Emergency Firefighting Water System (EFWS) Update

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What is the EFWS?

- Emergency Firefighting Water System (EFWS): A high pressure fire-suppression water system built after 1906 earthquake.
- Hetch Hetchy Regional Water System = Primary Source of Water
- EFWS ownership transferred to SFPUC in 2010
- SFFD is the end user: System improvements and expansion approved by SFFD, SFPUC, and Public Works
- Modeling utilized to guide decision making.

Agenda

1. Findings of Studies:
   a) Neighborhood Firefighting Demand Study
   b) Seawater Supply Study

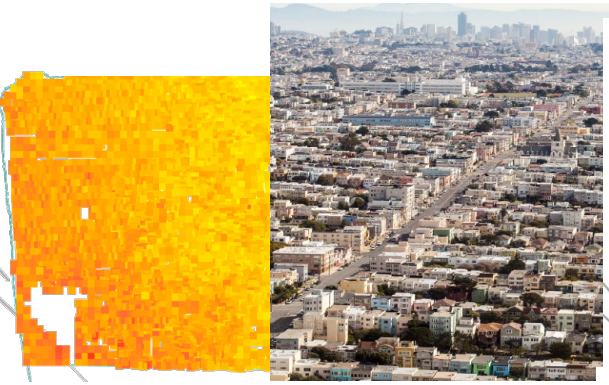
2. Proposed Citywide Plan
   a) Pipelines
   b) Water Sources
   c) SFFD Resources

Neighborhood Firefighting Demand Study - Overview

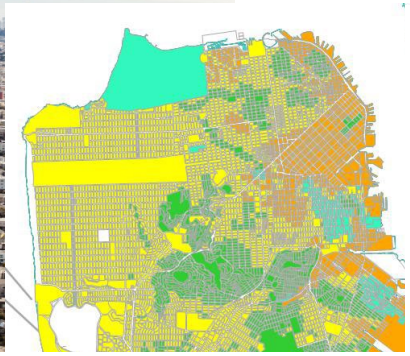
- Refine earthquake ***firefighting water demands***
- Based on:
  - Seismological, geotechnical, building inventory (materials, density, sprinkler systems, etc.), vegetation, SFFD resources, & other data
  - City buildings: current and future growth:
    - Planning Dept. Reports and Pipeline Projections
    - Area Redevelopment Plans
    - Capital Construction Projects in Area
    - Association of Bay Area Government Reports and Projections
  - EFWS
    - Current and extended
- Current and for 2030, 2040, 2050

Neighborhood Firefighting Demand Study - Illustrated

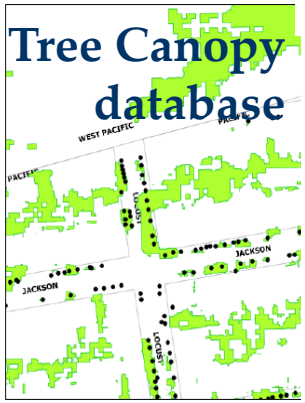
Analysis: Earthquake → Buildings/ignitions → Weather/fire spread → SFFD Ops → water system functionality →



