

STAFF REPORT

To: Coastside County Water District Board of Directors

From: Mary Rogren, General Manager

Agenda: October 11, 2022

Report

Date: October 7, 2022

Subject: Approval of Coastside County Water District Response to San Mateo County Civil Grand Jury Report: "The Other Water Worry: Is Your Water Provider Prepared for the Big One?"

Recommendation:

Approve the Coastside County Water District Response to San Mateo County Civil Grand Jury Report: "The Other Water Worry: Is Your Water Provider Prepared for the Big One?"

Background:

At the September 13, 2022 Board of Directors Meeting, staff provided an overview of the August 5, 2022 San Mateo County Civil Grand Jury report addressing the issue "to what extent are water providers in San Mateo County prepared to supply water to customers in the event of a major seismic catastrophe?"

In February 2022, the Civil Grand Jury conducted 27 interviews and made document requests to the County of San Mateo, the San Francisco Public Utilities Commission, and 10 water providers in the County. The Grand Jury's key recommendations include:

- By March 31, 2023, county water providers perform emergency preparedness exercises consistent with their emergency response plans.
- By March 31, 2023, county water providers perform an analysis and document an after-action report consistent with their emergency response plans
- County water providers develop plans to increase emergency water storage sufficient to provide emergency water for a period of at least three days. *(Note – not applicable to Coastside County Water District as the District already complies with this recommendation.)*
- County water providers develop plans to increase emergency fuel storage sufficient to provide emergency fuel for a period of at least three days. *(Note – not applicable to Coastside County Water District as the District already complies with this recommendation.)*

STAFF REPORT

Agenda: October 11, 2022

Subject: Approval of Response Letter to Grand Jury Report

Page Two

- County Department of Emergency Management develop a plan to bring its policy in line with EPA recommendations to coordinate disaster response with County water providers. *(Note – this item only applies to the County of San Mateo.)*

District staff welcomes the fact that the San Mateo County Civil Grand Jury took an interest in understanding emergency preparedness of water providers in the County. And certainly, as the water provider and first responders in water related emergencies for a population of 19,000 on the San Mateo Coastside, District staff continually considers emergency preparedness in day-to-day activities as well as in future planning.

District Response to the Grand Jury Report

The District is required to respond to the Grand Jury no later than November 4, 2022. Attached is a draft letter (Exhibit A) to the Grand Jury for the Board to review and approve.

Attachments

Exhibit A – Draft Response Letter

Exhibit B – San Mateo County Civil Grand Jury Report dated August 5, 2022 - “The Other Water Worry: Is Your Water Provider Prepared for the Big One?”

October XX, 2022

The Honorable Amarra A. Lee
Judge of the Superior Court
c/o Jenarda Dubois
Civil Grand Jury Coordinator
Hall of Justice
400 County Center, 8th Floor
Redwood City, CA 94063-1655

Subject: Coastside County Water District Response to Grand Jury Report Entitled “The Other Water Worry: Is your Water Provider Prepared for the Big One?”

Dear Judge Lee,

The Coastside County Water District (District) received the August 5, 2022 Grand Jury report entitled “The Other Water Worry: Is Your Water Provider Prepared for the Big One?” The District's Board of Directors reviewed the report and approved this response at the October 11, 2022 regular Board meeting. This letter responds to the Civil Grand Jury's findings and recommendations in the report.

Findings:

F1. The water provider was unable to demonstrate that it conducts the emergency exercises specified in its ERP, which may compromise its ability to supply water following a catastrophic interruption in water distribution service.

Response:

The District disagrees partially with the finding. In 2021, District staff spent over 250 hours along with 350 consulting hours to prepare a Risk and Resilience Assessment of the District and an updated Emergency Response Plan (ERP) in accordance with the American Water Infrastructure Act (AWIA). The ERP preparation included conducting (6) Workshops to formulate Incident Action Checklists for priority emergencies including earthquakes with key emergency management staff. The District's ERP was completed in December 2021 and certified with the US Environmental Protection Agency on December 20, 2021.

The District was interviewed by the Civil Grand Jury just 2 months after the comprehensive update of the District's ERP, so the District was unable to demonstrate that it had conducted tabletop or operations-based exercises as recommended by the ERP certified in December 2021. As of this writing, key District emergency management staff are in the process of taking the recommended SEMS and ICS (FEMA) courses. In accordance with conducting annual training per the ERP for calendar year 2022, District staff have planned four exercises, including interagency exercises. On October 5, 2022, eight District emergency staff participated in the San Mateo County Department of Emergency Management Tsunami Tabletop exercise. (The exercise included ap. 70 participants from multiple County and State agencies.)

The District's staff and Board of Directors take seriously its responsibility as the water provider and first responder in water emergencies for a population of 19,000 on the San Mateo coast. Although conducting interagency exercises was limited over the last few years due to COVID, emergency preparedness is a

foremost and ever-present priority for Coastside County Water District staff and the Board in day-to-day activities. These efforts include:

- On average, District operations staff responds to 10-12 after hours emergencies annually (including storm damage, lightning strikes, and main breaks) and staff routinely review such events after the fact in weekly staff meetings for emergency response improvements. The PG&E PSPS events and the CZU fire also presented valuable hands-on learning experiences in recent years.
- District operations staff maintain Distribution and Water Treatment professional certifications along with ongoing continuing education requirements. Staff regularly conduct safety tailgate activities; CPR and AED training; backflow; fire extinguisher and prevention training for example. In addition, staff frequently work with vendors to exercise equipment including pumps and alarm systems. Generators are exercised monthly and serviced/load bank tested annually.
- In January 2021, the District performed an emergency pump test exercise with Coastside Fire Protection District which provided District and Fire Staff with hands-on experience working together utilizing emergency equipment.
- In the summer of 2021, the District staff spent 40+ hours completing the San Mateo County Local Hazard Mitigation Annex Plan (approved by FEMA in December 2021.) The District is also an active member of California Water/Wastewater Agency Response Network (CalWARN) and California Utilities Emergency Association (CUEA). District staff also attends the monthly Coastal Emergency Action Plan (CEAP) meetings.
- The District's 10-year Capital Improvement Program includes \$68 Million in infrastructure spending to improve the District's resiliency and seismic vulnerabilities, including replacement of three aging water tanks and many aging pipelines. In 2021-2022, the District implemented Cityworks Asset Management System and accompanying workflows to allow for tracking of the condition of the District's infrastructure.
- Over the last 5 years alone, the District has invested \$1.7M in equipment targeting emergency preparedness including generators, emergency response vehicles, and spare parts inventories for emergency repairs. In 2022, the District received a \$200K grant from Cal-OES and purchased an above-ground split fuel tank with the capacity to hold 5,000 gallons of diesel and 1,000 gallons of unleaded. This tank provides 15-20 days of emergency fuel storage for generators and vehicles.

In summary, the outlined emergency efforts noted above go beyond tabletop exercises. The District does not agree that the absence of recent formal tabletop exercises as specified in the ERP compromises or reduces the District's ability to supply water or effectively respond to a catastrophic interruption in water distribution service.

F2. The water provider was not able to produce documentation analyzing past exercises to test readiness and improve their performance, which may compromise its ability to supply water following a catastrophic interruption in water distribution service.

Response:

The District disagrees partially with the finding. The District's formal documentation is limited and has historically not been in the recommended FEMA format noted in the ERP certified as of December 2021.

The District does not agree that the lack of this documentation compromises or reduces the District's ability to supply water or effectively respond to a catastrophic interruption in water distribution service.

The December 2021 updated ERP recommends the FEMA format: "Training documentation, such as class rosters, syllabus, evaluation checklists and copies of certificates, are kept on file. Exercise documentation includes an After Action Report (AAR) that encompasses a scenario synopsis, list of participants, best practices and lessons learned."

