area Region Report (Ackerly et al. 2018) and vetted by the Project Management Team and the advisory committees based on the likelihood of direct or coincidental impacts on identified OneWatershed infrastructure networks. Climate change hazards examined include the following:

- Sea level rise
- Extreme heat
- Extreme precipitation
- Drought

- Wildfire

Communities and community assets (e.g., roadways, electric/natural gas utilities, and parcels) are served by several different OneWatershed infrastructure networks that are potentially vulnerable to climate change hazards. Many of these infrastructure networks are interrelated by their being co-located or potentially having intentional or unintentional system interconnections, such as the effect of stormwater runoff inflow and infiltration and on wastewater treatment systems, or the design of systems that store stormwater for capture and groundwater recharge or water reuse. As such, these interconnected OneWatershed infrastructure networks might also have shared exposure to the selected climate change hazards, whether from multiple climate change hazards affecting overlapping infrastructure network service or resource areas or from the single overlapping effect of one hazard on multiple systems (i.e., the potential scenario for sea level rise and storm surge to impact coastal drainage systems as well as the potential for wastewater treatment plant inundation).

For assessment of the overall OneWatershed climate change hazard exposure for a specific location, the approach included a geospatial calculation of the climate change hazard exposure for the four infrastructure categories (i.e., stormwater/flood, water supply, sanitary sewer, groundwater basins) independently for each selected climate change hazard. A climate change hazard exposure score was assigned based on the relative magnitude of the projected climate change hazard exposure. The combination of exposure scores across all OneWatershed infrastructure networks and climate change hazards is referred to as the composite exposure for individual assets and communities. The assessment examined climate change hazard exposure geospatially at a OneWatershed infrastructure network unit scale for a consistent set of climate change scenarios, as detailed below.

OneWatershed infrastructure network unit boundaries for water supply and wastewater were set at the service area boundaries. Watershed boundaries (HUC-10) were used to define OneWatershed infrastructure network unit boundaries for stormwater and groundwater basin delineations for groundwater. These OneWatershed infrastructure network unit boundaries are provided in the [OneWatershed Web Viewer](#).

Section E-3 (Assessment) includes details of how climate change hazard exposure was assessed for the selected OneWatershed infrastructure networks. Section E-4 (Application to OneWatershed Infrastructure Networks) describes the results of the climate change hazard exposure assessment.

E-3. ASSESSMENT

Climate change hazard exposure was assessed with data from previously established studies. An exposure score of low, moderate, or high was identified geospatially for each OneWatershed infrastructure network category based on the relative magnitude of exposure to the associated climate change hazard. These scores were set based on thresholds identified in studies (when available) or using best professional judgement and were intended to identify areas throughout the County that are more likely to be exposed to climate change hazards. The subsections below

provide details about the data sources referenced to assess each climate change hazard and how exposure scores of low, medium, or high are defined for each climate change hazard.

Four emissions scenarios were examined for climate change hazard exposure assessment, based on the recommendations of California Sea Level Rise Guidance: 2024 Science and Policy Update and included in the BCDC RSAP Guidelines (BCDC 2024), as shown in Table E-1 below. The identified OneWatershed Climate Scenarios were applied to each climate change hazard.

Table E-1: OneWatershed Climate Scenarios (based on California 2024 scenarios for sea level rise)

Time Frame	Emissions Scenario	California Sea Level Rise Scenario	OneWatershed Climate Scenario
2050	Intermediate	0.8 feet (9.6 inches)	Mid-Century – Intermediate
2100	Intermediate	3.1 feet (37 inches)	End of Century – Intermediate
2100	Intermediate-High	4.9 feet (59 inches)	End of Century – Intermediate-High
2100	High	6.6 feet (79 inches)	End of Century – High

3.1 Sea Level Rise

Sea level rise caused by climate change is a major threat to community infrastructure. Infrastructure flooded from surface inundation or groundwater intrusion due to sea level rise could be acutely damaged or corroded over time and might not operate properly or negatively affect water quality. Flooding and groundwater intrusion also creates challenges to properly maintain infrastructure, especially in coastal areas, so that it operates over the long term as designed and under changing conditions.

