

Emergency Firefighting Water System Financing Study



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This report was written in response to Resolution 403-22 passed by the Board of Supervisors on September 30, 2022. The City Administrator and Office of Resilience and Capital Planning (ORCP) appreciate the opportunity to provide the Board a summary and conclusion of various funding sources to support the expansion of the City's Emergency Firefighting Water System (EFWS).

Executive Summary

San Francisco's Emergency Firefighting Water System (EFWS) is an independent high-pressure water supply system dedicated to fire protection, particularly fires following major earthquakes. Since 2010, \$363 million has been committed to repairs, retrofits, upgrades and expansion of the system. These investments have been primarily funded through the Earthquake Safety and Emergency Response (ESER) Bond General Obligation (G.O.) Program with support from water revenue bonds and developer agreements.

In response to requests from the Board of Supervisors and the Civil Grand Jury Report ([*Act Now Before It Is Too Late: Aggressively Expand and Enhance Our High-Pressure Emergency Firefighting Water System*](#)), the San Francisco Public Utilities Commission (SFPUC) commissioned a comprehensive, citywide planning study from AECOM to consider future performance requirements for EFWS based on population and development projections for 2050. The [*Emergency Firefighting Water System 2050 Planning Study*](#) reported that the total cost of citywide system upgrades would require as much as \$4 billion over the next few decades.

Resolution 403-22 adopted by the Board of Supervisors requested exploration of financing options to meet the cost of the EFWS enhancements described in the 2050 Planning Study. This report addresses the resolution's requests, including the evaluation of federal grant funding and revenue related to local development, and other existing and potential funding sources.

Recommendations

Based on our analysis, we recommend regular investment in the EFWS through the ESER G.O. bond program and consideration of other local funding sources, especially developer agreements and a Community Facilities District enabling the use of Mello-Roos bond financing.

We also recommend the implementation and further evaluation of interventions by property owners that reduce the risk of post-earthquake fire, including transitioning appliances from gas to electric, the installation of gas shutoff valves, and building materials designed to increase resistance to fires. These building strategies could be eligible for federal funding. Lastly, we recommend continued pursuit of possible new grant opportunities under the Federal Emergency Management Agency pre-disaster mitigation program or other federal programs should they become available.

Scope of Proposed Upgrades to the Emergency Firefighting Water System

Initial investment in EFWS focused on core infrastructure improvements to reservoirs, tunnels, storage tanks, and pump stations, as well as adding 30 new cisterns. With that work nearing completion, efforts have turned toward expanding the pipe network to neighborhoods in the Richmond, Seacliff and Sunset districts. Using ESER 2020 bonds and SFPUC issued Water Revenue Bonds, a western pipeline network that includes up to 14 miles of new, seismically resilient high-pressure pipelines and multiple water sources, is now underway.

The [Emergency Firefighting Water System 2050 Planning Study](#) (2050 Planning Study) recommended increasing conveyance capacity and geographic coverage of the EFWS based on 2050 population estimates. It also evaluated enhancements for seismic safety. AECOM estimated all citywide improvements and capacity upgrades to be \$1.947 billion dollars, in current dollars. Applying escalation, AECOM estimated the cost to be \$2.945 billion dollars if completed in 2034 and over \$4 billion if completed in 2046.

FIGURE 1: Post-earthquake firefighting water demand levels in San Francisco based on 2050 population projections. The height of bars indicates the magnitude of demand in the location.¹