District staff are in the process of implementing the recommended documentation including an After Action Report format to be used to document future exercises.

Responses to Recommendations:

R1: The Grand Jury recommends that by March 31, 2023, the water service provider performs emergency preparedness exercises consistent with its emergency response plan.

Response:

The District has not yet fully implemented this recommendation but as stated in the response to F1 above, the District has started to implement it and it will be fully implemented by March 31, 2023.

R2: The Grand Jury recommends that, by March 31, 2023, the water provider perform an analysis and document an After Action Report consistent with its emergency response plan.

Response:

The District has not yet implemented this recommendation but it will be implemented by March 31, 2023.

On behalf of the District's Board of Directors and staff, I would like to extend the District's appreciation to the Civil Grand Jury for their efforts and interest in better understanding the emergency preparedness of water providers in the County. As first responders, water providers can never be too prepared for earthquakes and other emergencies, and we welcome the Grand Jury's insights for improvements. We also welcome the opportunity to work closer with the County of San Mateo and other agencies in planning coordinated responses for emergencies.

Please let us know if the District can provide additional information.

The Honorable. Amara A. Lee
October XX, 2022
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Very truly yours,

Robert Feldman
President, Board of Directors
Coastside County Water District

cc: Board of Directors
Mary Rogren, General Manager

DRAFT



Superior Court of California, County of San Mateo
Hall of Justice and Records
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Redwood City, CA 94063-1655

NEAL TANIGUCHI
COURT EXECUTIVE OFFICER
CLERK & JURY COMMISSIONER

(650) 261-5066
www.sanmateocourt.org

August 5, 2022

Mary Rogren
General Manager
Coastside County Water District
766 Main Street
Half Moon Bay, CA 94019

RECEIVED

AUG 08 2022

COASTSIDE COUNTY
WATER DISTRICT

Re: Grand Jury Report: "The *Other* Water Worry: Is Your Water Provider Prepared for the Big One?"

Dear Ms. Rogren:

The 2021-2022 San Mateo County Civil Grand Jury filed the above-titled report on August 5, 2022, which contains findings and recommendations pertaining to your agency. Your agency must respond, within 90 days, to the Hon. Amarra A. Lee. Your agency's response is due no later than November 4, 2022.

There are several requirements for **the content** of your response. The response should indicate that it was approved by your governing body at a public meeting. In addition, please be aware that your agency is expected to adhere to the wording, as instructed below, when responding to the findings and recommendations of the Grand Jury report.

For each Grand Jury finding, your agency **must indicate** one of the following:

1. The respondent **agrees** with the finding; or
2. The respondent **disagrees wholly** or **partially with the finding**, specifying the portion of the finding that is disputed and including an explanation of the reasons therefor.

For each Grand Jury recommendation, your agency **must indicate** one of the following actions:

1. The recommendation **has been implemented**, with a summary of the implemented action;
2. The recommendation **has not yet been implemented**, but will be implemented in the future, with an **estimated date** for implementation;
3. The recommendation **requires further analysis**, with an explanation and the scope and parameters of an analysis or study, and an estimated date (**no later than six months from the publication date of the report**) for the matter to be prepared for discussion by the officer or director of the agency or department being investigated or reviewed, including the governing body of the public agency when applicable; or
4. The **recommendation will not be implemented** because it is not warranted or reasonable, with an explanation therefor.

Kindly submit your responses in ALL the following formats.

1. Responses to be placed on file with the Clerk of the Court by the Court Executive Office:

- Prepare original on your agency's letterhead, indicate the date of the public meeting that your governing body approved the response address, and mail to:

Hon. Amarra A. Lee
Judge of the Superior Court
c/o Jenarda Dubois
Civil Grand Jury Coordinator
Hall of Justice
400 County Center; 2nd Floor
Redwood City, CA 94063-1655.

2. Responses to be placed at the Grand Jury website:

- Scan response and send by e-mail to: grandjury@sanmateocourt.org. (Insert agency name at the top of your response if it is not indicated.)

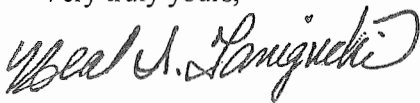
3. Responses to be placed with the clerk of your agency:

- File a copy of the response directly with the clerk of your agency. Do not send this copy to the Court.

The 2021-22 Grand Jury foreperson is available to clarify the recommendations of the Grand Jury report until August 15, 2022. To reach the foreperson, please contact Jenarda Dubois, Civil Grand Jury Coordinator, at (650) 261-5066.

If you have any questions regarding these procedures, please do not hesitate to contact David Silberman, Chief Deputy County Counsel, at (650) 363-4749.

Very truly yours,



Neal Taniguchi
Court Executive Officer

Enclosure

cc: Hon. Amarra A. Lee
David Silberman



The *Other* Water Worry: Is Your Water Provider Prepared for the Big One?

Release Date: August 5, 2022

ISSUE

To what extent are water providers in San Mateo County prepared to supply water to customers in the event of a major seismic catastrophe?

SUMMARY

Along with the danger of drought, San Mateo County faces the likelihood of a powerful earthquake that could disrupt our supply of drinking water. Most of the water consumed in San Mateo County is sourced from the Hetch Hetchy Water System operated by the San Francisco Public Utilities Commission. In the event of a major earthquake, County water providers expect to regain access to this water supply within 72 hours after a catastrophic seismic event. However, some of those same water providers lack sufficient water reserve capacity to keep their customers' taps flowing for a three-day period without access to Hetch Hetchy water.

The Grand Jury found that the challenges of the County's aging water infrastructure are exacerbated by the diffuse patchwork of 16 water providers, each with its own pipes, tanks, management, and business model. Each of the 12 water providers the Grand Jury investigated had adopted a formal emergency response plan (ERP) as required by the Environmental Protection Agency (EPA). Nearly all the ERPs reviewed include provisions for exercises and after-action reports to identify problems. Some of those water providers indicated they had attended emergency response exercises run by other organizations, but none provided documentation that they had performed the emergency exercises specified by their ERPs. None of those water providers produced any after-action reports consistent with their ERPs.

Electric power is critical to the basic functioning of water providers' service, so back-up generators with sufficient fuel are needed in the event of an electrical power loss. Only about half of the water providers interviewed by the Grand Jury maintain a three-day supply of fuel for their emergency needs.

The County Department of Emergency Management is responsible for coordinating countywide emergency preparedness. The Grand Jury found that this department has had limited contact with water providers and could not produce a current list of emergency contacts.

Based on its investigation, the Grand Jury recommends that:

- County water providers perform emergency preparedness exercises consistent with their emergency response plans;
- County water providers perform an analysis and document an after-action report consistent with their emergency response plans;

- County water providers develop plans to increase emergency water storage sufficient to provide emergency water for a period of at least three days;
- County water providers develop plans to increase emergency fuel storage sufficient to provide emergency fuel for a period of at least three days; and
- County Department of Emergency Management develop a plan to bring its policy in line with EPA recommendations to coordinate disaster response with County water providers.

GLOSSARY

After-Action Report – An After-Action Report is an evaluation of an emergency response exercise designed to assess performance of exercise objectives and capabilities by documenting strengths, weaknesses, and corrective actions.

BAWSCA – The Bay Area Water Supply and Conservation Agency is a consortium formed by the State of California and major water providers in the San Francisco Bay area for the purpose of negotiating water purchases to buy water from the Hetch Hetchy Regional Water System.

SFPUC – The San Francisco Public Utilities Commission owns and controls the water that flows from the Hetch Hetchy Regional Water System to water providers.