Geospatial data corresponding to the sea level rise scenarios were obtained from San Francisco Bay Conservation and Development Commission’s (BCDC’s) Online Mapping Platform (BCDC 2021). County of San Mateo Sea Level Rise Vulnerability Assessments (San Mateo County 2018, San Mateo County et al. 2022) were used for comparison. The relationship between the sea level rise scenarios for both sources is included in Table E-2. Maps of groundwater rise for limited areas around the Bay are available from the San Francisco Estuary Institute (SFEI) for specific sea-level rise scenarios (SFEI 2022). The OneWatershed Framework uses the State’s recommended sea level rise scenarios (California Ocean Protection Council 2024, BCDC 2024) to align with the recently adopted State guidance and new State requirements for Bay shore communities to have a San Francisco Bay Shoreline Resiliency Plan in place by January 1, 2034 (per Senate Bill 272 and described in BCDC 2024).

Table E-2: Sea Level Rise Scenarios Used Corresponding to OneWatershed Climate Scenarios

OneWatershed Climate Scenario	California (2024) SLR Scenario ¹	Corresponding SMC SLR Assessment Scenario ²	Corresponding SFEI Groundwater Depth under Future SLR Conditions Scenario ³
Mid-Century – Intermediate	0.8 feet (9.6 inches)	Not Assessed	12 inches
End of Century – Intermediate	3.1 feet (37 inches)	3.3 feet of SLR	36 inches
End of Century – Intermediate-High	4.9 feet (59 inches)	Not Assessed	66 inches
End of Century – High	6.6 feet (79 inches)	6.6 feet of SLR	77 inches

Purple highlighted cells indicate SLR values used in the analysis. The other studies are shown for reference.

¹ California SLR scenarios must combine SLR plus the mean higher high water plus the 1% annual chance coastal storm surge.

² The SMC Vulnerability Assessment used SLR plus the historic 1% annual chance coastal flood.

³ For California (BCDC 2024) scenarios, the corresponding shallow groundwater scenario should be “depth to groundwater for a rise at the Bay equal to the amount of sea level rise.”

SLR: sea level rise

SMC: San Mateo County

For estimation of shared climate change hazard exposure at a Countywide scale to different water sector assets, the OneWatershed shared-risk approach examined sea level rise flooding exposure resulting from inundation (from BCDC 2021) or emergent groundwater (from SFEI 2022) for the static OneWatershed climate scenarios presented. The proposed climate change hazard exposure score for sea level rise and groundwater intrusion flooding exposure are provided in Table E-3.

Table E-3: OneWatershed Sea Level Rise Flooding or Groundwater Intrusion Exposure Score

Hazard	Low	Moderate	High
Inundation or Groundwater Intrusion	0% of area ¹ inundated	Up to 10% of area inundated	Greater than 10% of area inundated

¹ Area within OneWatershed infrastructure network unit boundaries; see Section E-4.

Update: the data sources summarized above were used for the analysis results included in this Appendix. Reviewers from the TAC and EPC recommended that sea level rise data refined by San Mateo County in early 2025 (San Mateo County 2025) be used for exposure estimates. This data was developed based on the United States Geological Survey (USGS) Coastal Storm Modeling System (CoSMoS) projections available on the Our Coast, Our Future website (USGS Coastal Storm Modeling System 2025) and has been incorporated into the updated OneWatershed Framework method and the OneWatershed Dashboard.

3.2 Extreme Heat

San Mateo County’s Extreme Heat Dashboard were used to estimate heat-related exposure for the identified climate scenarios. A summary of the climate projections used for extreme heat is summarized in Table 6 below. The San Mateo County analysis was conducted based on specific carbon emissions scenarios, or representative concentration pathways (RCPs). This analysis matched the RCPs and ranges analyzed to the associated OneWatershed Climate scenarios as possible given available analyses and information. The planning horizon available from the San Mateo County Extreme Heat Dashboard is 2056 – 2085, which was used for the OneWatershed End of Century scenarios.

Table E-4: Extreme Heat Scenarios Used Corresponding to OneWatershed Climate Scenarios

OneWatershed Climate Scenario	San Mateo County Extreme Heat Dashboard Scenarios ¹
Mid-Century – Intermediate	Year Range 2040–2049, Carbon Pathway RCP 4.5
End of Century – Intermediate	Year Range 2056–2085, Carbon Pathway RCP 4.5
End of Century – Intermediate-High	Year Range 2056–2085, Carbon Pathway Average of RCP 4.5 and RCP 8.5
End of Century – High	Year Range 2056–2085, Carbon Pathway RCP 8.5

¹ Temperature threshold of 85 degrees Fahrenheit (°F) and average of climate models. Carbon pathway RCP refers to the Representative Concentration Pathway, which relate to the future carbon emissions scenario used in the model.

