Emergency Firefighting Water System Update

John Scarpulla, SFPUC

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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
- Hydraulic modeling utilized to guide decision making.

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Partnership

- Evaluation of EFWS when transferred to SFPUC:
  - Using modern seismic resilience capability analysis looking for vulnerabilities, leading to immediate and future projects
  - 47% system reliability for median flow of water needed by SFFD to fight fires after 7.8 earthquake
- Since 2010 - SFPUC, SFFD, and Public Works have been implementing projects to improve the EFWS.
- Projects completed utilizing Earthquake Safety and Emergency Response Bonds:
  - 2010 Bond: $102 million for EFWS capital projects
  - 2014 Bond: $54 million for EFWS capital projects
  - 2020 Bond: $153.5 million for EFWS capital projects

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Today's Topics – Updates on Reports

- *By June 30, 2021, continue and complete the more detailed analysis of emergency firefighting water needs by neighborhood.*

- *By June 30, 2021, complete a study analyzing additional EFWS seawater pump stations.*

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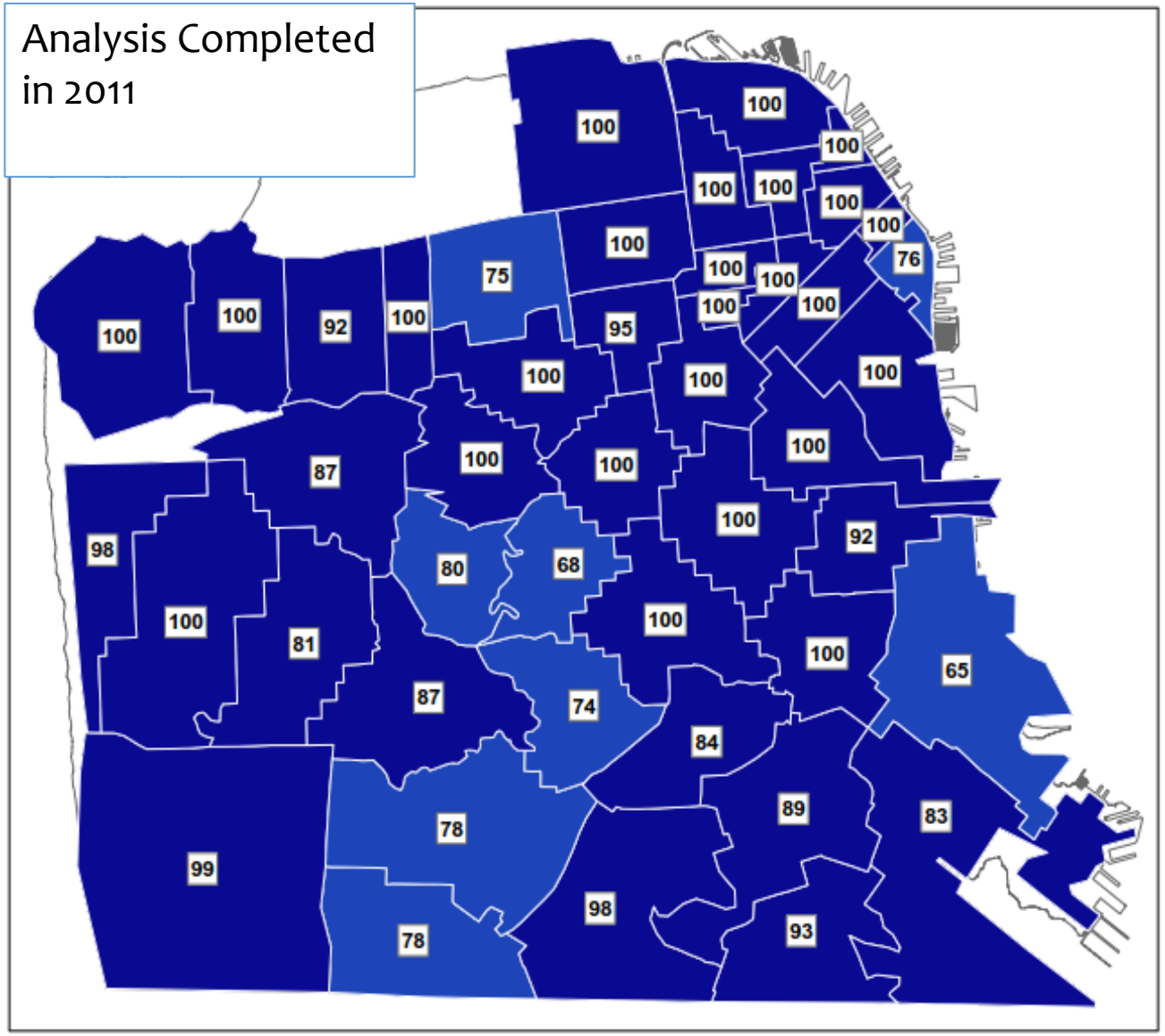
Refine Neighborhood Analysis