BACKGROUND

Water Matters

Access to clean drinking water is widely recognized as an essential public service. The current drought is now the most visible challenge to our water supply service, but there is another dangerous, and likely inevitable threat to the local water delivery infrastructure in San Mateo County.

Earthquakes (Will) Happen

The U.S. Geological Survey estimates that the San Francisco Bay area faces a 72% probability of a magnitude 6.7 earthquake sometime in the next 30 years.¹ The San Andreas Fault, which triggered the devastating 1906 San Francisco earthquake (magnitude 7.8), runs straight through San Mateo County. The Hayward Fault, which geologists say is overdue for a major earthquake that may destroy important infrastructure, runs through the East Bay.² In Figure 1, the percentage shown in the colored circles on each named fault represents the probability that a magnitude 6.7 or greater earthquake will occur somewhere on that fault by the year 2043. The

¹ USGS, “What is the probability that an earthquake will occur in the Los Angeles Area? In the San Francisco Bay area?”, accessed June 4, 2022, <https://www.usgs.gov/faqs/what-probability-earthquake-will-occur-los-angeles-area-san-francisco-bay-area>

² USGS, “Earthquake outlook for the San Francisco Bay region 2014–2043 - Fact Sheet”, accessed June 4, 2022, <https://pubs.er.usgs.gov/publication/fs20163020>

dark lines outlined in various colors represent major plate boundary faults; the thinner, yellow lines mark smaller and lesser-known faults.

Figure 1: Map of Earthquake Outlook for the San Francisco Bay region 2014–2043³



³ <https://www.usgs.gov/faqs/what-probability-earthquake-will-occur-los-angeles-area-san-francisco-bay-area>, June 13, 2022

A large earthquake along any of the major faults in the area could cause land displacement and related damage. For example, the images in Figure 2 show the damage to large water mains caused by the 1906 San Francisco earthquake on the San Andreas Fault.⁴ Most of the damage done to San Francisco as a result of the earthquake was attributable to lack of water to fight the fire.

Figure 2: Water Mains Damaged by the 1906 San Francisco Earthquake



Shaking Up the Water System

“The water system is the utility most vulnerable to earthquake damage, and that damage could be the largest cause of economic disruption following an earthquake.”

- Los Angeles Mayor’s Office, *Resilience By Design* (2015)⁵

Water systems, relying as they do on underground pipes, are susceptible to damage and failure in the event of earthquakes. This problem is compounded by the fact that County water providers are operating with components that are up to a century old and nearing the end of their useful lives.⁶

Potential pipe failures are not the only points of vulnerability to earthquake damage. The County’s many water systems – with networks of dams, aqueducts, pump stations, valves, storage tanks, above-ground water mains, and tunnels – are susceptible to damage from earth movement or loss of pumping power. Damage to the electrical grid, phone systems, and transportation infrastructure are also likely obstacles to rapid earthquake response.

In August 2014, a magnitude 6.0 earthquake occurred in Napa County. Aftershocks causing earth movement and further damage continued for months. As many as 163 water pipeline breaks were

⁴ Water Mains Damaged in 1906 San Andreas Fault Earthquake www.geengineering.com/ewExternalFiles/1906-2006.pdf, accessed June 2, 2022 and J.B. Macelwane archives, St. Louis University

⁵ Los Angeles Mayor’s Office, “Resilience by Design” 2015, accessed June 4, 2022, <https://www.usrc.org/wp-content/uploads/LA-Resilient-by-Design.pdf>

⁶ Grand Jury interview

reported and service to some customers was disrupted for weeks.⁷ In 2011, more than two million Japanese households were without water service following the magnitude 9.1 Tohoku earthquake. Over a million households remained without water service for two weeks.⁸

The California Governor's Office of Emergency Services has published a warning to Californians that they should be self-sufficient for at least three days after a major earthquake.⁹ The Centers for Disease Control recommends that households keep on hand at least a gallon of water per day for each person in the household, with sufficient water for three days for drinking and sanitation.¹⁰ The East Bay Municipal Utility District recommends two gallons of water per day for at least seven days for each person in the household.¹¹

So, Who Will Keep Your Taps Flowing?

The County's drinking water is almost entirely sourced from the Hetch Hetchy Regional Water System, including the Hetch Hetchy reservoir impounded behind the O'Shaughnessy Dam in Yosemite National Park, over 130 miles away and administered by the San Francisco Public Utilities Commission (SFPUC). The Bay Area Water Supply and Conservation Agency (BAWSCA) was formed in 2003 to represent 26 cities, water districts, and private utilities that purchase water from the SFPUC.¹²

⁷ Pacific Earthquake Engineering Research Center, University of California Berkeley, "The Mw 6.0 South Napa Earthquake of August 24, 2014", June 2016, https://peer.berkeley.edu/sites/default/files/cssc1603-peer201604_final_7.20.16.pdf

⁸ T. Okamoto, Y. Kuwata, "Influence to Water Outage due to Damage to Regional Water Supply during the 2011 off the Pacific Coast of Tohoku Earthquake", 2012, https://www.iitk.ac.in/nicee/wcee/article/WCEE2012_1681.pdf

⁹ "Community members are expected to be self-sufficient up to 3 days after a major earthquake without government response agencies, utilities, private-sector services, and infrastructure components. Education programs are currently in place to facilitate development of individual, family, neighborhood, and business earthquake preparedness." California Governor's Office of Emergency Services, "Earth Quake, Can You Go It Alone For Three Days", accessed June 10, 2022, <https://www.ucop.edu/risk-services/files/bsas/safetymeetings/oearthquakebrochure.pdf>

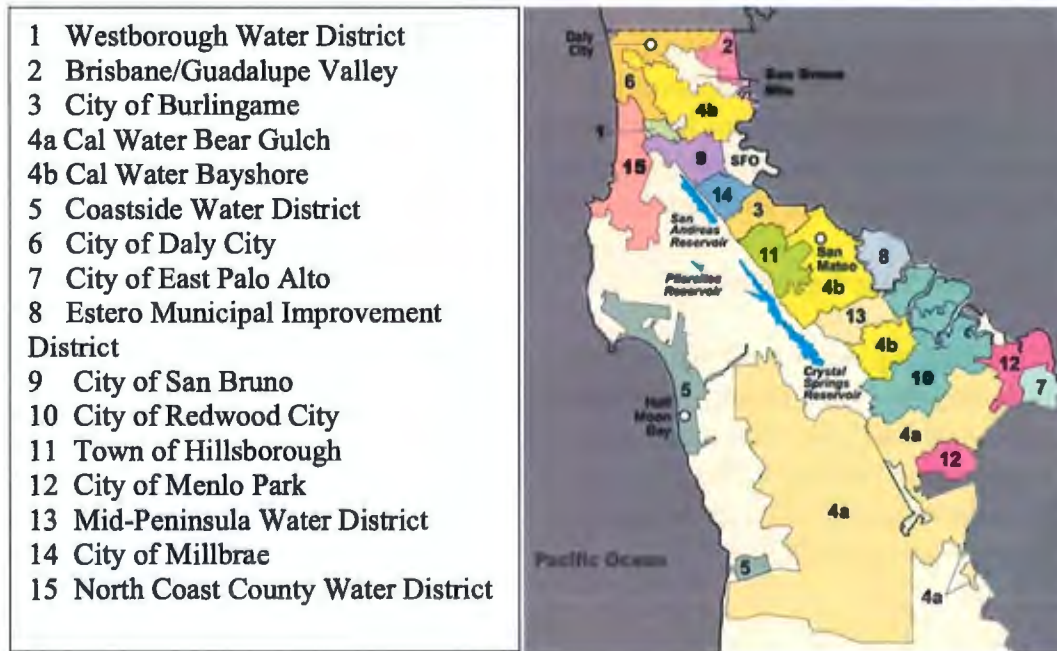
¹⁰ CDC, "Creating and Storing an Emergency Water Supply", accessed June 4, 2022, <https://www.cdc.gov/healthywater/emergency/creating-storing-emergency-water-supply.html/>

¹¹ East Bay Municipal District (EBMUD), accessed June 14, 2022, <https://www.ebmud.com/about-us/construction-and-maintenance/fire-safety-and-suppression/emergency-preparedness>

¹² Two small water providers do not get their water from SFPUC -- they are County Service Area 7, with 70 customers, in La Honda, and County Service Area 11, with 90 customers in Pescadero.