San Mateo County’s Climate Resilience “Extreme Heat” webpage defines high-heat days as days exceeding 85 degrees Fahrenheit (°F). Based on the legend provided on the webpage, lower exposure areas are those with 10 or less high-heat days. Medium exposure areas are those with approximately 11 to 40 high-heat days, and high exposure areas are those with greater than 40 high-heat days per year. These exposure levels are applied to all OneWatershed infrastructure network categories geospatially.

Table E-2: OneWatershed Extreme Heat Exposure Score

Hazard	Low	Moderate	High
High Heat Days ¹	10 days or fewer per year	11–40 days	40+ days per year

¹ Defined as days exceeding a temperature threshold of 85°F.

Update: The Extreme Heat projections from San Mateo County are provided on the OneWatershed Dashboard for use in watershed-based plans.

3.3 Extreme Precipitation

This analysis leveraged San Mateo Countywide Sustainable Streets Master Plan (C/CAG 2021), to evaluate and identify areas projected to have the highest increase in future precipitation across the County. The projected percent increase for the identified OneWatershed Climate Scenarios was estimated by evaluating exposure for two emission scenarios (RCP 4.5 and RCP 8.5) and a

mid-century and end-of-century period. The End of Century – Intermediate-High scenario is calculated from the average of the two emission scenarios. The OneWatershed Scenarios and the proposed corresponding extreme precipitation scenarios from Cal-Adapt (2024a) are presented in Table E-6.

Table E-6: Extreme Precipitation Scenarios Used Corresponding to OneWatershed Climate Scenarios

OneWatershed Climate Scenario	Cal-Adapt Extreme Precipitation Scenario ¹
Mid-Century – Intermediate	RCP4.5 (2034–2064)
End of Century – Intermediate	RCP4.5 (2069–2099)
End of Century – Intermediate-High	Average of RCP 4.5 + RCP 8.5 (2069–2099)
End of Century – High	RCP8.5 (2069–2099)

¹ Median of climate models.

For this analysis, exposure to extreme precipitation was estimated relative to precipitation increases due to climate change for a standard recurrence interval. The 10-year storm was used as the reference for evaluating extreme precipitation exposure due to its relevancy to storm drain infrastructure, as many storm drains in the County have been sized for the historical 10-year storm. Extreme precipitation exposure was evaluated by relative change in storm intensity for the 10-year storm. Table E-7 shows the proposed exposure levels for extreme precipitation. A projected increase in precipitation depth for the 10-year storm of less than 10% is considered low exposure. A projected increase of 10% to 25% is considered moderate exposure. A projected increase of over 25% is considered high exposure. These exposure levels are applicable for all asset categories. The projected increase is applied from the Cal-Adapt model grids to each asset category’s unit boundaries using an area-weighted average.

Table E-3: OneWatershed Extreme Precipitation Exposure Score

Hazard	Low	Moderate	High
Projected Increase in the 10-year Storm	Less than 10%	10–25%	Greater than 25%

Update: One concern mentioned by some TAC and EPC reviewers related to how extreme precipitation was incorporated into the composite climate change hazard exposure analysis. The change in precipitation (i.e., the amount of rain) was included in the analysis presented in this Appendix. However, reviewers mentioned that exposure should relate to flooding caused by extreme precipitation, not just the increase in rain. Unfortunately, analyses to understand increased flooding caused by projected increases in extreme precipitation has not been completed in the County and would require very detailed hydraulic/hydrologic modeling that is beyond the scope of the OneWatershed Framework project to develop. Some cities and regions within the County have developed models through their stormwater master plans or other efforts to begin to explore flood impacts, and these detailed location-specific results should be incorporated into watershed-specific OneWatershed studies.

3.4 Drought

Droughts are periods with below-average precipitation and, when sustained, can result in shortages in surface water supplies that might rely on certain amounts of precipitation per year. As highlighted in the California Fourth Climate Change Assessment, when compared to historical periods, more frequent, longer, and drier droughts are likely with climate change. Drought exposure was measured and scored relative to water supply impacts in San Mateo County, specifically related to projected water supply shortages under climate change conditions. Water supply shortages were measured as the difference between projected demand and projected supply availability under climate change conditions.¹ Thresholds of water supply shortages are proposed to be directly related to the California Department of Water Resources’ (DWR) standard Water Shortage Contingency Plan stages identified in Table E-8 below.

