

Emergency Firefighting Water System (EFWS) 2050 Planning Study

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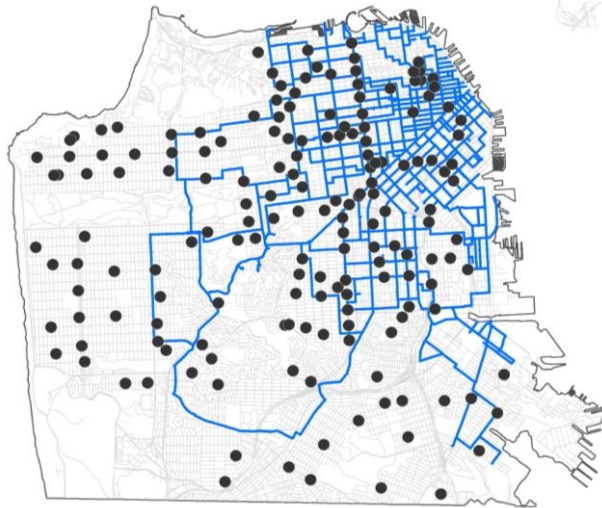


Objectives

- Develop a plan to provide emergency firefighting pipelines and water supply sources to all parts of San Francisco.
- 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).

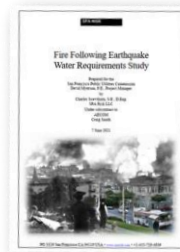
Overview

Existing System



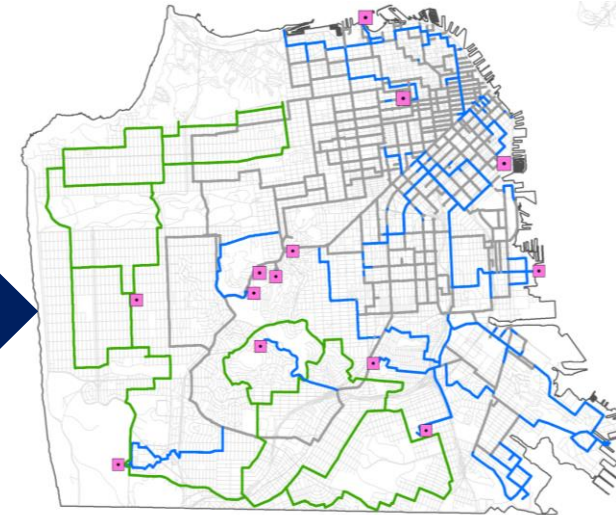
- EFWS pipelines largely in Eastern portion of City
- 2010 and 2014 ESER Bonds to update existing system
- Limited EFWS water supply from cisterns
- Total supply: approx. 80,000 gpm

2050 Demands



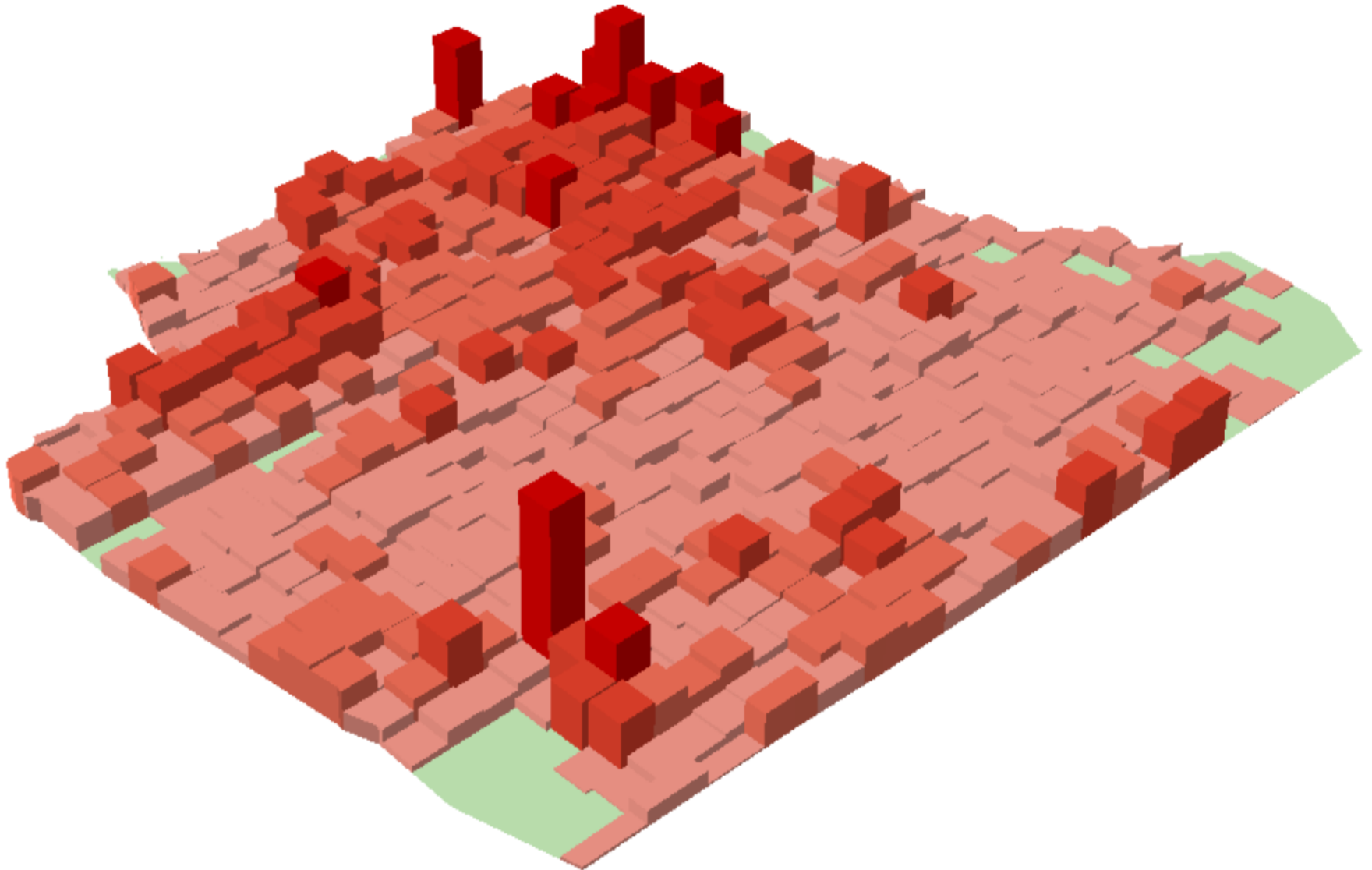
- Citywide Coverage
- 255,000 gpm Estimated Demand