Sixteen water providers in the County deliver water purchased from SFPUC to residential and business customers in their territories, as shown in Figure 3.¹³

Figure 3: Water Providers in San Mateo County

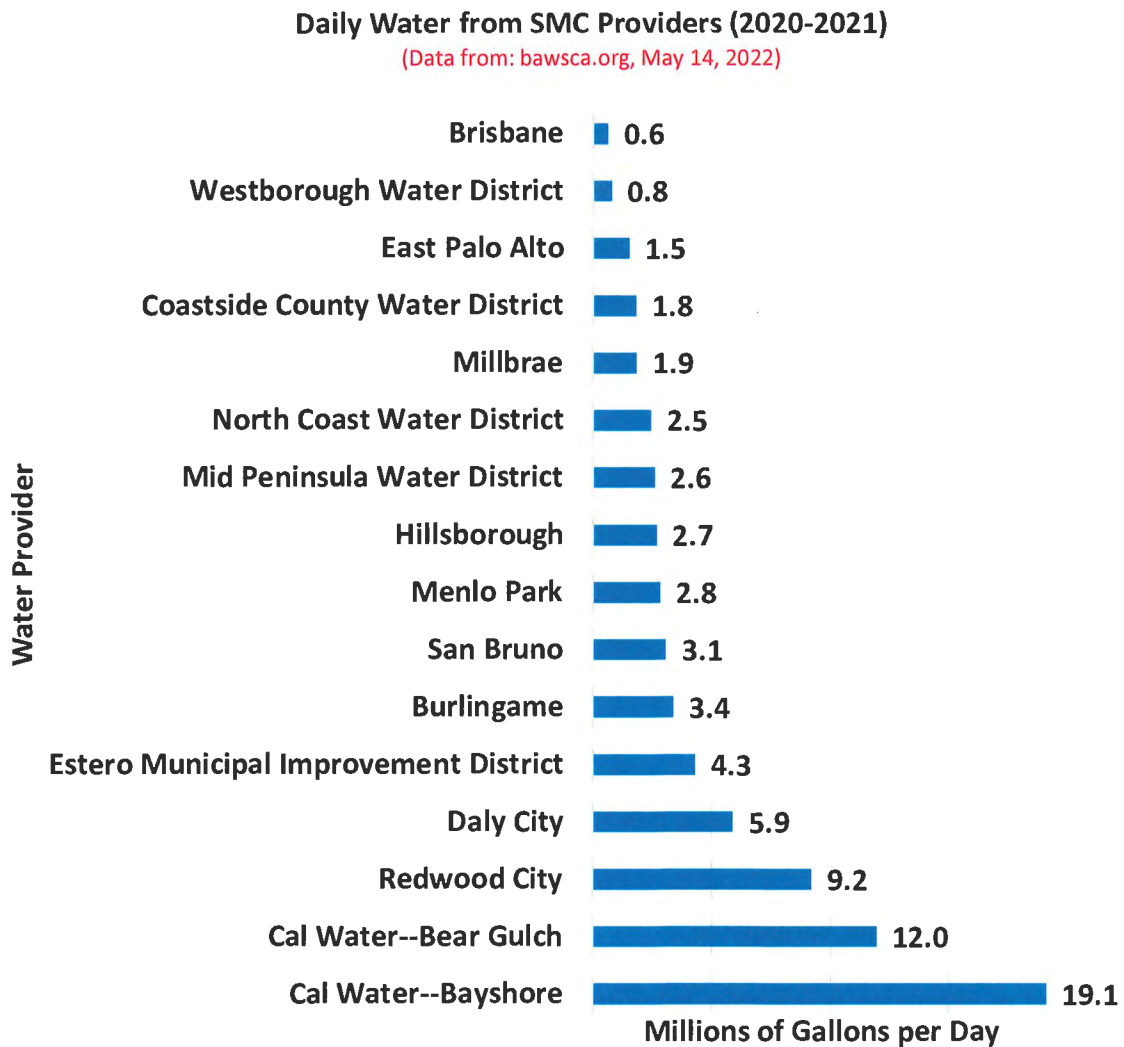


Those water providers vary significantly in size of area served, number of customers, water capacity, and form of ownership and control. Some water providers are municipal water districts managed by individual cities; some are special districts run by an elected board; and still others are investor-owned utilities regulated by the California Public Utilities Commission. The areas served by water providers generally do not conform to city boundaries. A single city may be served by several water providers, and one water provider may serve residents in different cities.

¹³ Based on User Survey 2014-2015, bawsc.org, accessed June 13, 2022

Although water providers are independently managed, most of their systems include physical linkages – known as “interties” – that allow them to share water supplies with another provider. Figure 4 shows the daily water usage by each water provider in San Mateo County.

Figure 4: Daily Water Usage (in Millions of Gallons) from County Water Providers



Securing the Source

The SFPUC has almost completed a ten-year water system improvement project on the Hetch Hetchy Water System. The work included earthquake-hardening construction on dams, aqueducts, underground tunnels, and 280 miles of large diameter pipes that span three major faults (Calaveras, Hayward, and San Andreas) and many secondary faults.

Figure 5: Hetch Hetchy Regional Water System



Prior to a recent Water System Improvement Program, BAWSCA estimated that the water delivery system was at significant seismic risk for outages of 20 - 30 days or more following an earthquake.¹⁴ The design criteria for the Hetch Hetchy System seismic upgrade included the goal that most of the water network managed by SFPUC will be restored to 70% of water providers within 24 hours after a major earthquake.¹⁵

Hardening and modernizing vulnerable water infrastructure against a major earthquake is costly, disruptive, and impractical for individual water providers. Therefore, much of the local distribution system, between the SFPUC “turnout” to the water provider and the water providers’ customers’ taps, is likely to be older and more vulnerable to earthquake damage.¹⁶

¹⁴ BAWSCA, “Water System Improvement Program”, accessed June 5, 2022, <https://bawsc.org/water/supply/improvement>

¹⁵ https://ssc.ca.gov/wp-content/uploads/sites/9/2020/08/sfpuc_final_version_12_4-19-06.pdf

¹⁶ Grand Jury interview

Federal Oversight

Several federal agencies share responsibility for regulation and oversight of water providers in San Mateo County.¹⁷

Of primary importance to this investigation is oversight administered through the Environmental Protection Agency (EPA). It implements the America's Water Infrastructure Act of 2018 (AWIA). AWIA requires water providers serving more than 3,300 people to develop a Risk and Resilience Assessment (Resiliency Assessment) that addresses risks from both natural hazards and malevolent actors. It includes an assessment of the resilience of water system infrastructure and operations, including cybersecurity. AWIA also requires providers to develop an Emergency Response Plan (ERP) that includes plans, procedures, and strategies to prepare for and respond to threats identified in their Resiliency Assessment. Water providers were required to self-certify and submit their ERPs to the EPA by December 31, 2021.¹⁸ The AWIA requirements for a compliant ERP are shown in Appendix A.