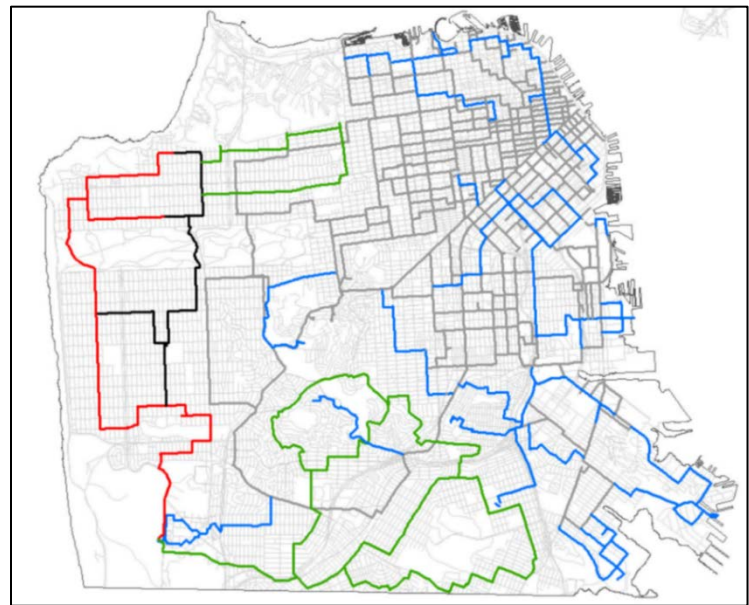
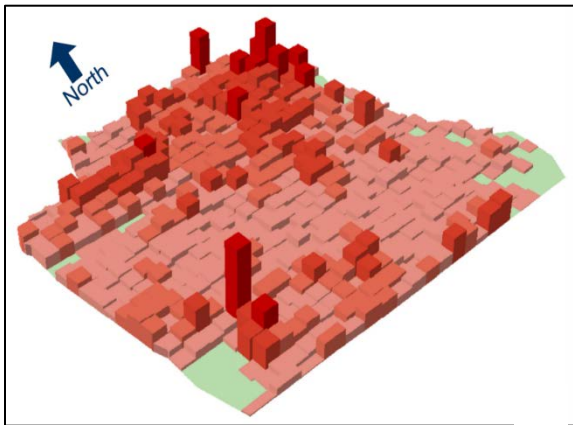


FIGURE 2: Current and recommended EFWS pipeline network. Existing pipeline (grey); Westside Phase 1, current implementation (red); Westside Phase 2, unfunded extension (black); future extensions of the system as recommended in the AECOM study based on projected population growth (blue and green).²

¹ Emergency Firefighting Water System (EFWS) Planning Study for 2050 Conditions. June 13, 2022. AECOM presentation for Capital Planning Committee.

² EFWS 2050 Financing Study Overview. September 14, 2022. Staff presentation for Board of Supervisors Budget & Finance Committee.

Funding Progress

To-date, bond financing and developer agreements have been the primary funding mechanisms for repairs and upgrades to the EFWS.

ESER G.O. Bond Program: The Earthquake Safety and Emergency Response (ESER) Bond program was first approved by voters in 2010; and subsequently approved again in 2014 and 2020. ESER was established to provide a consistent funding source to address facility and infrastructure needs related to emergency response and recovery. The program focused investment in the entire emergency response system instead of various one-off and smaller bonds focused on a particular asset. EFWS has benefited from the program through the receipt of over \$300 million from the ESER G.O. Bond Program. These funds represent the largest investment in the history in EFWS assets. The most recent 10-year capital plan includes EFWS investment in 2028.

Developer Agreements: New developments requiring infrastructure upgrades are also required to expand or upgrade the EFWS pipe network. This has occurred in Mission Bay, Pier 70, and other locations. Developers of Mission Rock and Pier 70 have agreed to pay up to \$1.5 million, subject to 4.5% escalation. The developer of 3333 California will pay \$1.055 million. Improvements supported by these funds are limited to the development areas.

Water Revenue Bonds: \$55.0 million of proceeds from water revenue bonds issued by the San Francisco Public Utilities Commission have been committed to the Westside Phase I Potable Emergency Firefighting Water System project through the Commission’s approval of the 10-Year capital plan.

TABLE 1: FUNDING TO-DATE

	Allocation (\$000)
General Obligation Bonds	
2010 ESER	\$ 102,568
2014 ESER	\$ 54,509
2020 ESER	\$ 151,184
Total General Obligation Funding	\$ 308,261
Revenue Bonds	
SFPUC Water Revenue Bond	\$ 55,000

Funding Options

General Obligation capacity

Investment in the EFWS has thus far relied primarily on the ESER G.O. program, in which it is a primary category that receives funds. Other G.O. programs supported by the capital plan include affordable housing, public health, transportation, the seawall, recreation and open space, and climate change.

G.O. debt is the City’s primary funding source for its capital needs. Bonding capacity is constrained to maintain the property tax rate to repay G.O. debt at the same level as it was in 2006. This fiscal constraint has been an important factor in voter acceptance for previous G.O. bonds.

The City’s 10-year capital plan publishes a G.O. bond schedule that forecasts borrowing capacity and names all Citywide capital planning priorities for the next 10 years. As described in Table 2 from the most recent 10-year capital plan, the total amount of available bonding capacity is \$1.245 billion. As a result, the use of G.O. bonds alone is insufficient to fund the EFWS as estimated by the 2050 Planning Study. However, the EFWS can continue to receive regular investments through the ESER G.O. program each time it is renewed.