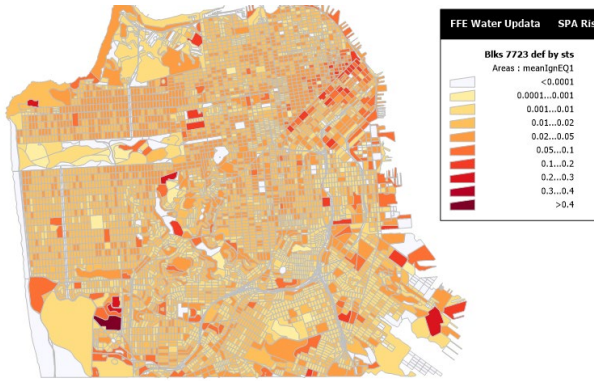
Mw 7.9 on San Andreas

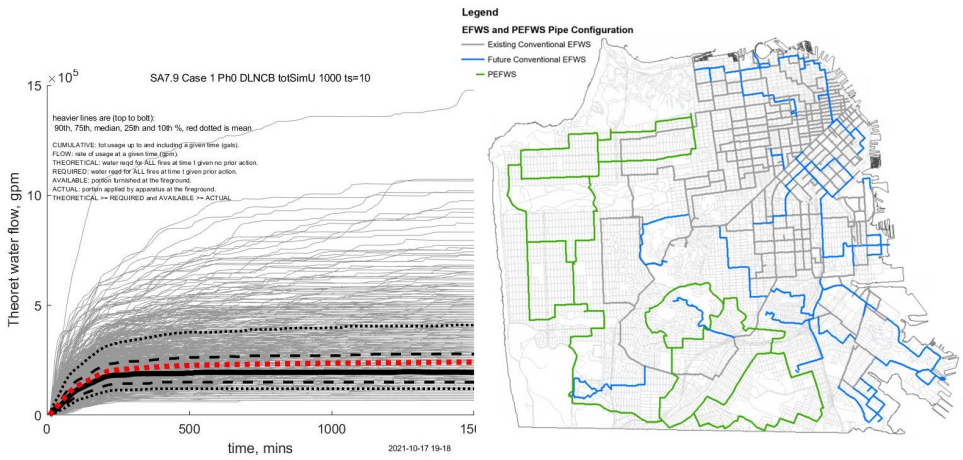


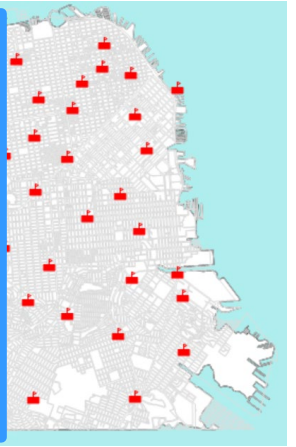
Building data



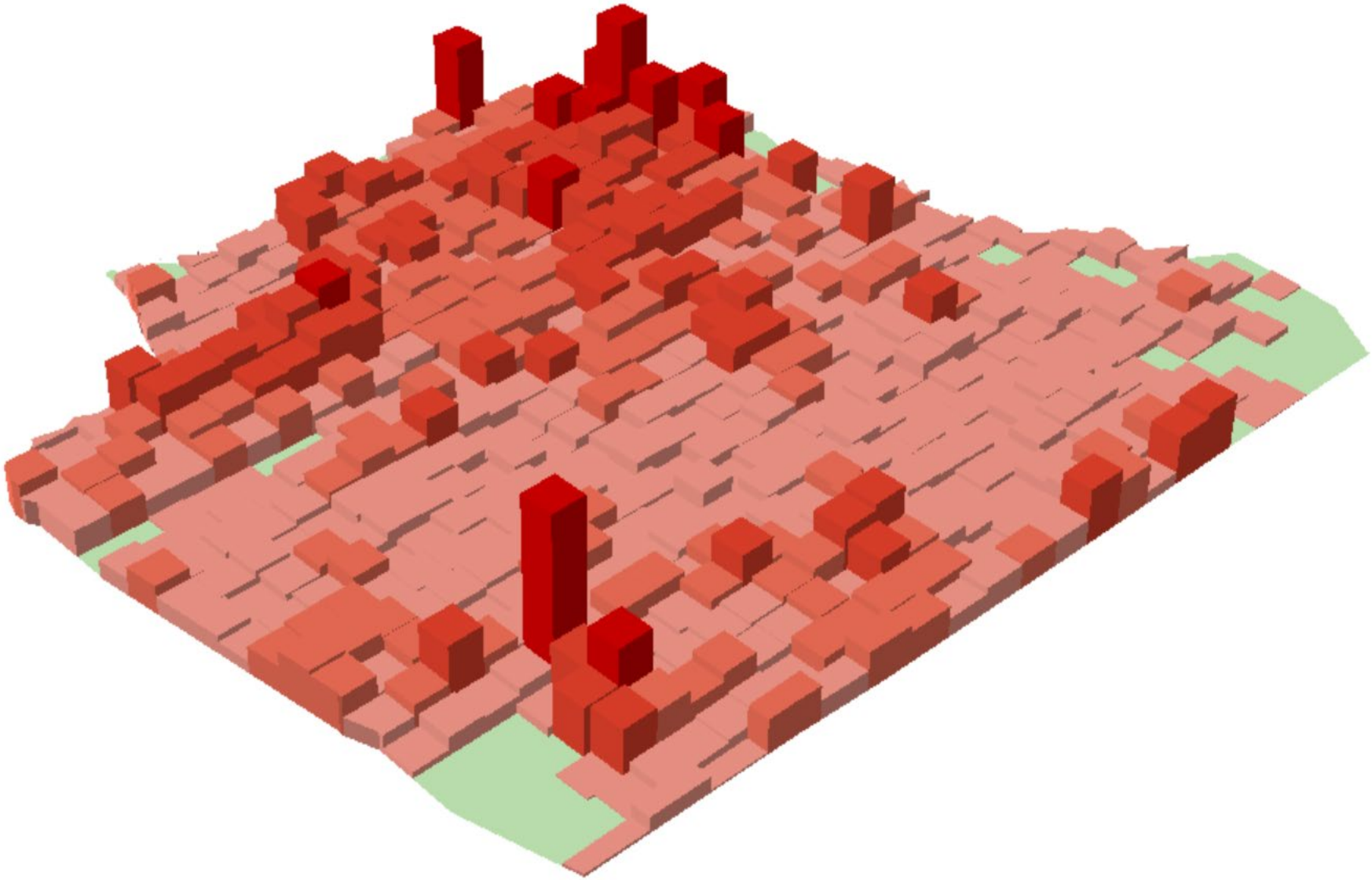
Ignitions by block, Mw 7.9



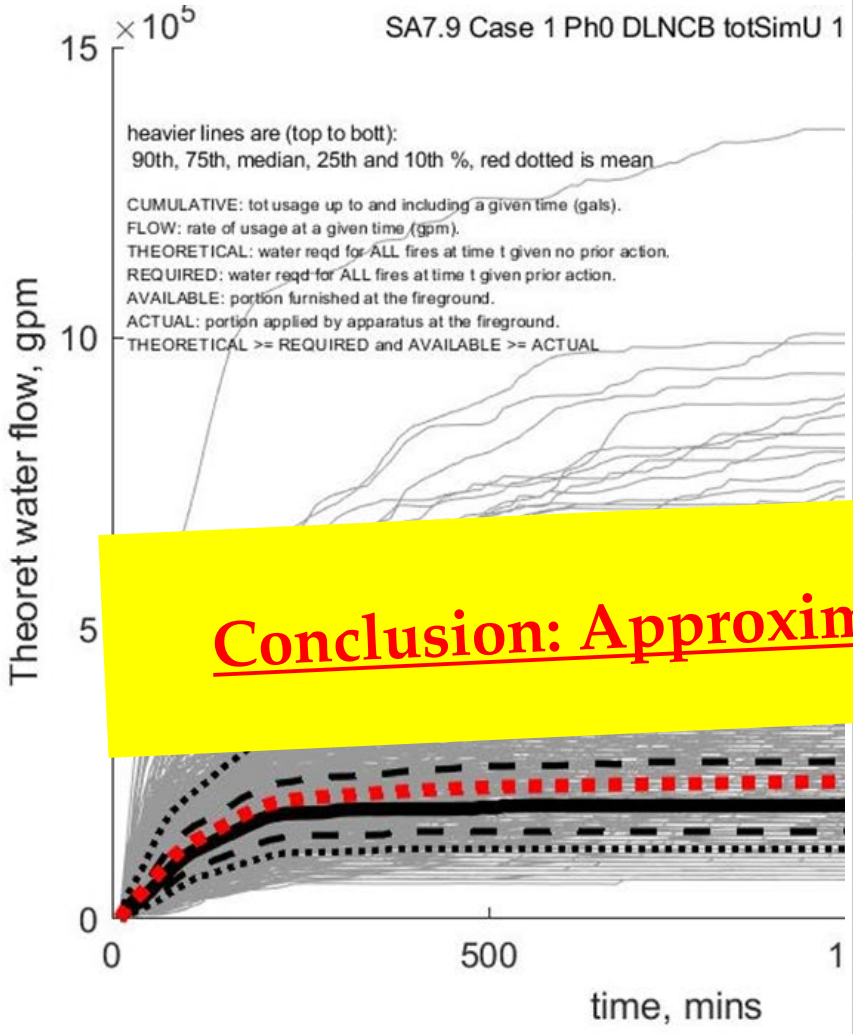




San Francisco Water Power Sewer



Neighborhood Firefighting Demand Study - Findings



Case		Total Required Water Flow (millions gallons)			Required Water Flow (gpm)		
		median	mean	75%	median	mean	75%
1	SA7.9 Ph0 DLNCB	218	284	309	165,059	228,439	243,896
2	SA7.9 Ph0 DMNCB	176	225	266	131,445	180,384	218,535