The EPA offers online tools and other resources to help water providers prepare and comply with their AWIA requirements.¹⁹ The EPA also encourages utilities to conduct tabletop emergency preparedness exercises as part of their emergency preparedness.²⁰

State Oversight

The State of California has numerous departments, councils, agencies, and commissions involved with water service in one way or another. With respect to emergency preparedness in particular, the California Water Code requires each provider serving more than 3,000 customers to prepare, and submit to Department of Water Resources, an Urban Water Management Plan outlining plans for a diminished water supply. This plan should include planning for water shortages in the event of a natural disaster, and is required to be updated every five years.²¹

Some water providers are investor-owned companies. These providers are regulated as public utilities by the California Public Utilities Commission, which oversees their rates and operations. The California Water Service Company, an investor-owned company, is the single largest provider in San Mateo County (see Appendix B).

¹⁷ E.g., Department of Homeland Security, Department of Defense, Department of the Interior, Department of Agriculture, Department of Energy, and Department of Health and Human Services. Cody, Schneider, Tiemann, *Selected Federal Water Activities: Agencies, Authorities, and Congressional Committees*, Congressional Research Service, 2017

¹⁸ EPA, "America's Water Infrastructure Act: Risk Assessments and Emergency Response Plans", accessed June 9, 2022, <https://www.epa.gov/waterresilience/awia-section-2013>

¹⁹ EPA, "[Vulnerability Self-Assessment Tool \(VSAT\): Protect Your Community From Risk](#)", accessed June 14, 2022

²⁰ EPA, "Tabletop Exercise Tool for Water Utilities", accessed June 9, <https://www.epa.gov/waterresiliencetraining/tabletop-exercise-tool-water-utilities-emergency-preparedness-response-and-climate-resiliency>

²¹ 2022, California Department of Water Resources, "Urban Water Management Plans", accessed June 9, 2022, <https://water.ca.gov/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Urban-Water-Management-Plans#:~:text=The%20requirements%20for%20UWMPs%20are,required%20to%20submit%20an%20UWMP>

County Oversight

No County agency is specifically assigned responsibility for regulation of water providers.

COVID-19 Considerations

Beginning in 2020, the COVID-19 pandemic dramatically impacted every aspect of life, including how public agencies delivered their services. Supply chain disruptions, staffing dislocation, and pandemic restrictions had significant impact on these agencies.

The Role of Readiness: Plan, Practice, Evaluate

“The water system’s training program should ... include routine training drills, tabletop exercises and possibly functional exercises, depending on the utilities['] resources. ...The water system should include all the key players in the training exercises, so everyone is familiar with emergency policies and procedures.”²²

“Train as you fight; fight as you train – keep the training and exercises close to real as possible because the skills and muscle memory developed is what will be called upon in the face of a real incident.”²³

-California State Water Board

²² 2015, State Water Resources Control Board Division of Drinking Water Emergency Response Plan Guidance for Public Drinking Water Systems Serving a population of 3,300 or more (approximately 1,000 SC or more, accessed June 9, 2022, https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/security/ddw_emergency_guidelines_0215.pdf

²³ California Water Boards, “Water Resiliency”, accessed June 9, 2022, https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/water_resiliency/

Water service interruptions in the event of an earthquake may be inevitable, but the extent and duration of those interruptions will largely depend on preparedness of water providers and emergency managers. How do water providers anticipate and plan for the potential chaos, obstacles, hazards, and contingencies that an actual catastrophe may bring?

The EPA and the Federal Emergency Management Agency (FEMA), a major agency of the Department of Homeland Security, both play significant roles in helping water providers prepare for water emergencies.

The EPA provides tools for agencies to help them prepare their ERPs, including:

- Tools on how to train and perform exercises for their personnel and response partners on the contents of their ERPs, including the roles and responsibilities of specific parties.²⁴
- Resources on how to plan for an emergency and how to practice and evaluate those plans before they're needed. Those resources include videos, detailed checklists, interactive maps, and mitigation and funding recommendations.²⁵
- An online guide, titled "Tabletop Exercise Tool for Drinking Water and Wastewater Utilities," that offers a comprehensive program to assist managers in developing and customizing exercise scenarios with unique local elements and challenges.²⁶

²⁴ EPA, "Developing Emergency Response Plans with the Drinking Water State Revolving Fund", accessed June 9, 2020, https://www.epa.gov/sites/default/files/2021-06/documents/emergency_response_plan-final.pdf

²⁵ EPA, "The Earthquake Resilience Guide for Water and Wastewater Utilities", accessed June 9, 2022, <https://www.epa.gov/sites/default/files/2018-02/documents/180112-earthquakeresiliencguide.pdf>

²⁶ EPA, "Tabletop Exercise Tool for Water Utilities: Emergency Preparedness, Response and Climate Resiliency", accessed June 14, 2022, <https://www.epa.gov/waterresiliencetraining/tabletop-exercise-tool-water-utilities-emergency-preparedness-response-and>

- An interactive, user-friendly Earthquake Resiliency Guide that helps water and wastewater utilities be more resilient to earthquakes.²⁷
- A Water Sector Utility Incident Action Checklist (excerpt reproduced in Figure 6).²⁸

Figure 6: EPA - Actions to Prepare for an Earthquake²⁹

Actions to Prepare for an Earthquake

Planning

- Review and update your utility's emergency response plan (FRP) and ensure all emergency contacts are current.
- Conduct briefings, training and exercises to ensure utility staff is aware of all preparedness, response and recovery procedures.
- Identify priority water customers (e.g., hospitals), obtain their contact information, map their locations and develop a plan to restore those customers first.
- Develop an emergency drinking water supply plan and establish contacts (potentially through your local emergency management agency [EMA] or mutual aid network) to discuss procedures, which may include bulk water hauling, mobile treatment units or temporary supply lines, as well as storage and distribution.
- Conduct a hazard vulnerability analysis in which you review historical records to understand the past frequency and intensity of earthquakes and how your utility may have been impacted. Consider taking actions to mitigate seismic impacts to the utility, including those provided in the "Actions to Recover from an Earthquake: Mitigation" section.
- Complete pre-disaster activities to help apply for federal disaster funding (e.g., contact state/local officials with connections to funding, set up a system to document damage and costs, take photographs of the facility for comparison to post-damage photographs).

Coordination

- Join your state's Water/Wastewater Agency Response Network (WARN) or other local mutual aid network.

- Coordinate with WARN members and other neighboring utilities to discuss:
 - Outlining response activities, roles and responsibilities and mutual aid procedures (e.g., how to request and offer assistance)
 - Conducting joint tabletop or full-scale exercises
 - Obtaining resources and assistance, such as equipment, personnel, technical support or water
 - Establishing interconnections between systems and agreements with necessary approvals to activate this alternate source. Equipment, pumping rates and demand on the water sources need to be considered and addressed in the design and operations
 - Establishing communication protocols and equipment to reduce misunderstandings during the incident
- Coordinate with other key response partners, such as your local EMA, to discuss:
 - How restoring system operations may have higher priority than establishing an alternative water source
 - Potential points of distribution for the delivery of emergency water supply (e.g., bottled water) to the public, as well as who is responsible for distributing the water
- Understand how the local and utility emergency operations center (EOC) will be activated and what your utility may be called on to do, as well as how local emergency responders and the local EOC can support your utility during a response. If your utility has assets outside of the county EMA's jurisdiction, consider coordination or preparedness efforts that should be done in those areas.
- Ensure credentials to allow access will be valid during an incident by checking with local law enforcement.

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²⁷ EPA, "Earthquake Resiliency Guide" (updated February 2022), <https://www.epa.gov/waterutilityresponse/earthquake-resiliency-guide>, accessed June 15, 2022. This resource can be found at Appendix C.