Table E-8: Linkage Between DWR Water Shortage Contingency Plan Stages and Proposed OneWatershed Drought Exposure Level

Water Shortage Contingency Plan Stage	Level of Projected Water Supply Shortage	OneWatershed Exposure Level
Stage 1	0%–10%	Low
Stage 2	10%–20%	
Stage 3	20%–30%	Moderate
Stage 4	30%–40%	
Stage 5	40%–50%	High
Stage 6	>50%	

Data sources used to estimate future water supply shortages within San Mateo County included data and context from San Francisco Public Utilities Commission’s (SFPUC’s) *Long-Term Vulnerability Assessment and Adaptation Plan (LTVA)* (Francois et al. 2021), 2020 Urban Water Management Plans for water suppliers in the County, and the USGS Basin Characterization Model (Flint and Flint 2014) in Table E-9.

Table E-9: Overview of Data Sources for the Proposed OneWatershed Drought Exposure

Data Source	Quantitative Information Provided	Potential Application	Discussion
SFPUC Long-Term Vulnerability Assessment	Projected imported and local water supply availability from the SF RWS under climate change conditions.	Leverage estimates of imported water available and impacts to the inflow in local SFPUC-owned reservoirs in San Mateo County (e.g., Crystal Springs Reservoir) under climate change conditions.	The vast majority of San Mateo County’s population is served imported water from the SF RWS. For many water suppliers in the County, water from the SF RWS is the only water supply source.

¹ External factors affecting water supply availability, such as future infrastructure investments and regulatory conditions are assumed to be held constant to current conditions.

Data Source	Quantitative Information Provided	Potential Application	Discussion
2020 Urban Water Management Plans	Projected water demands and conceptual/quantitative impacts of climate change on future water supply availability.	Leverage water demand projections and quantitative impacts on water supply availability for estimating future water supply shortages.	Urban Water Management Plans provide discussion on climate change related risks to water supply and demands, which could augment or supplement the most recent estimates of SFPUC’s Long-Term Vulnerability Assessment.
USGS Basin Characterization Model	Projected groundwater balance for California under 18 climate change projections.	Leverage estimates of groundwater recharge and water deficit under climate change conditions.	Data could be most useful in estimating impacts to water suppliers in the County who are not connected to the SF RWS.

Notes:

SFPUC: San Francisco Public Utilities Commission

SW RWS: San Francisco Regional Water System

USGS: United States Geological Survey

In San Mateo County, 16 water agencies, containing 90% of the County’s population, purchase water primarily from SFPUC and are represented by the Bay Area Water Supply & Conservation Agency (BAWSCA). Based on water production volume data from 2023, 95% of the water supply to San Mateo County’s BAWSCA member agencies came from the SF RWS, while 5% consisted of local groundwater and surface water supply.

In 2021, SFPUC partnered with The Water Research Foundation and University of Massachusetts Hydrosystems Research Group to publish the LTVA, which assessed how climate change and other external factors could affect SFPUC’s ability to meet level of service goals for both retail and wholesale customers² over the next 50 years (2020–2070). The coupled model intercomparison project (CMIP5)-based global climate model projections were used in the study to evaluate the potential range of climate change impacts on the three SFPUC watershed regions (Upcountry, East Bay, and Peninsula) under different emissions scenarios (RCPs). The global climate model projections were analyzed for temperature and precipitation changes around the 2040 and 2070 periods using a 30-year averaging interval for each. The RCP 8.5 emissions scenario³ was selected to allow for an assessment of the outer bounds of RWS impacts by 2070, and the study noted that the different assumptions of each RCP tended to result in “*similar climate projections to mid-century* [i.e., from 2020–2050].” Downscaled global climate model climate data was input into hydrologic models developed for each of the three SF RWS regions, which in turn generated climate change-adjusted simulations of streamflow into each SF RWS

² BAWSCA member agencies are considered wholesale customers.

³ The LTVA study considered four RCPs from the Inter-Governmental Panel on Climate Change Fifth Assessment Report labeled as RCP 2.6, RCP 4.5, RCP 6, and RCP 8.5, after a possible range of radiative forcing values in the year 2100.

reservoir. The LTVA used the hydrologic model output to inform a water system operations model of the SFPUC retail and wholesale supply system. Four demand⁴ and 1,360 climate⁵ scenarios were modeled over the 2021–2070 simulation period to evaluate water supply shortages.

The analysis below and values in Table E-10 are a deterministic distillation of the LTVA work. The LTVA 2040 and 2070 RCP 8.5 outputs provide comparable climate factors to the Mid-Century Intermediate and End-of-Century High bookend scenarios, respectively, and the results below reflect conditions of the median climate change projections of +2 degrees Celsius (°C) warming by 2040 and +4°C by 2070 with no change in mean annual precipitation. The 265-million-gallon-per-day (mgd) system-wide demand (+15% of the LTVA baseline) scenario was chosen for both scenarios as they reflect the sum of SFPUC’s retail demand nearing buildout (i.e., 2045 retail demand projection from the SFPUC 2020 Urban Water Management Plan) and the BAWSCA agencies’ Individual Supply Guarantees from SFPUC, which cannot be exceeded. This reflects an expected upper limit of SF RWS system-wide demands.