Improved System



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

A Pattern of Demands





Potential Future System Improvements

1. Pipeline Improvements for Coverage and Capacity

- Conventional EFWS Pipelines:
 - ◆ Potable Water is primary water source
 - ◆ Seawater is secondary water source
- Potable EFWS (PEFWS) Pipelines
 - ◆ PEFWS provides post-earthquake drinking water

2. Water Supply Sources

3. Other EFWS Improvements

- Reliability improvements to existing facilities

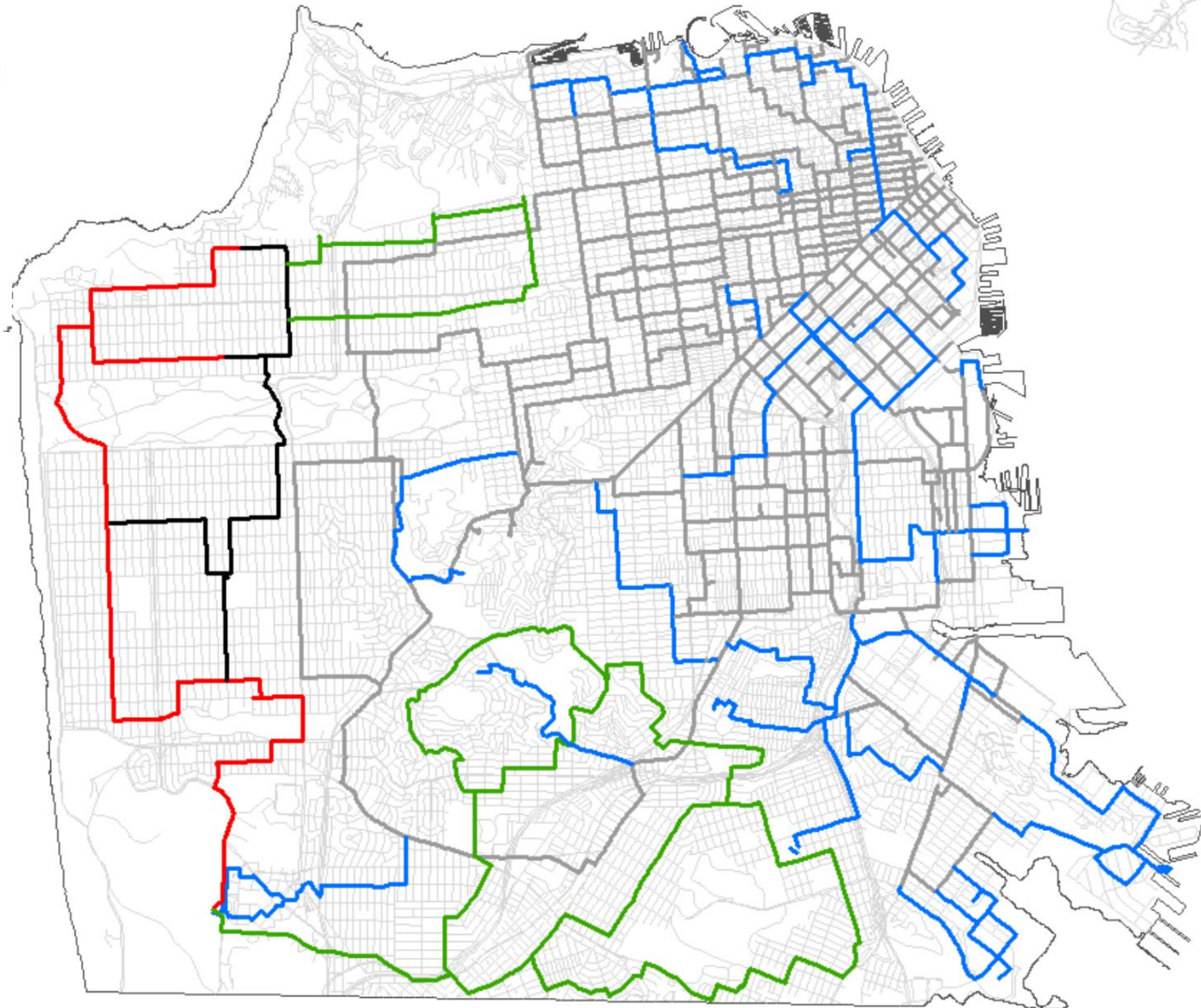


Potential System Improvements - Pipelines (Map)