²⁸ EPA, "Water Sector Utility Incident Action Checklist," https://www.epa.gov/system/files/documents/2021-10/incident-action-checklist-earthquakes_508c-final.pdf, accessed June 19, 2022

²⁹ See Appendix D

According to the EPA, "... [t]he water sector should be engaged in a continuous cycle of planning, organizing, training, equipping, exercising, evaluating, and taking corrective actions to achieve and maintain readiness to respond to, and reduce impacts from, emergencies. Preparedness also leads to increased resiliency, which is a key component of a utility's ability to provide critical services under adverse conditions."³⁰ That preparedness cycle is illustrated in Figure 7.

Figure 7: EPA Preparedness Cycle



FEMA has long recognized that well-designed practice sessions or tabletop exercises are a cost-effective, low risk mechanism for training staff, promoting communication across organizations and validating plans, procedures, equipment, systems, tools, facilities, and training for emergency management.³¹ There have been extensive government efforts to support that goal. For example, the Department of Homeland Security created The Homeland Security Exercise and Evaluation Program (HSEEP) to train stakeholders like water and sanitation systems in developing and implementing essential readiness components.³²

An "After-Action Report" is a formal review of an emergency preparedness exercise, such as a tabletop exercise, that is designed to identify what worked and what needs to be improved. It converts lessons learned from the exercise into concrete, measurable steps to improve response capabilities. It specifically details the actions to take to address recommendations presented, who will be responsible for taking the action, and the timeline for completion.³³

Experience gained from both the 1991 Oakland Hills fire and the 1989 Loma Prieta earthquake highlighted the importance of mutual aid among water providers. The California

³⁰ EPA, "How to Develop a Multi-Year Training and Exercise (T&E) Plan", accessed June 14, 2022, https://www.epa.gov/sites/default/files/2015-05/documents/how_to_develop_a_multi-year_training_and_exercise_plan_a_tool_for_the_water_sector.pdf

See also NIH, "Use of After-Action Reports (AARs) to Promote Organizational and Systems Learning in Emergency Preparedness", accessed June 14, 2022, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3447598/>

³¹ The White House archives, President George Bush, "Katrina Lessons Learned", accessed June 9, 2022, <https://georgewbush-whitehouse.archives.gov/reports/katrina-lessons-learned/appendix-a.html>

³² FEMA, "Homeland Security Exercise and Evaluation Program (HSEEP)", accessed June 9, 2022, <https://www.fema.gov/emergency-managers/national-preparedness/exercises/hseep>

³³ San Francisco Department of Emergency Management, "Phase 4: After Action Report and Improvement Planning," accessed June 14, 2022, <https://sfdem.org/phase-4-after-action-report-and-improvement-planning-0>

Water/Wastewater Agency Response Network (CalWARN) was formed and membership eventually expanded to include over 190 utilities across the state. “The mission of CalWARN is to support and promote statewide emergency preparedness, disaster response, and mutual assistance processes for public and private water and wastewater utilities.”³⁴ Its network enables agencies to locate and share vital resources, including both equipment and personnel during emergencies. The EPA recommends that water providers participate in mutual aid activities.³⁵

The County Executive’s Office describes the responsibility of the Department of Emergency Management (County DEM) as “alerting and notifying appropriate agencies within the county’s 20 cities when disaster strikes; coordinating all agencies that respond; ensuring resources are available and mobilized in times of disaster; developing plans and procedures in response to and recovery from disasters; and developing and providing preparedness materials for our residents.”³⁶ Formerly operated by the County Sherriff’s Office as the Office of Emergency Services, County DEM came under the authority of the County Executive’s Office in 2021 and later became a stand-alone County department.

The Grand Jury investigated the degree to which water providers in the County are preparing for potential difficulties in restoring water to customers in the event of an abrupt service interruption.

DISCUSSION

While the SFPUC is nearing completion of its upgrade to the seismic resilience of the Hetch Hetchy Regional Water System, County water providers have managed their infrastructure upgrade programs in diverse ways. Some water providers reported that they can only afford enough capital outlay to replace about 2% of aging components per year without severely increasing water rates.³⁷ History suggests they could face crippling pipeline breaks, equipment damage, and fuel shortages during the aftermath of a major seismic event.

Mitigating an earthquake’s impact requires the ability to:

- Quickly identify and repair damage, much of it underground and invisible;
- Coordinate and communicate with scattered staff in a chaotic post-quake environment;
- Locate and transport emergency equipment and supplies;

³⁴ CalWARN Mission Statement, accessed June 14, 2022. <https://www.calwarn.org>

³⁵ EPA, “Water Sector Utility Incident Action Checklist,” accessed June 19, 2022, https://www.epa.gov/system/files/documents/2021-10/incident-action-checklist-earthquakes_508c-final.pdf

³⁶ County of San Mateo, Department of Emergency Management, accessed June 9, 2022, <https://www.smcgov.org/ceo/departments-emergency-management>

³⁷ Grand Jury interviews

- Quickly react and adapt to both likely and unpredictable challenges in a stressful environment; and
- Coordinate response with emergency agencies and other water providers.³⁸

Federal and State regulations and guidelines require water providers to document the adequacy of emergency preparation measures, including an ERP. The Grand Jury sought to verify that the individual water providers were in compliance with provisions of their ERPs.³⁹ We also sought to assess emergency preparedness, and potential improvements to the emergency response planning of County water providers.

The Grand Jury selected 12 of the 16 major County water providers, representing a cross-section of populations served and types of providers (municipal water districts, special districts, and public utilities). We reviewed documents and conducted interviews with representatives from each of these water providers listed in Figure 8.

Figure 8: Water Providers Investigated

Water Provider	Provider Type ⁴⁰	Population Served (2021) ⁴¹
Brisbane	Municipal Water District	4,657
Hillsborough	Municipal Water District	10,869
Westborough Water District	Special District	12,703
Coastside County Water District	Special District	18,738
East Palo Alto	Municipal Water District	26,181
Mid-Peninsula Water District	Special District	26,924
Estero Municipal Improvement District	Special District	37,687
North Coast County Water District	Special District	38,546
Cal Water Bear Gulch	Public Utility	60,827
Redwood City	Municipal Water District	90,518
Daly City	Municipal Water District	106,638
Cal Water Bayshore	Public Utility	200,111

As required by the America’s Water Infrastructure Act (AWIA), each of these providers has prepared, self-certified, and submitted to the EPA a Resiliency Assessment and an ERP.⁴² Brisbane was not required by AWIA to submit an ERP specifically, but has an equivalent document titled an Emergency Operations Plan.

³⁸ EPA, March 2018, “Connecting Water Utilities and Emergency Management Agencies”, accessed June 10, 2022, https://www.epa.gov/sites/default/files/2018-05/documents/water_emaconnection.pdf/

³⁹ Grand Jury interviews/correspondences

⁴⁰ Grand Jury interviews

⁴¹ BAWSCA.org member agency profiles

⁴² EPA, “America’s Water Infrastructure Act: Risk Assessments and Emergency Response Plans”, accessed June 10, 2022, <https://www.epa.gov/waterresilience/awia-section-2013>

Emergency Response Plans: Promise, Performance, Documentation

The ERPs of all water providers the Grand Jury investigated included provisions for emergency readiness exercises. Only seven specified that these exercises would be performed at least annually. Others contained no commitment about the frequency of exercises. Some water providers we investigated indicated that the COVID-19 pandemic hampered their capacity to perform the exercises required by their ERPs.

The SFPUC invites most County water providers to attend its annual emergency preparedness exercises. Several water providers told us they attend these exercises. Two water providers (Westborough Water District and East Palo Alto) indicated that they did not participate and they did not receive invitations.⁴³ In addition, several water providers informed us that they had participated in general emergency preparedness exercises organized by local public safety and similar agencies in the past.