3	SA7.9 Ph0 DHNCB	162	205	246	120,072	166,243	195,212
4	SA7.9 Ph0 NENCB	141	194	223	112,510	159,258	184,002
20	SA7.9 Ph1 NEYCF	143	205	256	112,621	167,254	202,586
22	SA7.9 Ph1 NENCF	161	209	241	128,048	169,887	202,599
48	SA7.9 Ph2 NEYCF	143	213	221	113,026	178,722	176,621
50	SA7.9 Ph2 NENCF	142	194	216	112,719	159,024	173,056
64	SA7.9 Ph3 DLYCF	216	282	340	165,368	233,123	274,085
65	SA7.9 Ph3 DLYAF						85,350
							55,097
							1,481
							0,338
							8,888
						160,093	188,237
73	SA7.9 Ph3 DHYAF	216	306	371	165,255	245,180	289,105
74	SA7.9 Ph3 DHNCF	136	204	245	105,150	170,313	191,507
75	SA7.9 Ph3 DHNAF	208	254	305	157,598	198,034	237,922
76	SA7.9 Ph3 NEYCF	150	215	241	120,181	180,760	198,990
77	SA7.9 Ph3 NEYAF	208	294	334	161,549	237,548	262,762
78	SA7.9 Ph3 NENCF	144	193	236	112,664	162,089	195,184
	Min all Cases	**136**	**192**	**216**	**105,150**	**159,024**	**173,056**
	Max all Cases	**275**	**334**	**371**	**210,124**	**262,908**	**289,105**

Conclusion: Approximately 240,000 gpm is required

Seawater Supply Study

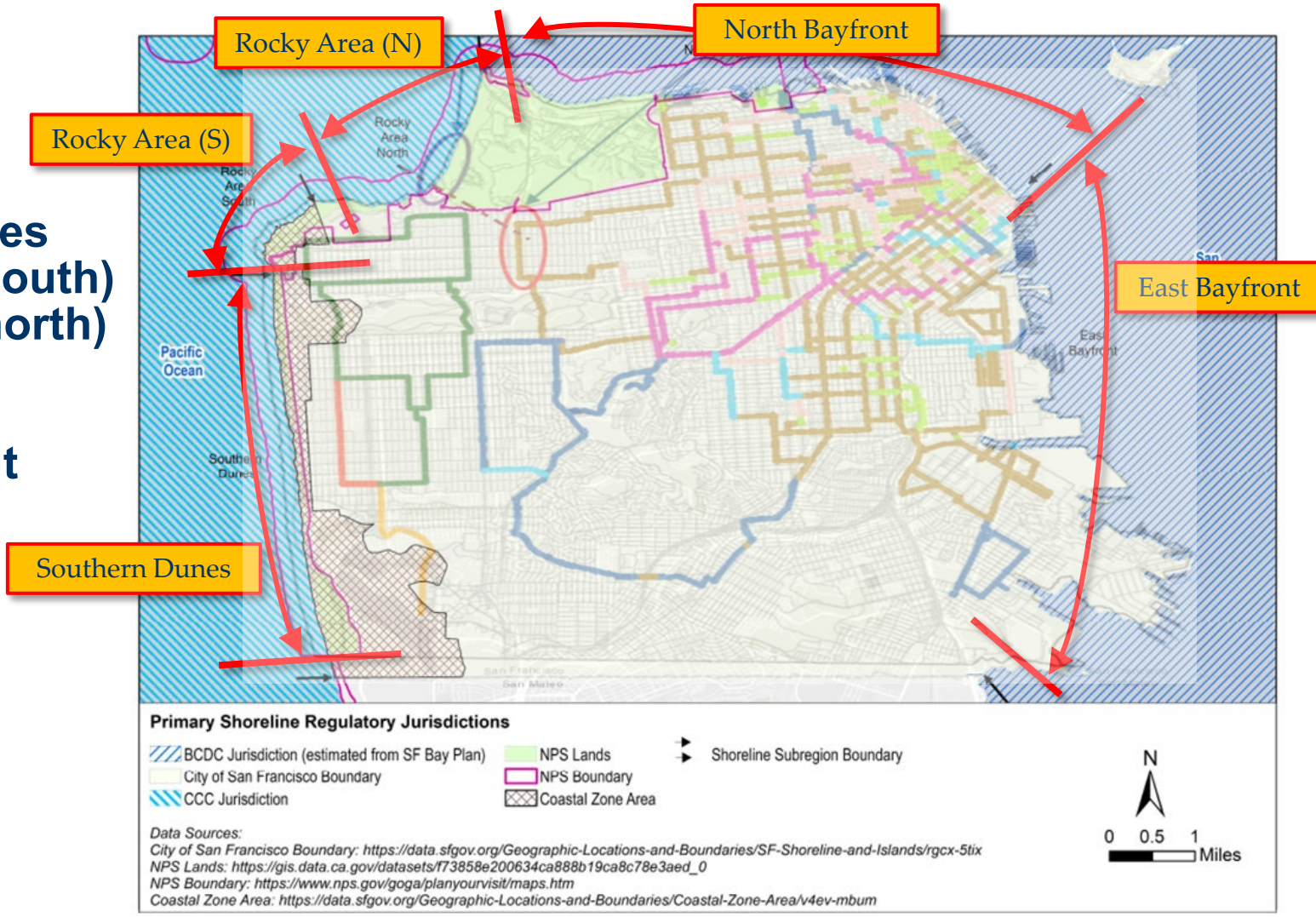
High-level Evaluation:

- Regulatory / Permitting
- Siting Considerations
- Geotechnical and Geological
- Sea Level Rise
- Engineering
- Intake Types
- Capital Cost
- Operations & Maintenance
- Operating Costs

Seawater Supply Study: Areas of Study

Ocean Side
Southern Dunes
Rocky Area (south)
Rocky Area (north)

Bay Side
North Bayfront
East Bayfront



Seawater Supply Study: Findings

Seawater pump station not immediately advised for Westside:

A. Adequate water supply to meet all firefighting demands:
   I. GPM Need for Westside: 37,000 GPM
   II. Lake Merced and Sunset Reservoir meet this need and provide multiple weeks of supply storage.

B. Difficult and lengthy permitting process
   I. Federal Permitting: Army Corps of Engineers and National Park (primary)
   II. State Permitting: California Coastal Commission (primary)
   III. Movement of Infrastructure Away from Shoreline

C. Expensive to install and maintain
   I. Costly to install
      i. $68 million for a 3,000 GPM pump station
      ii. $180 million for pump station to cover all Westside demands
   II. Costly to operate:
      i. Life Cycle: $78 million for 3,000 GPM pump station
      ii. Life Cycle: $286 million for pump station to cover all Westside demands

Seawater Supply Study: Findings Cont'd.

Recommend: expand capacity of two existing pump stations and new pump station to serve Southeast and East:

a) Water supply shortage in the areas
b) Easier to permit
c) Easier and more cost efficient to install and maintain