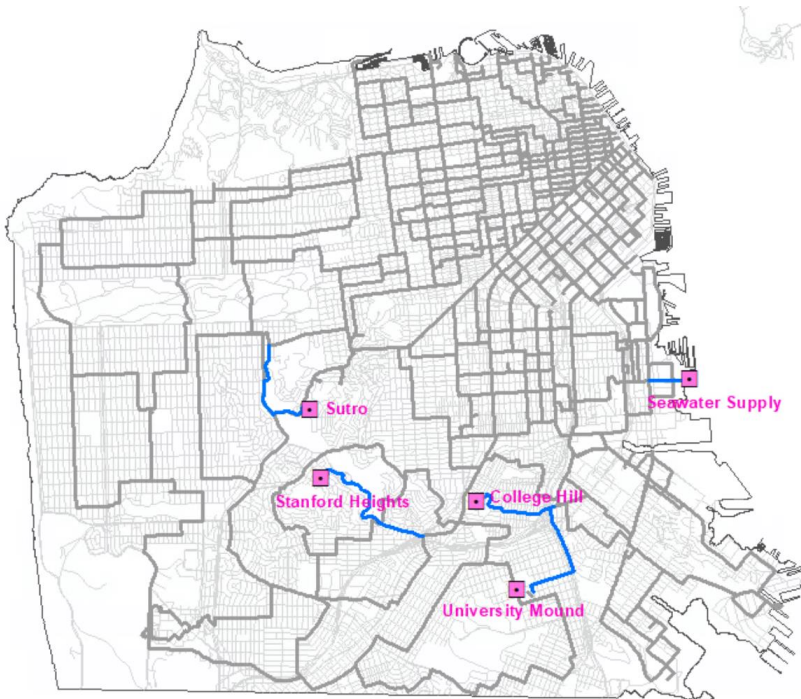
Legend

EFWS and PEFWS Pipe Configuration

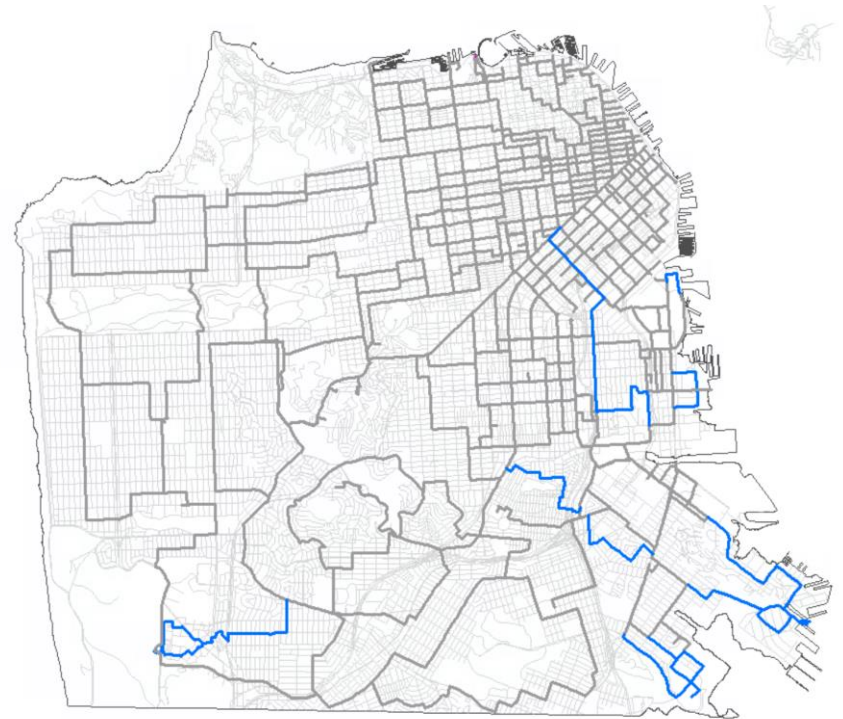
- Existing Conventional EFWS
- Future Conventional EFWS (unfunded)
- PEFWS Phase 1 (funded)
- PEFWS Phase 2 (unfunded)
- PEFWS Future Phases (unfunded)