The Grand Jury was unable to determine whether the SFPUC exercises, or local emergency response planning exercises, satisfied the specific requirements described in the water districts' respective ERPs, as submitted to EPA.

None of the water districts investigated was able to present to the Grand Jury any documentation showing that they had conducted the water district readiness exercises described in their respective ERPs. In addition, no water provider was able to present to the Grand Jury any After-Action Report related to its ERP requirements.

Backup Water and Fuel

The SFPUC publication on seismic design criteria states that their performance goal for the Hetch Hetchy's Water System Improvement Program is to restore winter demand volume to 70% of their customer turnouts within 24 hours of a major earthquake.⁴⁴ The Grand Jury noted that County water providers are reasonably confident the improved SFPUC system will be functioning within three days.⁴⁵

Grand Jury interviews and BAWSCA data indicate that only seven of the 12 water providers investigated by the Grand Jury had back-up water storage sufficient for three days of normal usage. Several water providers informed the Grand Jury that they should also maintain a three-day back-up storage of fuel to keep generators operating to run the water delivery system during an emergency.

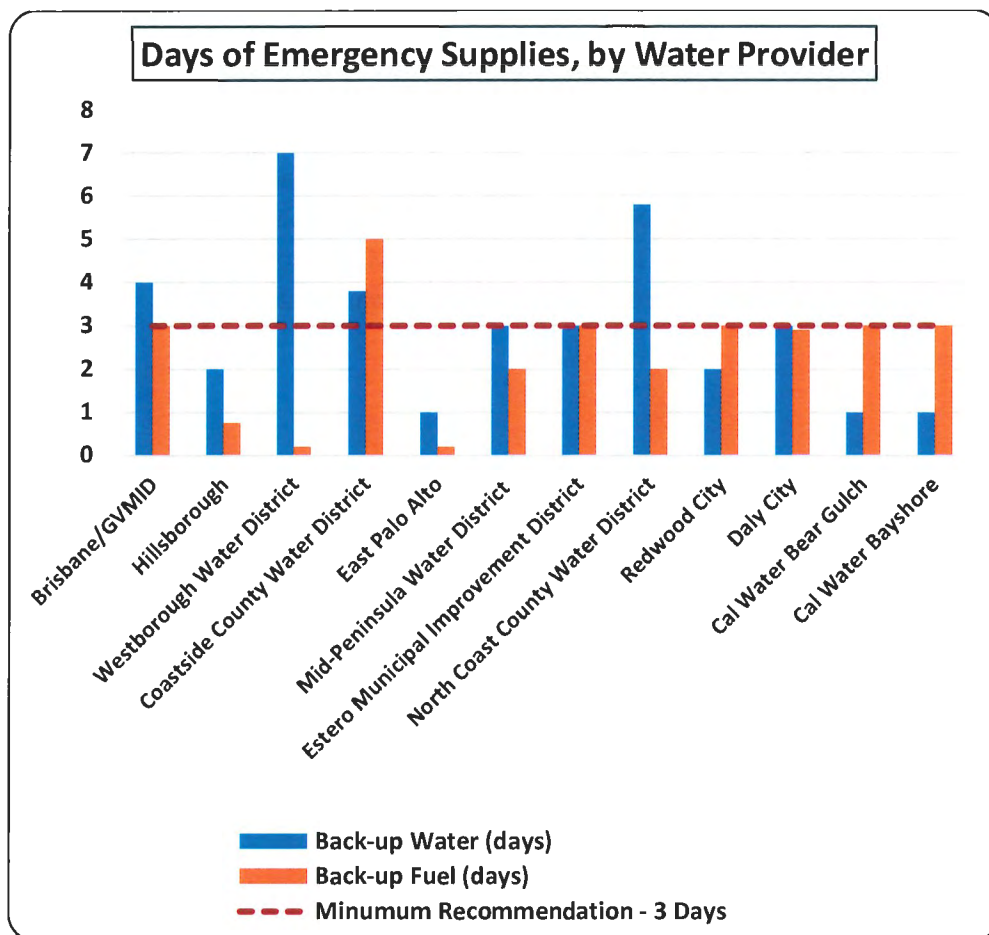
⁴³ Grand Jury interview

⁴⁴ https://ssc.ca.gov/wp-content/uploads/sites/9/2020/08/sfpuc_final_version_12_4-19-06.pdf

⁴⁵ Grand Jury interview

Only seven of the water providers we investigated had a three-day back-up fuel supply. Only four had a three-day back-up supply of both water and fuel, as shown in Figure 9.

Figure 9: Days of Emergency Supplies, by Water Provider⁴⁶



County Responsibilities

In a catastrophic event, County DEM is responsible for alerting and coordinating agencies’ responses, ensuring availability of resources, and developing plans for response and recovery.

The EPA has published guidance for cooperation that is needed between local emergency management agencies, such as County DEM, and the water providers serving the local communities. Its recommendations include:

- Sharing contact information between the agencies and water providers;
- Joint training and exercises and mutual facilities tours;

⁴⁶ Grand Jury interviews; BAWSCA, “Member Agency Profiles”, accessed June 11, 2022, <https://bawasca.org/members/profiles>

- Creating a “water desk” at the emergency agency; and
- Coordinating public messaging during a water emergency.⁴⁷

The Grand Jury found a gap between these recommendations and County DEM practices. County DEM informed us that it had no water desk, had not conducted emergency water interruption exercises, had not developed a coordination plan for emergency water interruption, and did not have a current list of emergency contacts for County water providers.

Several water providers informed the Grand Jury that they had, had no recent contact with the County DEM. Several informed us that they believe the County should be responsible for countywide water disaster exercises. To date, County DEM has conducted emergency preparedness exercises, but none addressing catastrophic water interruption.

FINDINGS

The following findings apply to the specific governing bodies identified under “Request For Responses” below:

- F1. The water provider was unable to demonstrate that it conducts the emergency exercises specified by its ERP, which may compromise its ability to supply water following a catastrophic interruption in water distribution service.
- F2. The water provider was not able to produce documentation analyzing past exercises to test readiness and improve their performance, which may compromise its ability to supply water following a catastrophic interruption in water distribution service.
- F3. The water provider does not have three days of emergency water storage, which may compromise its ability to supply water following a catastrophic interruption in water distribution service.
- F4. The water provider does not have three days of emergency fuel storage, which may compromise its ability to supply water following a catastrophic interruption in water distribution service.
- F5. The County Department of Emergency Management has not followed EPA recommendations that it coordinate disaster response with County water providers, which may compromise its ability to coordinate a response to a catastrophic interruption in water distribution service.

⁴⁷ EPA, “Connecting Water Utilities and Emergency Management Agencies”, accessed June 10, 2022, https://www.epa.gov/sites/default/files/2018-05/documents/water_emaconnection.pdf

RECOMMENDATIONS

The following recommendations apply to the specific governing bodies identified under “Request for Responses” below:

- R1. The Grand Jury recommends that, by March 31, 2023, the water provider perform emergency preparedness exercises consistent with its emergency response plan.
- R2. The Grand Jury recommends that, by March 31, 2023, the water provider perform an analysis and document an After-Action Report consistent with its emergency response plan.
- R3. The Grand Jury recommends that, by March 31, 2023, the water provider develop plans to increase emergency water storage sufficient to provide emergency water for a period of at least three days.
- R4. The Grand Jury recommends that, by March 31, 2023, the water provider develop plans to increase emergency fuel storage sufficient to provide emergency fuel for a period of at least three days.
- R5. The Grand Jury recommends that, by December 31, 2022, the County Department of Emergency Management develop a plan to bring its policy in line with EPA recommendations to coordinate disaster response with County water providers.