TABLE 2: G.O. BOND PROGRAM³

Election	Bond Program	Amount (\$M)
Jun-22	Transportation	\$400
Nov-23	Public Health	\$187
Nov-24	Affordable Housing & Homeless Shelters	\$160
Nov-26	Waterfront Safety and Climate Change	\$130
Nov-27	Earthquake Safety & Emergency Response	\$217
Nov-28	Parks & Open Space	\$151
Nov-31	Public Health	TBD
	TOTAL	\$1,245

Source: 10-Year Capital Plan, FY2022 – 2031⁴

³ Since the last Capital Plan was released, Proposition H was passed on November 8, 2022, eliminating odd-year local elections. The next Capital Plan will update the G.O. bond schedule and the ESER program has moved to 2028.

⁴ The City’s General Obligation debt program is described in greater detail [here](#).

Other local revenue mechanisms

G.O. bonds are the most cost-effective financing mechanism, however, limitations on debt capacity necessitate the exploration of other funding options:

Fire Protection Fees through an Impact Fee: Other cities have administered impact fees to fund fire protection services. The Menlo Park Fire Protection District collected over \$5 million in revenues from redevelopment projects in Menlo Park and East Palo Alto in FY2021⁵. In Sacramento, the Metropolitan Fire District collected over \$2 million from development impact fees⁶ in the same year. A new development impact fee can provide a dedicated revenue stream. However, impact fees are more volatile and limited. Development fees also add costs to new development projects. Fee implementation and restricted use of the revenue would need to be adopted by the Board of Supervisors and administered by the Planning Department. Another consideration is that developments that pay impact fees are primarily located in the eastern portions of the city and fees may have limitations or restrictions on the application of fees to benefit other parts of the city.

Mello-Roos Bonds through a Community Facilities District: A Mello-Roos bond can finance extensions of the EFWS through the formation of a community facilities district (CFD). Two-thirds voter approval would be required to levy a special property tax for repayment of indebtedness. The City has issued these bonds in the past to fund infrastructure needs in several areas, including Transbay and Treasure Island. Borrowing capacity will depend on voter approval and the size of the taxbase within the boundaries of the CFD. Structurally, a Mello-Roos bond is similar to a G.O. bond as they require two-thirds voter approval and are attached to property payments. Unlike G.O. bonds, CFD's can be established based on certain geography and type of expenditure.

Temporary Water Utility User Surcharge: A flat and time-limited utility surcharge could be administered to PUC ratepayers. This would capture a stable, but limited, revenue stream likely totaling less than \$2 million annually. A utility user surcharge can have an inequitable impact on ratepayers not residing in areas where major system work is performed.

Tax Increment Financing District: Incremental property tax growth can also be captured through the formation of a tax increment district. Tax increment districts are used for economic development activities in new development area; and there must be reasonable taxable growth anticipated to fund infrastructure improvements. The City has used tax increment strategies at Mission Bay, Hunters Point, and Transbay. In

⁵ Menlo Park Fire Protection District, Annual Comprehensive Financial Report, FY2021. The district provides firefighting and emergency response services.

⁶ Sacramento Metropolitan Fire District, Annual Comprehensive Financial Report, FY2021. The district provides firefighting and emergency response services.

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the last five fiscal years, redevelopment areas in the City have redirected about \$150 million annually from general property tax collection towards infrastructure and economic development in areas designated tax increment districts. A combination of developer agreements and tax increment financing can be appropriate for areas with planned greater residential and commercial density.⁷ Should significant new development merit a new tax increment financing district, the EFWS should be considered in the infrastructure plan.

These funding mechanisms can provide the EFWS with additional funding, although options with greater political feasibility provide a smaller magnitude of funding required for the full scope of citywide extension (see Appendix A for more detail).

Federal grant funding

The Federal Emergency Management Agency (FEMA) oversees a Pre-Disaster Mitigation (PDM) grant program that makes federal funds available to state, local, tribal and territorial governments to plan for and implement sustainable cost-effective measures designed to reduce the risk to individuals and property from future natural hazards, while also reducing reliance on federal funding from future disasters. The Hazard Mitigation Grant Program (HMGP) and Building Resilient Infrastructure and Communities (BRIC) fall under PDM.