Conventional EFWS Pipeline Improvements

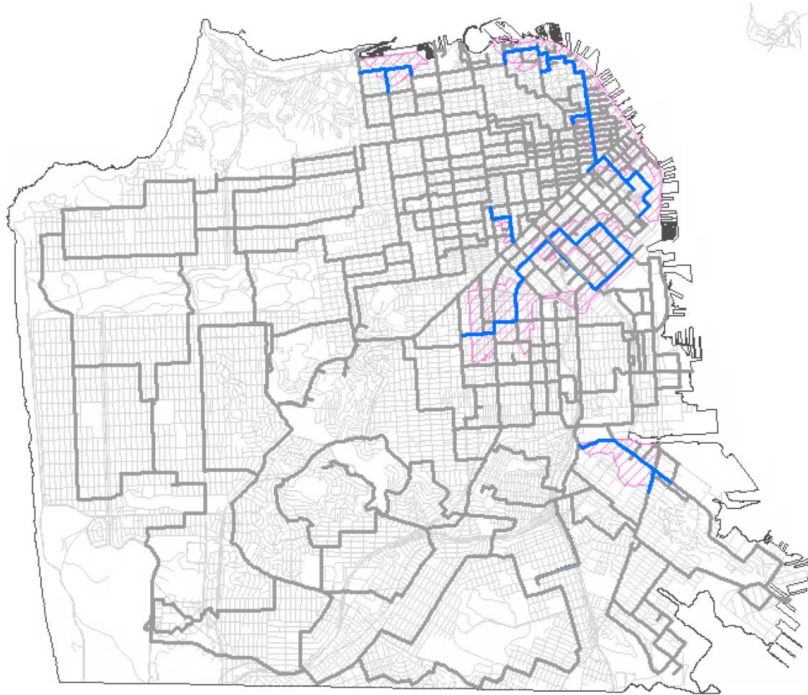


New Supply Sources

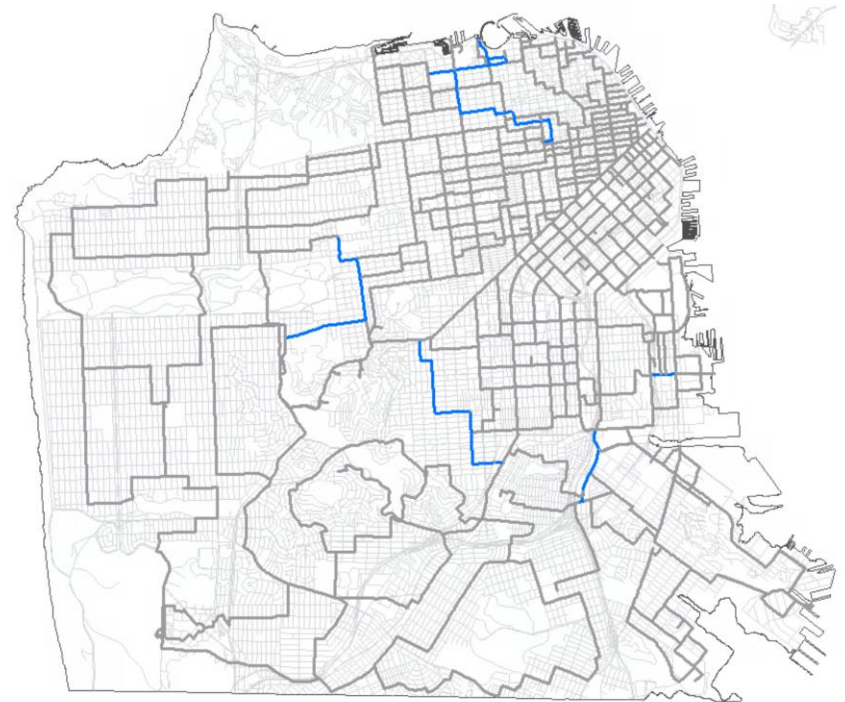


Extend Coverage

Conventional EFWS Pipeline Improvements (cont'd)