REQUEST FOR RESPONSES

Pursuant to Penal Code Section 933.05, the Grand Jury requests responses from the following governing bodies:

Water Provider	F1	F2	F3	F4	F5	R1	R2	R3	R4	R5
Brisbane/GV Municipal Improvement District	X	X				X	X			
Hillsborough	X	X	X	X		X	X	X	X	
Westborough Water District	X	X		X		X	X		X	
Coastside County Water District	X	X				X	X			
East Palo Alto	X	X	X	X		X	X	X	X	
Mid-Peninsula Water District	X	X		X		X	X		X	
Estero Municipal Improvement District	X	X				X	X			
North Coast County Water District	X	X		X		X	X		X	
Redwood City	X	X	X			X	X	X		
Daly City	X	X				X	X			
San Mateo County					X					X

The governing bodies indicated above should be aware that the comment or response of the governing body must be conducted subject to the notice, agenda, and open meeting requirements of the Brown Act.

RESPONSE REQUIREMENTS

California Penal Code Section 933.05, provides (emphasis added):

(a) For purposes of subdivision (b) of Section 933, as to each grand jury finding, the responding person or entity shall report one of the following:

(1) The respondent **agrees** with the finding.

(2) The respondent **disagrees** wholly or partially with the finding; in which case the response shall **specify the portion of the finding that is disputed and shall include an explanation of the reasons therefor.**

(b) For purposes of subdivision (b) of Section 933, as to each grand jury recommendation, the responding person or entity shall report one of the following actions:

(1) The recommendation has been implemented, **with a summary regarding the implemented action.**

(2) The recommendation has not yet been implemented, but will be implemented in the future, **with a timeframe for implementation.**

(3) The recommendation requires further analysis, **with an explanation and the scope and parameters of an analysis or study, and a timeframe for the matter to be prepared for**

discussion by the officer or head of the agency or department being investigated or reviewed, including the governing body of the public agency when applicable. This timeframe shall not exceed six months from the date of publication of the grand jury report.

(4) The recommendation will not be implemented because it is not warranted or is not reasonable, **with an explanation therefor.**

METHODOLOGY

Preliminary Research

The Grand Jury reviewed many news articles and many publicly-available materials that described how water is distributed to San Mateo County and damage that may be caused by catastrophic earthquakes. We also researched which Federal, State, and local agencies help regulate water in San Mateo County. The sources of such documents included various departments of San Mateo County government, LAFCO, Federal and State agencies (including EPA, FEMA, DHS, and USGS), BAWSCA, and others.

Interviews and Document Requests

The Grand Jury conducted 27 interviews of public officials representing San Mateo County government departments, the San Francisco Public Utilities Commission, and water providers serving customers across San Mateo County. These included individuals that had general and specific knowledge regarding emergency services, water provision, and water ecosystems in San Mateo County. The Grand Jury also reviewed a multitude of documents provided by these agencies in response to document requests.

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Appendix A: Select Federal and State Laws Affecting Water Providers

Appendix B: California Water Service, Areas Served

Appendix C: Earthquake Resiliency Guide

Appendix D: EPA Incident Action Checklist – Earthquake

APPENDIX A

SELECT FEDERAL AND STATE LAW AFFECTING WATER PROVIDERS

America's Water Infrastructure Act of 2018

Section 2013 of the law requires providers serving more than 3,300 people to develop and submit to the EPA a Risk and Resilience Assessment (Resiliency Assessment) as well as an Emergency Response Plan (ERP). The law requires that both documents include specific information.

Risk and Resilience Assessment (Section 2013)

- 1) "...[t]he risk to the system from malevolent acts and natural hazards;
- 2) the resilience of the pipes and constructed conveyances, physical barriers, source water, water collection and intake, pretreatment, treatment, storage and distribution facilities, electronic, computer, or other automated systems (including the security of such systems) which are utilized by the system;
- 3) the monitoring practices of the system;
- 4) the financial infrastructure of the system;
- 5) the use, storage, or handling of various chemicals by the system; and
- 6) the operation and maintenance of the system."

Emergency Response Plan (Section 2013)

1. "...strategies and resources to improve the resilience of the system, including the physical security and cybersecurity of the system;
2. plans and procedures that can be implemented, and identification of equipment that can be utilized, in the event of a malevolent act or natural hazard that threatens the ability of the community water system to deliver safe drinking water;
3. actions, procedures and equipment which can obviate or significantly lessen the impact of a malevolent act or natural hazard on the public health and the safety and supply of drinking water provided to communities and individuals, including the development of alternative source water options, relocation of water intakes and construction of flood protection barriers; and
4. strategies that can be used to aid in the detection of malevolent acts or natural hazards that threaten the security or resilience of the system."

California Water Code

At the State level, California Water Code California Water Code, [§10610-10656](#) and [§10608](#) specify that water providers serving more than 3,000 connections develop and submit an Urban Water Management Plan.

Urban Water Management Plan (UWMP)

The UWMP is largely focused on the need for providers to develop measures to reduce demand and to design sets of mitigation measures for possible implementation in the event of drought conditions or emergency loss of water service resulting from natural disaster. The UWMP is required to:

- (1) Assess the reliability of water sources over a 20-year planning time frame.
- (2) Describe demand management measures and water shortage contingency plans.
- (3) Report progress toward meeting a targeted 20 percent reduction in per-capita (per-person) urban water consumption by the year 2020.
- (4) Discuss the use and planned use of recycled water.

APPENDIX B

CALIFORNIA WATER SERVICE, AREAS SERVED

Bayshore District - services the cities of

- San Carlos
- San Mateo
- South San Francisco
- Colma

Bear Gulch District – services the cities of

- Portola Valley
- Woodside
- Atherton
- Menlo Park
- Unincorporated Portions of San Mateo County

California Water Service (an investor-owned water provider) provides water to residents in these cities through its Bayshore and Bear Gulch districts. California Water Service rates and operations are regulated by the California Public Utility Commission.



APPENDIX C

EPA, “Earthquake Resiliency Guide” (2018)

<https://www.epa.gov/waterutilityresponse/earthquake-resilience-guide> (accessed June 15, 2022).

EARTHQUAKE RESILIENCE GUIDE
for Water and Wastewater Utilities

Select a menu option below.

Introduction and Video

Step 1. Understand the Earthquake Threat

Step 2. Identify Vulnerable Assets and Determine Consequences

Step 3. Pursue Mitigation and Funding Options

EPA

Disclaimer: This guide is not intended to serve as regulatory guidance. Mention of trade names, products or services does not convey official United States Environmental Protection Agency (EPA) approval, endorsement or recommendation for use.

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APPENDIX D

EPA Incident Action Checklist – Earthquake

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Incident Action Checklist – Earthquake

Earthquake Impacts on Water and Wastewater Utilities

An earthquake is caused by the shifting of tectonic plates beneath the Earth's surface. Ground shaking from moving geologic plates collapses buildings and bridges, and sometimes triggers landslides, avalanches, flash floods, fire and tsunamis. The strong ground motion of earthquakes has the potential to cause a great deal of damage to drinking water and wastewater utilities, particularly since most utility components are constructed from inflexible materials (e.g., concrete rat pipes). Earthquakes create a variety of cascading and secondary impacts that may include, but are not limited to:

- Structural damage to facility infrastructure and equipment
- Water tank damage or collapse
- Water source transmission line realignment or damage
- Damage to distribution lines due to shifting ground and soil liquefaction, resulting in potential water loss, water service interruptions, low pressure, contamination and sinkholes and/or large pools of water throughout the service area
- Loss of power and communication infrastructure
- Restricted access to facilities due to debris and damage to roadways



PEWMA

The following sections outline actions water and wastewater utilities can take to prepare for, respond to and recover from an earthquake.