Results of the LTVA median climate projections at 265 mgd demands found that the maximum annual SFPUC system-wide supply deficit across the scenarios was 97 thousand acre-feet (TAF) in 2040 (equivalent to 36% rationing) and 100 TAF in 2070 RCP 8.5 (equivalent to 37% rationing). The median climate projection resulted in a system-wide rationing of 20% or greater in about 1 in every 10 years on average for both the 2040 and 2070 RCP 8.5 scenarios. The SFPUC 2020 Water Shortage Contingency Plan outlines a water shortage allocation plan to allocate water between the retail and wholesale customers collectively. The water shortage allocation plan notes that when a system-wide reduction in water use above 15% is required, the collective wholesale customers’ share of the available RWS supply is 64.5%.⁶ This leads to a maximum annual reduction in aggregate SFPUC wholesaler supply of 42% by 2040 and 43% by 2070 RCP 8.5. The wholesale supply reduction is then passed through a Tier 2 allocation formula for distribution among wholesale agencies.⁷ Given the minimal variation in median climate factors (only +2°C change between 2040 and 2070, with no assumed change to mean annual precipitation) and no change in demand between the two bookend scenarios, the approximate maximum annual supply shortage and shortage frequency do not vary significantly.

⁴ The baseline demands scenario (226 million gallons per day [mgd]) is consistent with SF RWS fiscal year 2012–2013 records (the year prior to the 2014–2016 statewide drought). Additional demand scenarios increased the baseline demands by +15%, +30%, and +45% (265 mgd, 300 mgd, and 334 mgd, respectively).

⁵ To reflect the full plausible range of projections without regard to likelihood, 8 temperature scenarios ranging from +0 °C to +7 °C, and 17 precipitation scenarios ranging from -40% to 40% change from the historical baseline (1986 to 2005) were applied to 10 climate realizations (9 stochastic and 1 historical). Changes to mean annual temperature and precipitation were applied uniformly across seasons and regions.

⁶ Note that while the SFPUC Water Shortage Contingency Plan (Appendix K of SFPUC 2020) does not define allocation between retail and wholesale customers above RWS shortage levels of 20%, application of the 16%–20% allocation to shortage levels greater than 20% is typically assumed for SFPUC’s planning purposes.

⁷ The Tier 2 formula is largely dependent on the Individual Supply Guarantee (ISG) contractual volumes of the BAWSCA member agencies. Since net wholesale demands were modeled as the sum of BAWSCA member ISGs for this analysis, the combined San Mateo BAWSCA member agencies’ reductions can be assumed to equal the aggregate SFPUC wholesale supply reductions.

It can be assumed that values for both shortage and shortage frequency in the End-of-Century Intermediate and End-of-Century Intermediate-High scenarios would fall within this range.

Table E-10: Summary of SF RWS Imported Water Supply Impacts to BAWSCA Agencies at Median Climate Change Projections and 265 mgd Systemwide Demand

One-Watershed Scenario	Representative year + RCP Scenarios	Comparable LTVA Scenario	Approximate Maximum Modeled Shortage	One-Watershed Score
Mid-Century – Intermediate	2040–2049, RCP 4.5	2040	42%	High
End-of-Century – Intermediate	2056–2085, RCP 4.5	N/A*	42.5% *	High
End-of-Century – Intermediate-High	2056–2085, Average of RCP 4.5 + RCP 8.5	N/A*	42.5% *	High
End of Century – High	2056–2085, RCP 8.5	2070 RCP 8.5	43%	High

Notes:

* The SFPUC LTVA study did not provide comparable surrogate scenarios for the End-of-Century Intermediate and the End-of-Century Intermediate-High scenarios. These placeholder values represent the average of the bookend scenarios, as the climate factors outlined in these intermediate scenarios fall between the ranges.

BAWSCA: Bay Area Water Supply & Conservation Agency

LTVA: Long-Term Vulnerability Assessment and Adaptation Plan

mgd: million gallons per day

RCP: representative concentration pathway

SF RWS: San Francisco Regional Water System

The LTVA study did not provide detailed statistics regarding local groundwater and surface water sources to BAWSCA agencies in San Mateo County. However, given the small percentage of total supply, it can be assumed that the impact of climate change to local water sources will not significantly alter the total supply reliability to San Mateo BAWSCA agencies.