Relevant eligible activities under these programs include⁸:

- Infrastructure Retrofit: Measures to reduce risk to existing utility systems, roads, and bridges.
- Application of ignition-resistant construction: Projects that apply ignition-resistant techniques and/or non-combustible materials on new and existing homes, structures, and critical facilities.

Ineligible activities include⁹:

- Development or enhancement of fire-suppression capability through the purchase of equipment or resources (e.g., water supply or sources, dry hydrants, cisterns not related to water hydration systems, dip ponds)

With regards to the risk of fire-following earthquake, this means that grant funds could be sought to retrofit existing utility systems, but not for the expansion of fire suppression systems like EFWS. Grant funds could be sought to reduce the risk of ignition through gas-shut-off valves or building materials. In addition, a project must be considered cost-effective in order to be eligible for PDM funding.

⁷ Tax increment financing is used throughout many California cities for economic development. The city of Oakland is exploring EIFDs to support housing production and the future A's ballpark. The city of San Diego also recently approved EIFD formation for park, trail and recreation development along the San Diego River; the EIFD is planned to bring in \$380 to \$750 million in revenue.

⁸ FEMA, 2015. Hazard Mitigation Assistance Guidance, page 37

⁹ FEMA, 2015. Hazard Mitigation Assistance Guidance Addendum, page 32

Other strategies to protect of life and property from fire

Most fires following earthquakes are caused by natural gas leaks and damaged electric systems. Studies presented to the City in 2016¹⁰ recommended strategies to reduce the number of post-earthquake fires, primarily through tools to shutoff gas or electricity and appliance bracing.

- Automatic and excess flow shutoff valves can prevent gas leaks which can in turn, prevent fire ignitions. Re-starting gas service requires utility staff inspection, and programs or mandates requiring shutoff valves will require investment in enforcement and oversight to be effective. Shutoff valves have been mandated by city ordinance in several cities in Alameda, Contra Costa, and Marin counties (see Appendix B for a city list). These one-time costs for reducing post-earthquake fire ignitions are borne by property owners and range between \$5 and \$1,000 based on the equipment (see Appendix C for a list of equipment and installation costs).
- Automatic circuit breakers that sense movement or unintended electrical activity are another tool to shut off electricity to prevent fires from electric systems.
- Other strategies include public outreach campaigns directed at property owners and tenants on appliance bracing, manual valve shutoffs, and ignition-resistant building materials such as intumescent paint.

Recommendations & conclusion

The large EFWS extension and citywide capacity upgrades identified in the EFWS 2050 Planning Study require much greater investment than projected funding levels and borrowing capacity allow. While G.O. and water revenue bonds comprise the bulk of the funding to-date, the EFWS competes with other urgent capital needs throughout the City for future allocations of these funds.

The City should continue to make incremental allocations through the ESER program to the EFWS, as funding and other priorities allow. Concomitantly, developer agreements, and Mello-Roos financing through a Community Facilities District can provide a supplementary source of funding for the system.

Methods to reduce the number and spread of fires following earthquakes through building materials improvements to reduce ignitions should be further investigated. The adoption of an ordinance to increase or mandate the installation of gas shutoff valves and appliance bracing should be explored, especially since other

¹⁰ *The Study of Options to Reduce Post-Earthquake Fires in San Francisco* was prepared by the Applied Technology Council in 2016 for the San Francisco Earthquake Safety Implementation Program.

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Bay Area cities have these requirements in place, and applicable building improvements are eligible for FEMA PDM funding. In addition, the SFPUC should further analyze the potential reduction in ignitions and conflagrations of post-earthquake fires from such programs and requirements, and how this might reduce the future EFWS system and capacity needs.

Together, incremental funding for the upgrade of the EFWS and building modifications can make progress towards enhancing public safety after an earthquake.

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Appendix A: Funding Sources Strengths and Weaknesses

Funding mechanisms described in this study are summarized and ranked below. Each of the funding sources discussed has been categorized based on their strengths and weaknesses.