Infirm Areas

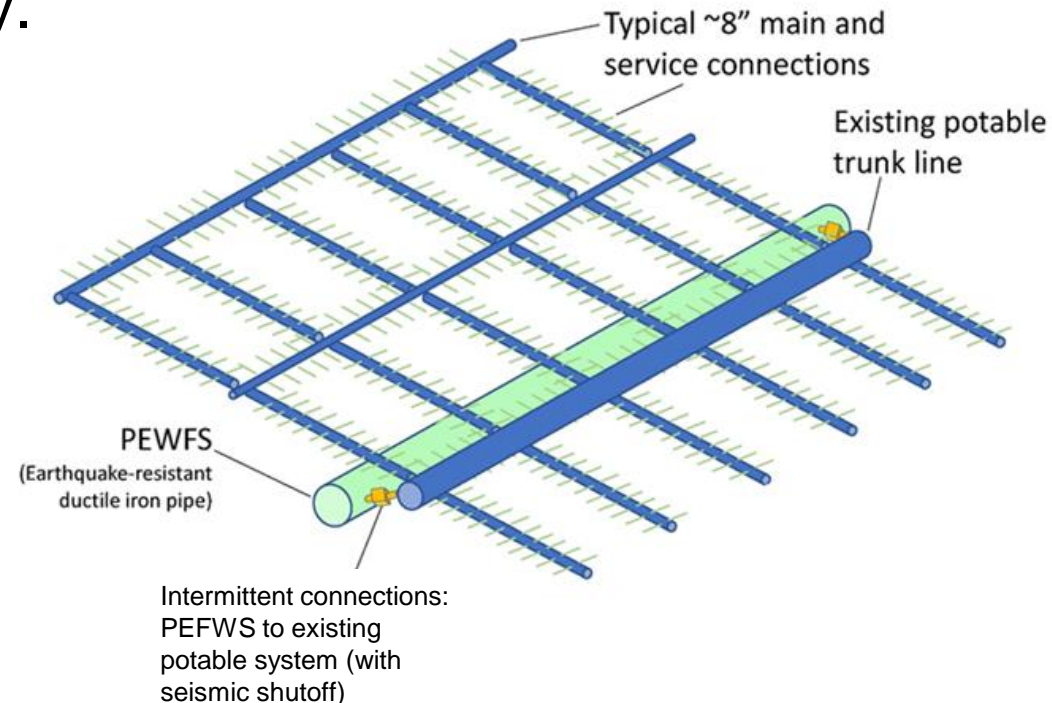


Conveyance Capacity

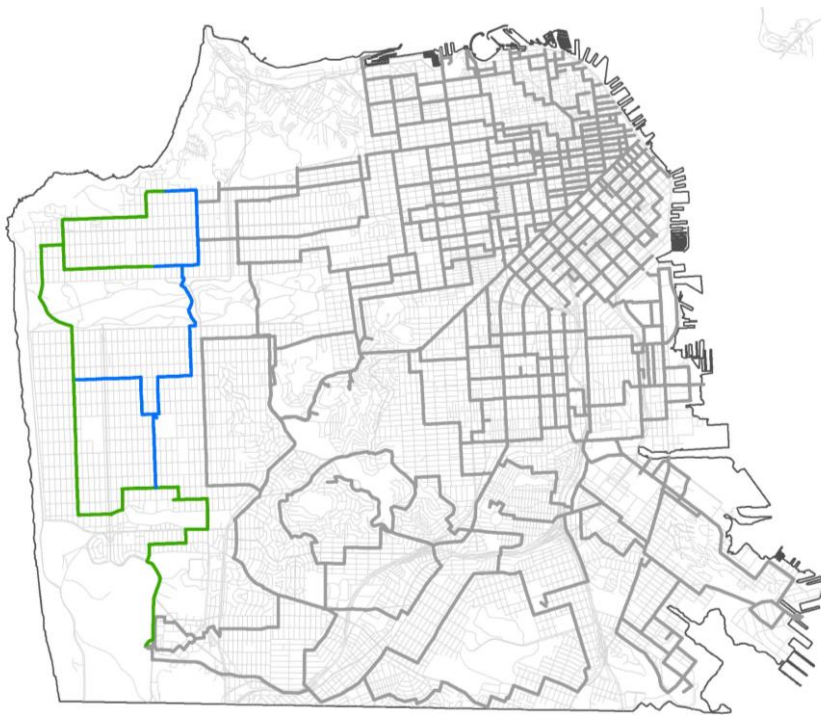
Potable EFWS (PEFWS) Pipelines

Post-Earthquake Conditions:

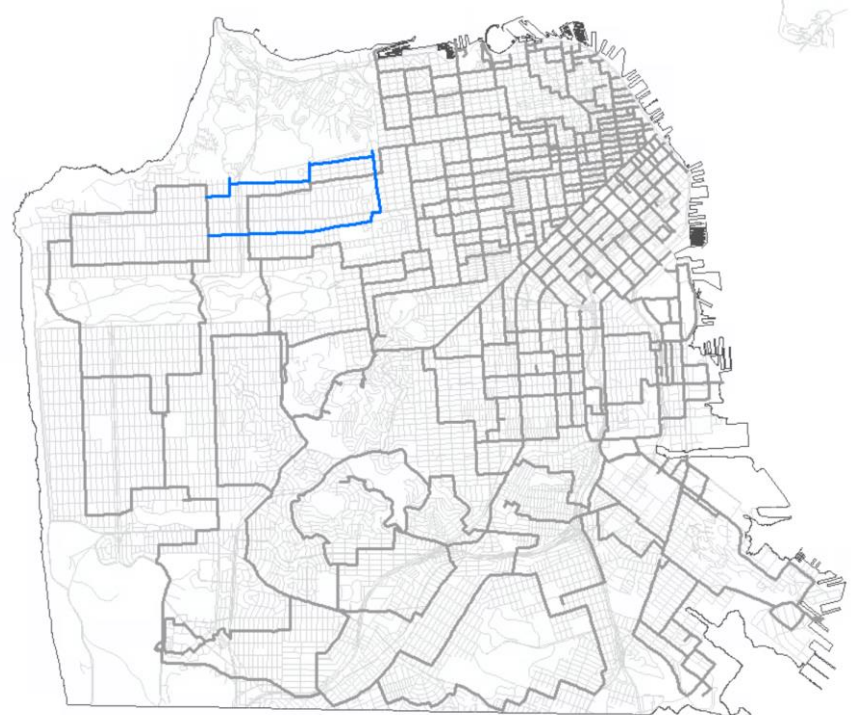
- Pressure and flow increased following an earthquake to support firefighting.
- After firefighting subsides, provides seismically reliable emergency water supply.