Beyond the climate change concerns discussed above, regulatory requirements from the San Francisco Bay/Sacramento-San Joaquin Delta Estuary Water Quality Control Plan (Bay-Delta Plan) are anticipated to have an outsized impact on future SFPUC water supply reliability, which would directly affect San Mateo County’s BAWSCA agencies. As discussed in SFPUC’s 2020 Urban Water Management Plan, full implementation of the Bay-Delta Plan and its 2018 amendments establishing flow objectives on three San Joaquin River tributaries would “*severely impact SFPUC’s water supply*” by increasing system-wide shortages during hydrologic drought. Notably, SFPUC’s 2020 Urban Water Management Plan projected a maximum annual shortage of 54% for wholesalers by 2045, or approximately 11% higher than under the LTVA climate change scenario 2070 RCP 8.5. Currently, the California Natural Resources Agency and water users in the Bay-Delta watershed (including SFPUC) are working to establish voluntary agreements to mitigate the water supply impacts from the Bay-Delta Plan while protecting

environmental interests. These voluntary agreement negotiations are still underway and the outcome for SFPUC’s long-term supply reliability to wholesalers remains uncertain.

Update: The maximum modeled shortage has been added to all SFPUC dependent water supplier boundaries in the OneWatershed Dashboard.

3.5 Wildfire

Wildfire poses risks to communities through impacts to air quality and to infrastructure through damage and loss and can impact water quality of water resources, beyond the more obvious and devastating potential impacts to communities, property and life especially in areas in the wildland urban interface. CalFire has assigned current wildfire risk for areas across San Mateo County through their website “Fire Hazard Severity Zones in State Responsibility Area” (Cal Fire 2024). Cal Fire ranks wildfire hazard within their responsibility area as moderate, high, and very high. Cal Fire has also identified wildland-urban interface zones that might be at risk of the adjacent wildfire threats from influence areas (ArcGIS n.d.) with similarly categorized risk.

Projected changes in climate change-related wildfire have not been analyzed on a smaller spatial scale, so there is insufficient data that predicts increased exposure to wildfire on a census-block by census-block basis, for example. However, a joint study by the USGS and several universities (Gao et al. 2021) found that wildfire risk in San Mateo County could increase by 30% by the end of the century (2070–2099).⁸ Table E-11 shows the criteria used to determine wildfire exposure across all asset categories.

Table E-11: OneWatershed Wildfire Exposure Levels

Hazard	Low	Moderate	High
Wildfire	Areas outside of Cal Fire influence, wildland-urban interface, intermix areas, and local moderate exposure and high exposure areas ¹	Cal Fire designated moderate areas and adjacent wildland-urban interface and intermix areas and local moderate exposure areas ¹	Cal Fire designated high and very high areas and adjacent wildland-urban interface and intermix areas and local high exposure areas ¹

¹ Where local data is available.

Without currently available detailed projections, these exposure levels were used for all OneWatershed climate scenarios to estimate wildfire climate change hazard exposure at a Countywide scale.

Update: Cal Fire released updated Fire Hazard Severity Zones in 2025. Older CalFire data was included in the analysis presented in this Appendix. The newly released geographical information system (GIS) layer (CalFire 2025) has been incorporated into the updated OneWatershed Framework method and the OneWatershed Dashboard. Cal-Adapt also has a tool

⁸ Percent change in fire probability for coastal California mountains as compared to historical baseline conditions.

that allows users to examine whether wildfire activity is likely to increase. This tool has also been recommended for detailed watershed-specific OneWatershed studies.

E-4. APPLICATION TO ONEWATERSHED INFRASTRUCTURE NETWORKS

The exposure thresholds summarized in the Section E-3 were used to conduct a geospatial analysis to assess climate change hazard exposure for each climate scenario for each OneWatershed infrastructure network category on a unit basis across San Mateo County. OneWatershed infrastructure network unit boundaries were defined as follows:

- Water supply service areas
- Wastewater collection and treatment plant service areas
- Stormwater catchments
- Groundwater basins

For each applicable OneWatershed infrastructure category, an exposure level (i.e., low, moderate, high) was assigned for each climate change hazard category per the exposure level definitions described in section E-3. The levels were assigned to infrastructure network units countywide based on the co-located geospatial climate change hazard data.