Funding Source	Revenue Generating Potential	Stable Revenue Stream	Long-Term Sustainability	Competition for other City uses	Voter Approval Required	Administrative Complexity
Developer Agreements	Weakness	Weakness	Weakness	Strength	Strength	Neither strength or weakness
Fire Protection Impact Fee	Weakness	Weakness	Weakness	Strength	Strength	Neither strength or weakness
General Obligation Bonds	Strength	Strength	Neither strength or weakness	Weakness	Weakness	Strength
Mello-Roos Bonds / CFD	Strength	Strength	Strength	Neither strength or weakness	Weakness	Weakness
Tax Increment Financing District	Neither strength or weakness	Weakness	Weakness	Neither strength or weakness	Weakness	Weakness
Utility Surcharge	Weakness	Strength	Neither strength or weakness	Strength	Strength	Neither strength or weakness
Water Revenue Bonds	Strength	Neither strength or weakness	Neither strength or weakness	Weakness	Strength	Neither strength or weakness

Key	
Strength	Strength
Neither strength or weakness	Neither strength or weakness
Weakness	Weakness

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Funding Source	Revenue Generating Range	Notes
Developer Agreements	< \$2M per agreement	Based on prior developer agreements with Mission Rock, Pier 70, and 3333 California.
Fire Protection Impact Fee	Variable, depends on development	
General Obligation Bonds	By appropriation	
Mello-Roos Bonds / CFD	Based on current and projected taxbase, > \$15M	A minimum issuance of \$15 - \$20M is recommended considering the cost of issuance and administration of the debt
Tax Increment Financing District	Based on current and projected taxbase	
Utility Surcharge	< \$2M annually	Based on approximately 175,000 residential, municipal, commercial and industrial accounts and an approximate \$10 annual contribution.
Water Revenue Bonds	By appropriation	

Appendix B: Gas Shut-off Valve Ordinances in the San Francisco Bay Area and Los Angeles Metro

Ordinance Requirements by City:

	Required for new buildings	Required for building alterations	Required upon sale
Berkeley (link)	Yes	Yes – if alteration \$50,000+	
Alameda (link)		Yes – only for permits related to gas piping	Yes
Alameda County (link)	Yes	Yes – some types	
Contra Costa County (link , link)	Yes	Yes – some types	
Lafayette (link)		Yes – some types	
Moraga (link)	Yes (if the project involves gas piping)	Yes – some types	
Orinda (link)	Yes	Yes – some types	
Clayton (link)	Yes	Yes – some types	
Marin County (link)	Yes	Yes – for permits related to gas piping	
City of Los Angeles (link , link)	Yes (since 1995)	Yes – if alteration \$10,000+	Yes (since 1998)
Pittsburg (link)	Yes	Yes – some types	
Culver City (link , link)	Yes	Yes - if alteration \$10,000+	Yes
Malibu (link , link)	Yes	Yes - if alteration \$10,000+	Yes
Santa Monica (link , link)	Yes	Yes - if alteration \$10,000+	Yes
West Hollywood (link)	Yes	Yes - if alteration \$10,000+	Yes

Appendix C: Equipment and installation costs for tools to reduce fire ignitions

Equipment Descriptions:

- **Seismic Shutoff valves:** Affixed to side of building and shut off valve when shaking is detected. May shut off gas unnecessarily, causing customers to have to pay to turn gas back on.
- **Excess flow valves:** Shuts off when significant leak of excess of pressure occurs for any reason. Only detects significant issues, may miss gas leaks and smaller issues after an earthquake.
- **Hybrid valve:** Customizable, triggered through a combination of motion detection, excess flow, and/or natural gas, carbon monoxide, or smoke detection; current options are expensive.
- **Arc-Fault circuit interrupters:** Detects an unintended electrical arc and shuts off electricity
- **Earthquake sensing breakers:** Detects shaking and automatically cuts off electricity; not widely available.

Costs¹¹:

Type	To Property Owner	To City
Seismic Shutoff Valve	Equipment: \$100 - \$300 Installation: \$100 - \$300+	Enforcement and inspection
Excess Flow Valve	Equipment: \$105 - \$115 Installation: \$100 - \$300+	Enforcement and inspection
Hybrid Valve	Equipment: \$200 - \$500+ Installation: \$100 - \$500+	Industry research and development needed, inspection and enforcement costs
Manual Shut Off	Equipment: \$5 - \$20	Public education and outreach
Gas Appliance Bracing	Equipment: \$15 - \$50 per appliance Installation: \$0 - \$100 per appliance	Public education and outreach
Arc-Fault Circuit Interrupters	Equipment: \$35+ Installation: \$100 - \$300	Enforcement and inspection
Earthquake Sensing Breakers	Equipment: \$60 - \$200+ Installation: \$100 - \$300	Enforcement and inspection

¹¹ Costs and descriptions from *The Study of Options to Reduce Post-Earthquake Fires in San Francisco*, 2016. Dollar amounts from 2016; has not been reviewed by Department of Building Inspection.