PEFWS Pipeline Improvements

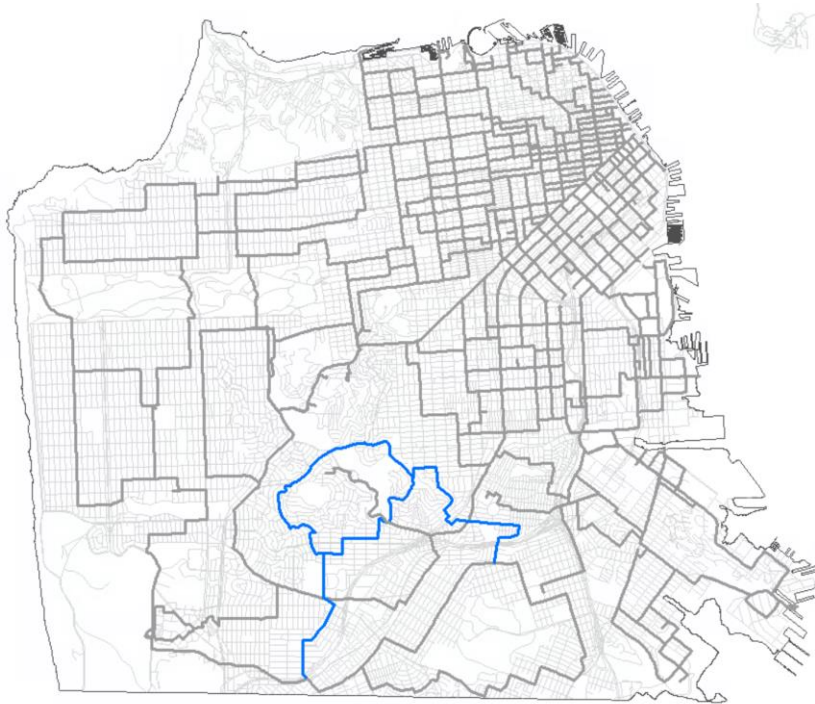


Richmond and Sunset

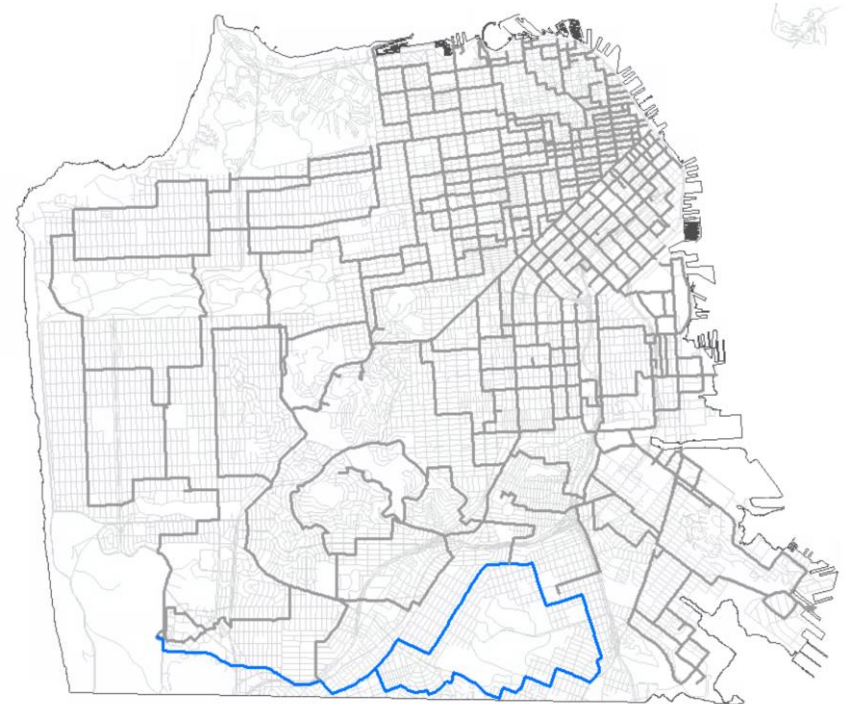


Presidio

PEFWS Pipeline Improvements



Portola



Southern Area

Water Supply Sources:

- **Supply Sources Considered:**

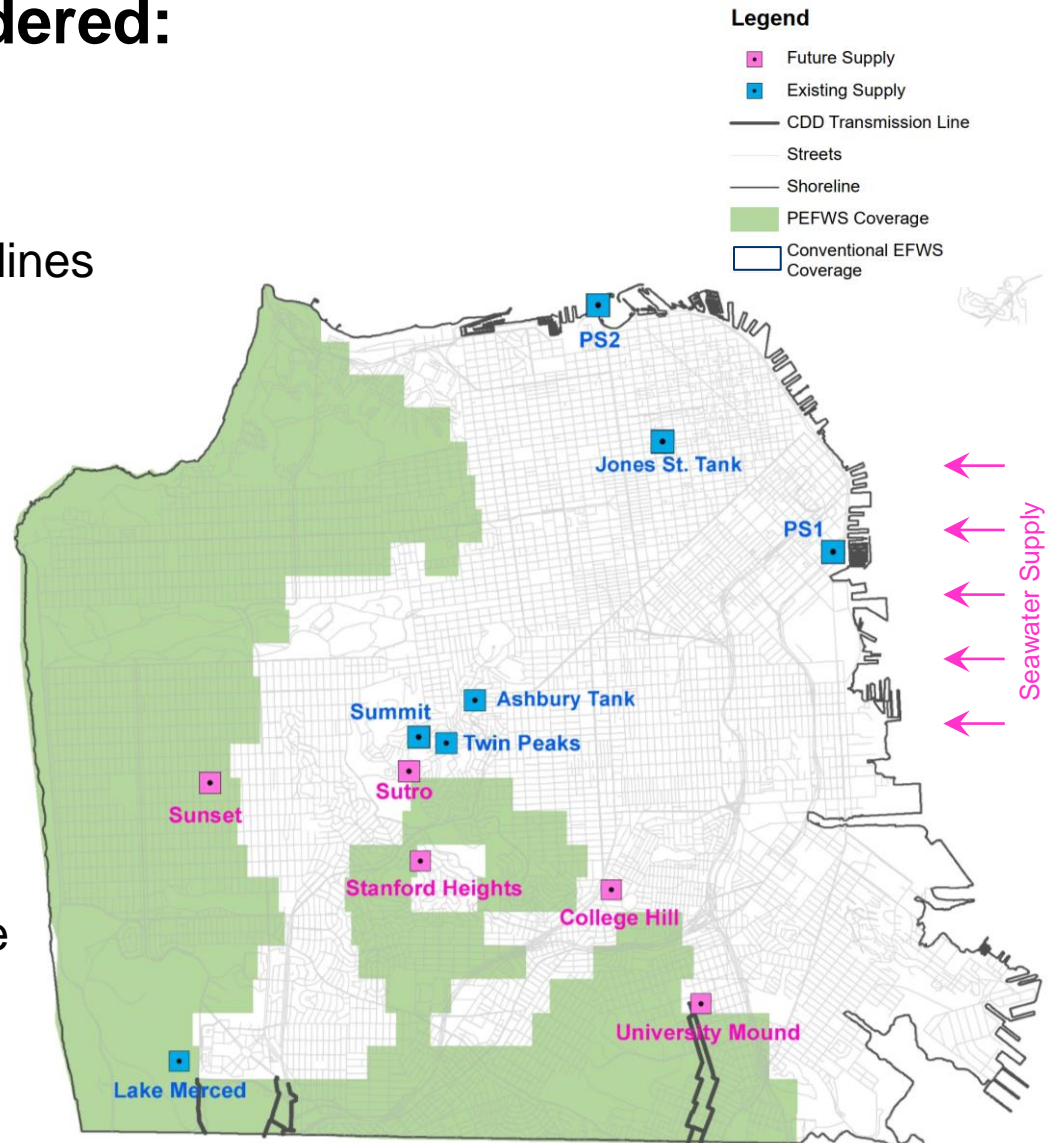
- Lake Merced
- Seawater
- In-City Potable Reservoirs
- Regional Water System Pipelines

- **Conventional EFWS:**

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

- **PEFWS:**

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



Other EFWS Improvements

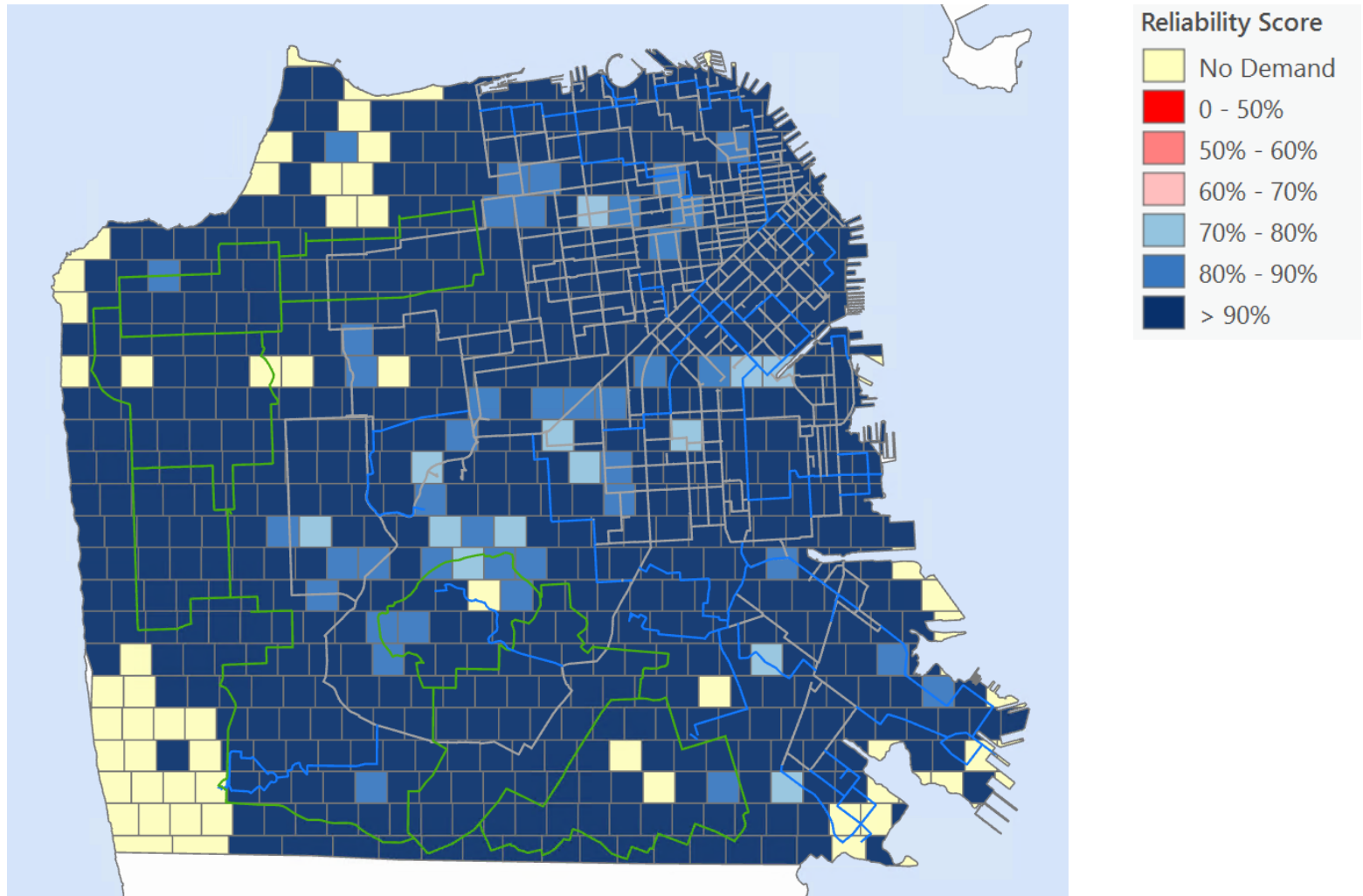
- Enhanced monitoring and control to respond quickly and effectively
 - Seismic valves
 - Motorized / remote operated valves
 - Enhanced SCADA functionality (e.g. pressure monitoring for leak detection)
- Reliability Improvements to Existing Facilities