Additionally, a heat map showing climate change hazard exposure, which averages all climate change hazard exposure levels across all water infrastructure categories, was developed for each climate scenario to provide a visual reference to locations that might be “hot spots” for climate change hazard exposure. These are provided as examples in Figure E-1.

As stated previously in this appendix, the results of this analysis should be considered an example of how to consider climate change hazard exposure across many different infrastructure classes and how exposure (and, potentially, ultimate vulnerability or risk) could compound when many infrastructure classes are exposed to multiple hazards in the same location. The OneWatershed Framework has been adjusted from the previous version such that these results are no longer incorporated into the process.

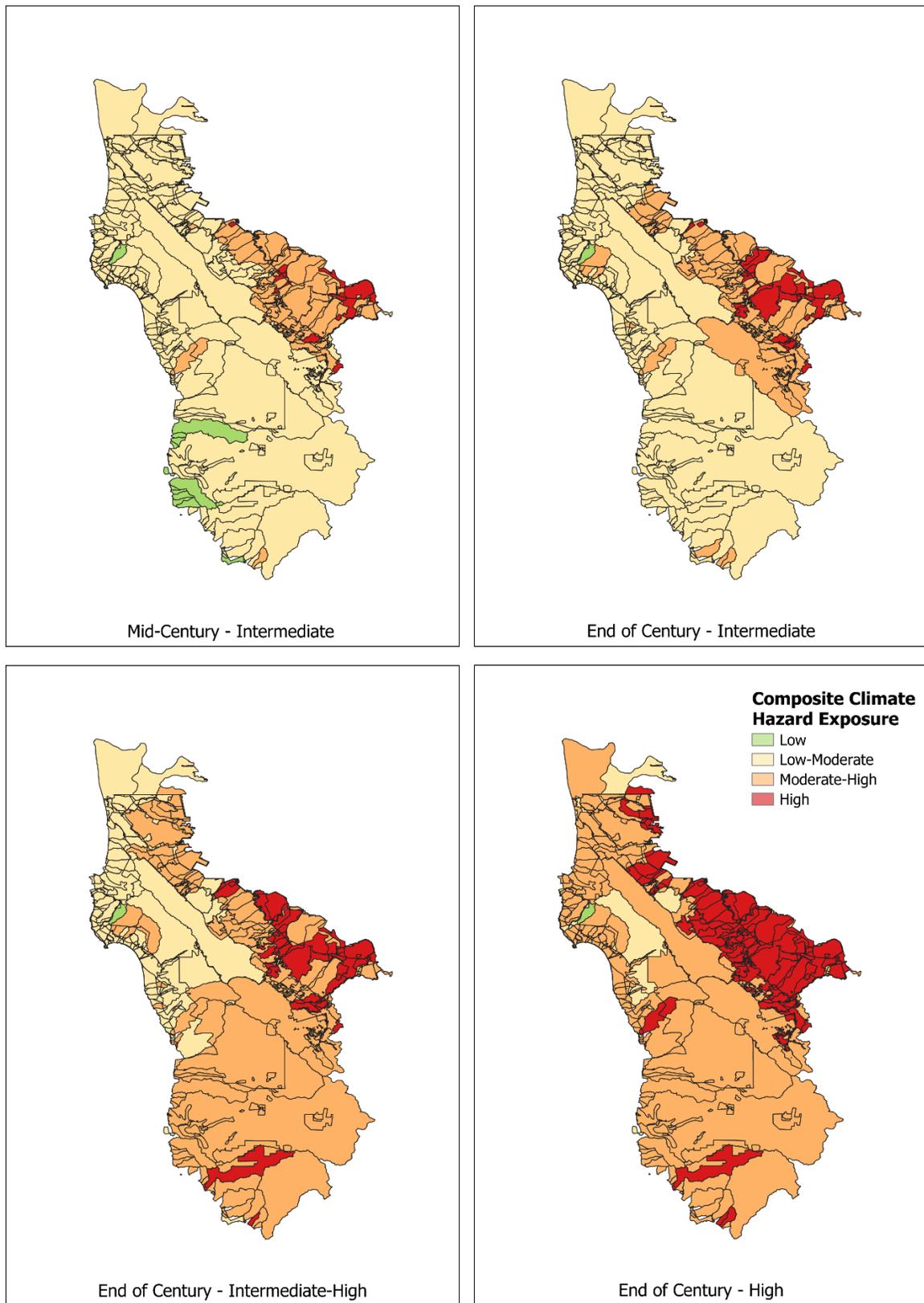


Figure E-1: Climate Hazard Exposure for OneWatershed Climate Scenarios

E-5. REFERENCES

- Ackerly, D., A. Jones, M. Stacy, and B. Riordanet. 2018. *San Francisco Bay Area Summary Report*. California's Fourth Climate Change Assessment. Publication number: CCCA4-SM-2018-005. Available at: https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-005_SanFranciscoBayArea_ADA.pdf.
- ArcGIS. n.d. "Wildland-Urban Interface Fire Threat." Map Available at <https://mtc.maps.arcgis.com/apps/mapviewer/index.html?layers=d45bf08448354073a26675776f2d09cb>.
- BCDC. 2021. "Adapting to Rising Tides Bay Shoreline Flood Explorer." San Francisco Bay Conservation and Development Commission. Available within the BCDC open data portal at <https://data-bcdc.opendata.arcgis.com/apps/e0d2cb43dfd243f287b141f476556176/explore>. November 9.
- BCDC. 2024. *Regional Shoreline Adaptation Plan: One Bay Vision, Strategic Regional Priorities, and Subregional Shoreline Adaptation Plan Guidelines*. December. Available at: <https://bcdc.ca.gov/wp-content/uploads/sites/354/2024/12/regional-shoreline-adaptation-plan-spreads.pdf>.
- C/CAG. 2021. *San Mateo Countywide Sustainable Streets Master Plan*. City/County Association of Governments of San Mateo County. February 21. Available at: <https://ccag.ca.gov/countywide-sustainable-streets-master-plan>.
- Cal-Adapt. 2024a. "Extreme Precipitation Events." Web-Tool and Data. Available at <https://cal-adapt.org/tools/extreme-precipitation>.