Proposed Citywide Plan

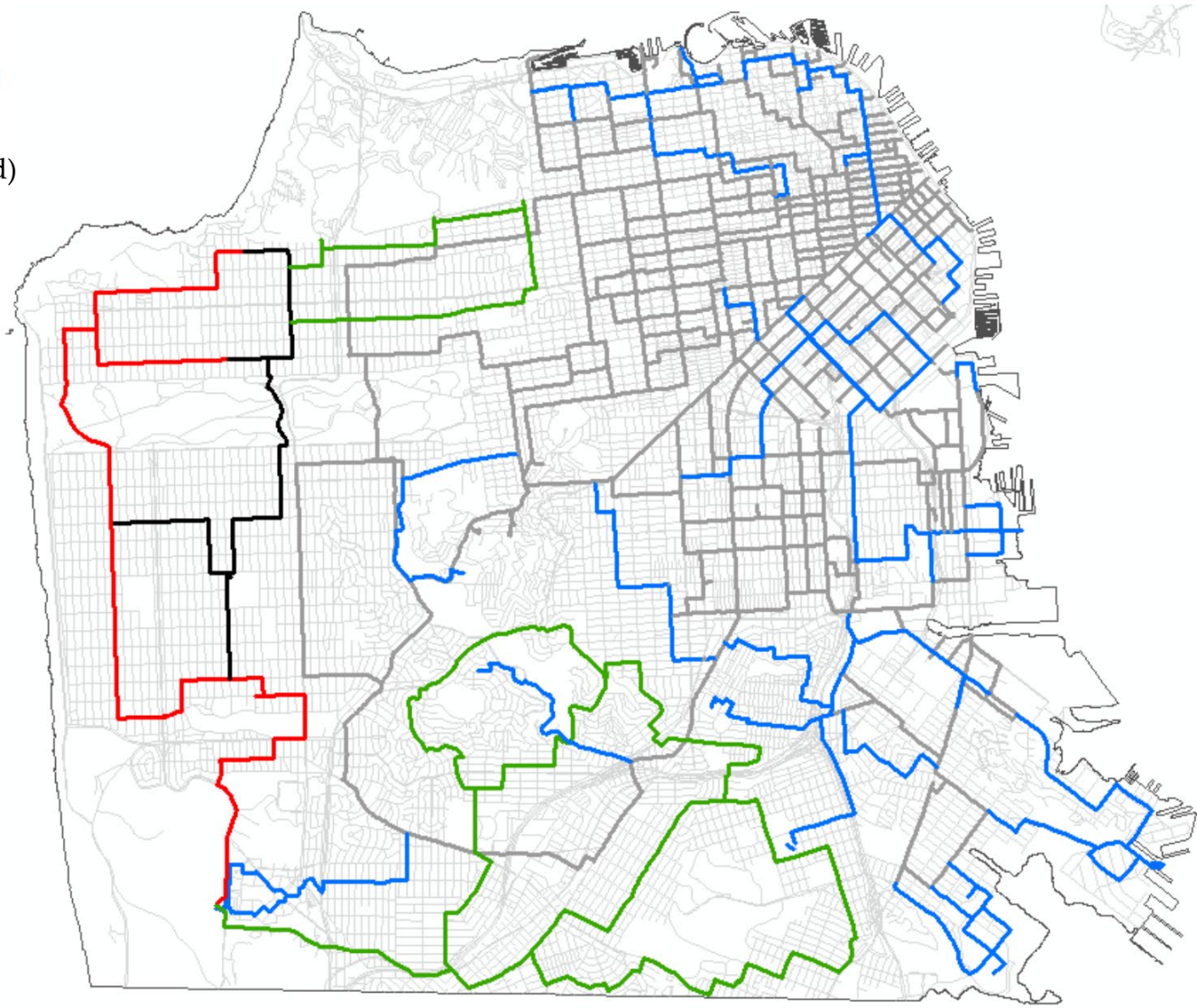
- Expand EFWS Pipelines
- Add additional water sources
- Resources for SFFD