Results: System Performance

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

Performance of Proposed System





Option 2 & 3 – Westside Seawater Pumpstations

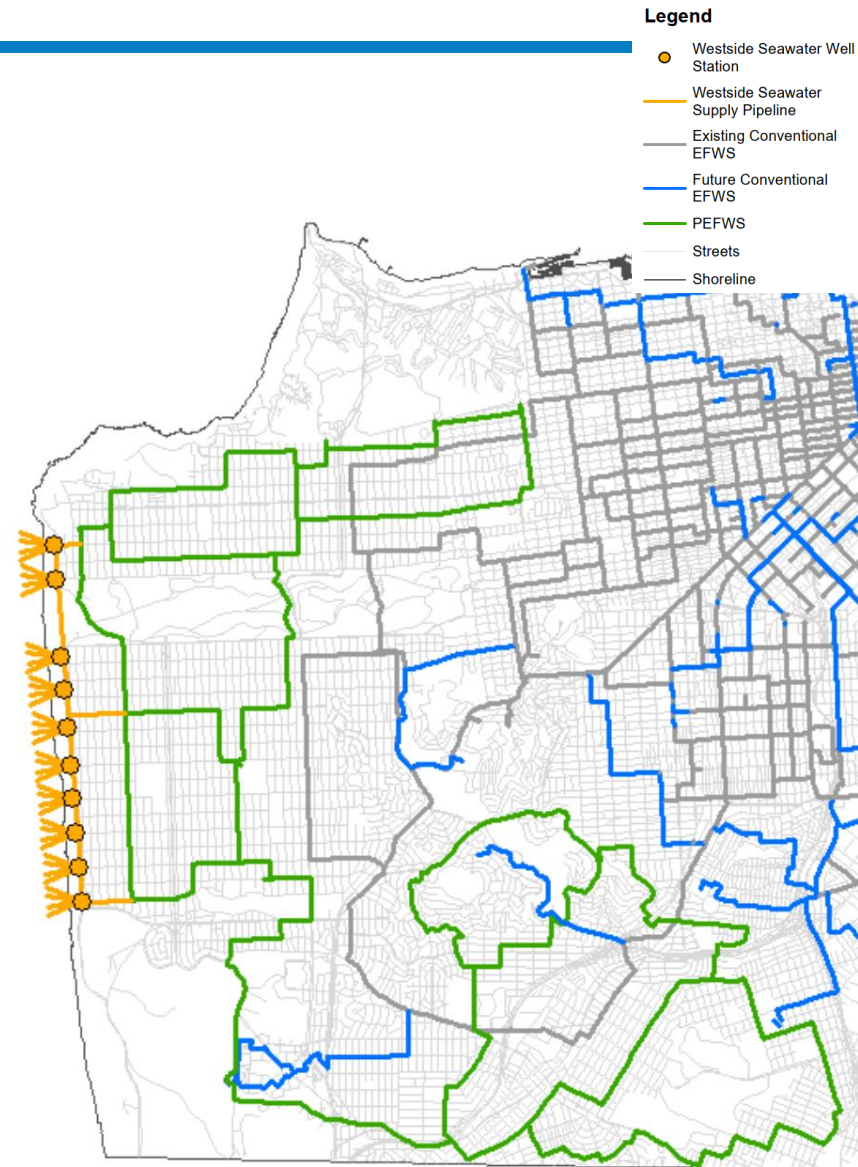
- Analyzed two alternatives:
 - Option 2: Seawater
 - Option 3: Fully Redundant (Option 1 + Seawater Pumpstations)
- Considerations:
 - Slant-well pumpstations likely required (California Ocean Plan)
 - 9,000-10,000 gallons per minute for each pumpstation
 - Requires a structure to house the pumpstation
 - Difficult and lengthy permitting process
 - Tsunami zone with shifting sands (impacts to infrastructure)
 - Seawater **cannot** sit in pipes/hydrants (due to corrosion)

Existing Pumpstations



Westside Seawater Supply

- 90,000 gpm supply (PEFWS service area demand)
- 10 well stations
- Collector pipeline, connected to PEFWS at three locations
- Emergency water supply backbone function not available immediately after earthquake
- Additional operations and maintenance required





Program Cost Estimate

	Option 1 (\$M)	Option 2 (\$M)	Option 3 (\$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?