- Cal Fire. 2024. *San Mateo County State Responsibility Area Fire Hazard Severity Zones*. Effective April 1, 2024. Available at: <https://calfire.app.box.com/s/viyyvmweaciuhwfb2bdxqdok3zo0ke/file/1483769665386>.
- Cal Fire. 2025. "Local Responsibility Area Fire Hazard Severity Zones." Recommended February 24, 2025. Available at <https://experience.arcgis.com/experience/6a9cb66bb1824cd98756812af41292a0>.
- CA LCI, 2025 [Extreme Heat and Community Resilience Program - Office of Land Use and Climate Innovation](#)
- California Ocean Protection Council. 2024. *California Sea Level Rise Guidance: 2024 Science and Policy Update*. 2024. California Sea Level Rise Science Task Force, California Ocean Protection Council, California Ocean Science Trust. <https://opc.ca.gov/wp-content/uploads/2024/05/California-Sea-Level-Rise-Guidance-2024-508.pdf>.
- Flint, L.E., and A.L. Flint. 2014. *California Basin Characterization Model: A Dataset of Historical and Future Hydrologic Response to Climate Change*. (ver. 1.1, May 2017): U.S. Geological Survey Data Release, <https://doi.org/10.5066/F76T0JPB>.

Francois, B., A. Bruce, K. Nguyen, D.K Park, D. Rheinheimer, M. Taner, S. Wi, H.F. Khan, D.Yates, C. Ammann, M. Haasnoot, A. Dufour, D. Behar, and C. Brown. 2021. *Long-Term Vulnerability Assessment and Adaptation Plan for the San Francisco Public Utilities Commission Water Enterprise - Phase I*. Prepared for San Francisco Public Utilities Commission.

San Mateo County. 2018. *County of San Mateo Sea Level Risk Vulnerability Assessment*. Office of Sustainability, Sea Change, and Coastal Conservancy. Final Report. March.

San Mateo County, 2025. [San Mateo County Sea Level Rise Hazard Viewer](#). Accessed March 2025.

San Mateo County Office of Sustainability. 2022. *South Coast Sea Level Rise Vulnerability Assessment*. Available at: <https://www.smcsustainability.org/wp-content/uploads/NoDiv-South-Coast-SLR-VA-Edited-Final-Draft-vgc-11-29-22-reduced-web.pdf>.

SFEI. 2022. *Shallow Groundwater Response to Sea-level Rise: Alameda, Marin, San Francisco, and San Mateo Counties*. Prepared by Pathways Climate Institute and SFEI. Available at <https://www.sfei.org/data/shallow-groundwater-mapping#sthash.u2SPmTUH.Wsd2BXzD.dpbs>.

SFPUC. 2020. Water Shortage Contingency Plan for the City and County of San Francisco. June.

USGS Coastal Storm Modeling System (CoSMoS v2.x; Barnard et al. 2019), accessed via the Our Coast Our Future web platform (Point Blue Conservation Science and USGS 2025).