Proposed Pipelines

Legend

EFWS and PEFWS Pipe Configuration

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

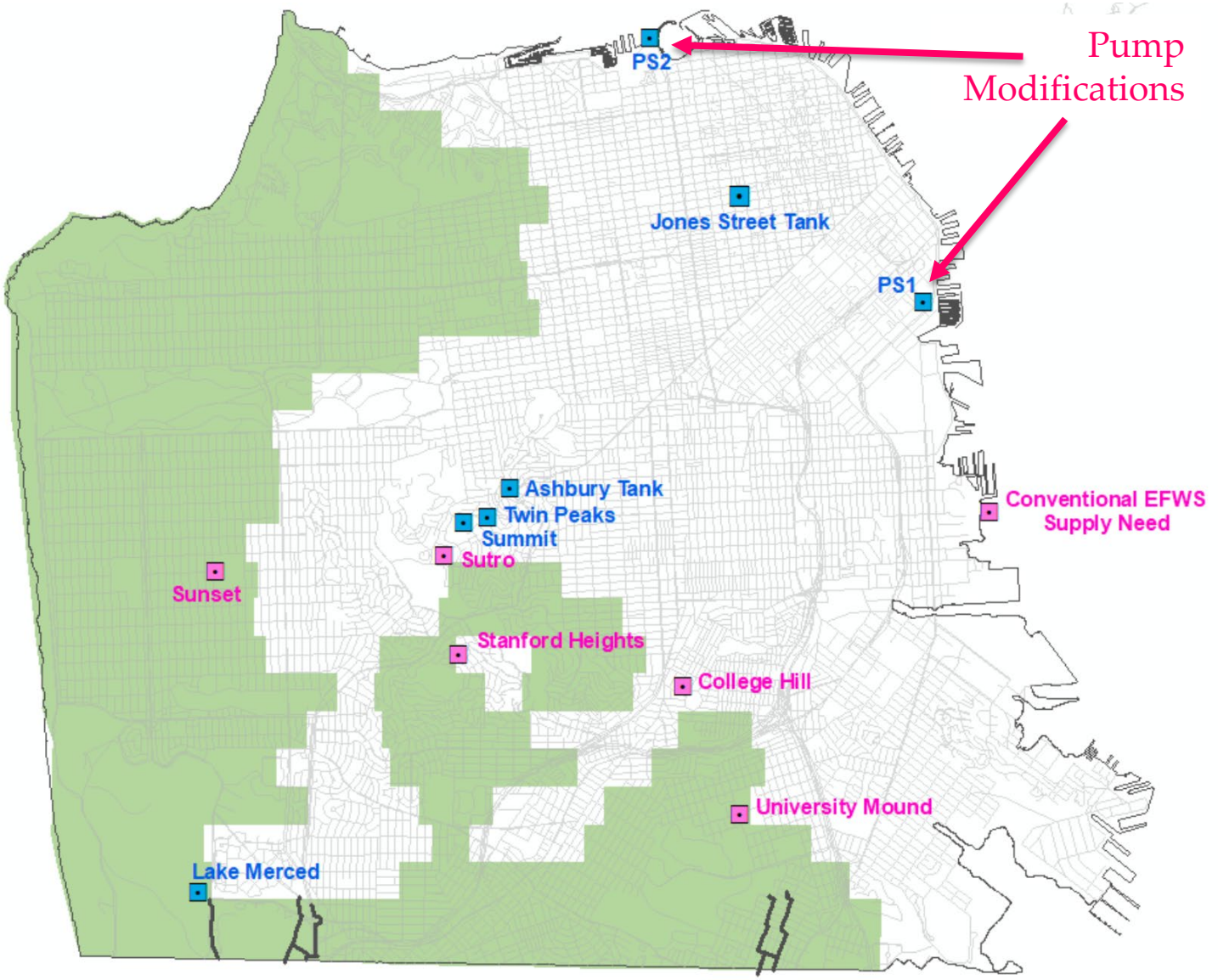


Proposed Water Sources

PEFWS Coverage

Blue = Existing/Funded

Pink = Proposed new water source



Water Sources in a Table

Supply Sources		Storage (Gallons)
Supplied by Hetch Hetchy Regional Water System	Twin Peaks Reservoir (existing)	9 million
	Ashbury Tank (existing)	500,000
	Jones St. Tank (existing)	750,000
	Summit (existing)	12.6 million
	Sutro (proposed)	27 million
	Sunset Reservoir (proposed)	158 million
	University Mound (proposed)	122 million
	College Hill (proposed)	12.2 million
	Stanford Heights (proposed)	10.8 million
Fresh Water	Lake Merced (connection funded for Phase 1 of Westside Project)	1.7 Billion

		Pump Capacity
Seawater	Pump Station 1 (existing)	10,000 GPM
	Pump Station 2 (existing)	10,000 GPM
	Pump Stations 1 & 2 Modifications (proposed)	60,000 GPM
	Conventional EFWS Supply Need (proposed)	

Program Costs

	Project Costs ($M) Unescalated (2021$)
Pipelines	
Potable EFWS (1)	$ 420
Conventional EFWS	$ 510
Pump Stations and Facilities	$ 700
Total	**$ 1,630**

(1)Excludes previously funded Phase 1 of Westside Potable EFWS

Program Costs - Escalation

	Project Costs ($M) Escalated (2)	
	15-Year Construction Period (3)	25-Year Construction Period (3)
Pipelines		
Potable EFWS (1)	$ 670	$ 840
Conventional EFWS	$ 830	$ 1,030
Pump Stations and Facilities	$ 1,140	$ 1,420
Total	**$ 2,640**	**$ 3,290**

(1)Excludes previously funded Phase 1 of Westside Potable EFWS
(2)5-year planning/design
(3)Assumes 4% annual escalation

Summary

- Present and future firefighting water needs have been quantified through 2050
- City-wide plan for EFWS to meet future demands has been developed
- Cost of improvements is $1.6B (2021$)
- SFFD resources for best use of EFWS
- Planning concept will be optimized in future phases

San Francisco Water Power Sewer

Questions?