

Emergency Firefighting Water System (EFWS) Planning Study for 2050 Conditions

Capital Planning Committee June 13, 2022



- Develop a plan to expand emergency firefighting pipelines and water supply sources to all parts of San Francisco, based on estimated 2050 conditions.
- Incorporate results from the Fire Following Earthquake Water Requirements Study (Submitted to BOS 6/30/21)
- Utilize results from the EFWS Seawater Supply Pre-Feasibility Study in the evaluation of new water supplies (Submitted to BOS 6/30/21).



Study Objectives

Purpose

- Plan an EFWS to provide post-earthquake firefighting water supply to all parts of San Francisco through 2050
- Goals
 - New pipe networks in areas not currently served
 - Maximize utility for new pipelines via combined potable/EFWS system (PEFWS)
 - Identify water sources to meet expected demands

Objectives

- Preliminary layout of pipe networks
- Recommend a reliability target for system
- Identify water supply needs and new sources to meet them
- Estimate cost



Existing System

2050 Demands Improved System



- Fire Following Earthquake
- EFWS pipelines largely in Eastern portion of City
- 2010 and 2014 ESER Bonds to update existing system
- Limited EFWS water supply from cisterns
- Total supply: approx. 80,000 gpm

- Citywide Coverage
- 255,000 gpm **Estimated** Demand (75th percentile)



- Citywide coverage
- Additional water sources to meet demands
- Increased system capacity
- SFFD resources assumed to increase with population growth through 2050



Future Conditions

- Population:
 - 2020: 883,000
 - 2030: 960,000
 - 2040: 1,035,000
 - 2050: 1,120,000
 - Source: Plan Bay Area 2040 (ABAG/MTC)
- Building Square Footage in San Francisco:
 - 2020: 885 million
 - 2030: 1.01 billion
 - 2040: 1.13 billion
 - 2050: 1.25 billion
 - Source: SF Planning Department and available information on large planned developments.



Historical and Projected Population





- Basis: 1906 earthquake event on the San Andreas fault
- Per direction from San Francisco Board of Supervisors Resolution 422-19:

"FURTHER RESOLVED, That the Board of Supervisors reports that Recommendation No. R1 has not been implemented but will be implemented by no later than December 31, 2021..."

Recommendation No. R1:

"By no later than December 31, [2021], the Mayor, the SFPUC, the SFFD, and the Office of Resilience and Capital Planning should jointly present to the Board of Supervisors a detailed plan to ensure the City is well prepared to fight fires in all parts of San Francisco in the event of a <u>1906-magnitude (7.8) earthquake</u>."



75th Percentile: in a recurrence of the 1906 earthquake, adequate water will be supplied 3 out of 4 times









Potential Future System Improvements

- 1. Pipeline Improvements for Coverage and Capacity
 - Conventional EFWS Pipelines:
 - Extend coverage to areas not currently served
 - Improve water conveyance capacity
 - Potable EFWS (PEFWS) Pipelines
 - High-pressure firefighting supply, modern construction
 - Reliable post-earthquake emergency water for domestic use
 - Maximizes uses under both normal and earthquake conditions
- 2. Water Supply Sources
- 3. Other EFWS Improvements
 - Reliability improvements to existing facilities



- Enhanced monitoring and control to respond quickly and effectively
 - Seismic valves
 - Motorized / remote operated valves
 - Enhanced SCADA functionality (e.g. pressure monitoring for leak detection)
- Reliability Improvements to Existing Facilities



Potential System Improvements -Pipelines (Map)

Legend

EFWS and PEFWS Pipe Configuration

- Existing Conventional EFWS
- Future Conventional EFWS (unfunded)
- PEFWS Phase 1 (funded)
- ----- PEFWS Phase 2 (unfunded)
- PEFWS Future Phases (unfunded)





Potable EFWS (PEFWS) Pipelines

Post-Earthquake Conditions:

- After an earthquake: Increase pressure and flow to support firefighting.
- After firefighting subsides: Provides seismically reliable emergency water supply.





Water Supply Sources:

Supply Sources Considered:

- Lake Merced
- Seawater
- In-City Potable Reservoirs
- Regional Water System Pipelines

Conventional EFWS:

- New potable supplies: University Mound, Sutro, Stanford Heights, College Hill
- Approx. 60,000 gpm new seawater supply to be provided

• PEFWS:

 Lake Merced, Sunset and University Mound are adequate to meet demands





- Meet year 2050 demands from Fire Following Earthquake Water Requirements Study
- Includes improvements to pipelines, water sources, and SFFD resources
- System hydraulics and seismic response modeled to simulate performance
- Performance presented geographically throughout City



Performance of Proposed System





Improvement history

Pre – ESER Bond



Post ESER 2014



Post ESER 2010





Post ESER 2020



PRELIMINARY



Program Cost Estimate

	Option 1	Option 2	Option 3
		(\$M)	(\$M)
Supply to North, West, South Areas	Lake Merced / Potable	Seawater	Lake Merced / Potable Seawater (Redundant)
Supply to Conventional EFWS	Potable / Seawater	Potable / Seawater	Potable / Seawater
Unescalated (2021\$)	\$ 1,947	\$ 2,742	\$ 2,945
Escalated - Completion by 2034	\$ 2,945	\$ 4,149	\$ 4,456
Escalated - Completion by 2046	\$ 4,072	\$ 5,736	\$ 6,161

1) Assumes 4% escalation

2) Conceptual estimate

Program Schedules

Completion by 2034

- Accelerated project start
- 5-year planning, design and permitting
- 6-year construction
- Significant additional City resources required

Completion by 2046

- Typical project start schedule
- 7-year planning, design and permitting
- 14-year construction



Questions?