Analysis Completed in 2011



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Neighborhood Firefighting Needs

- Refine earthquake ***firefighting water needs.*** *Update and "Zoom in".*
- Based on:
  - Seismological, geotechnical, building inventory (materials, density, sprinkler systems, etc.), vegetation, SFFD resources and other data
  - City buildings: current and future growth
  - EFWS
    – current and extended
- Current and for 2030, 2040, 2050

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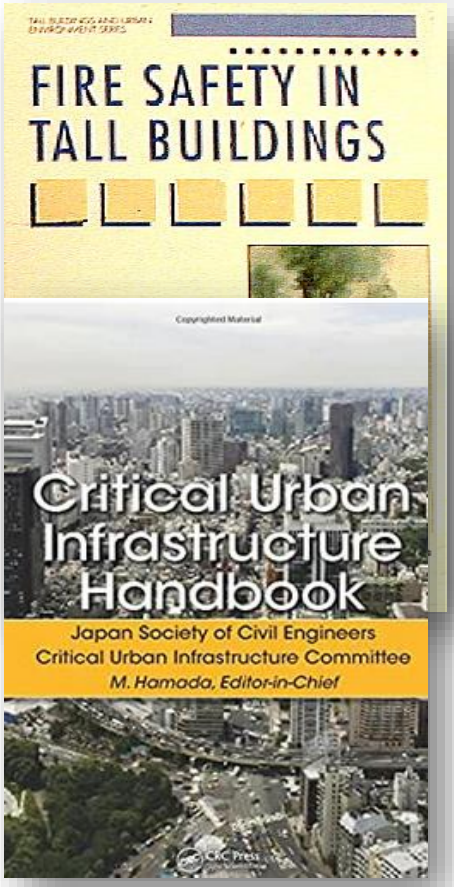
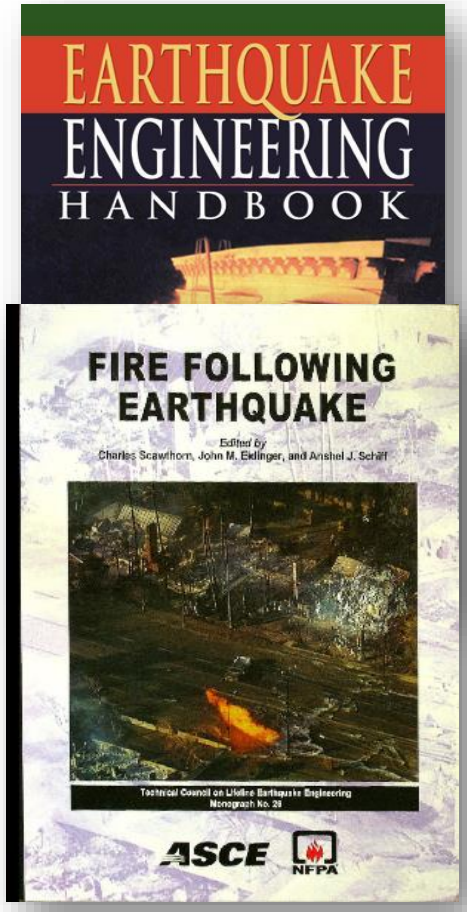
Project background

- Key step in upgrading EFWS
- Update to previous work
- Began in 2018
- Civil Grand Jury report





Project team

SFPUC

- David Myerson, P.E
- Ada Zhu, P.E.
- Leroy Gullette, P.E.

SFFD

- Chief Dawn Dewitt
- Capt. Brent Stuckert

AECOM

- Craig Smith, P.E.
- Derrick Wong, P.E.

SPA Risk:

- Prof. Charles Scawthorn, S.E.

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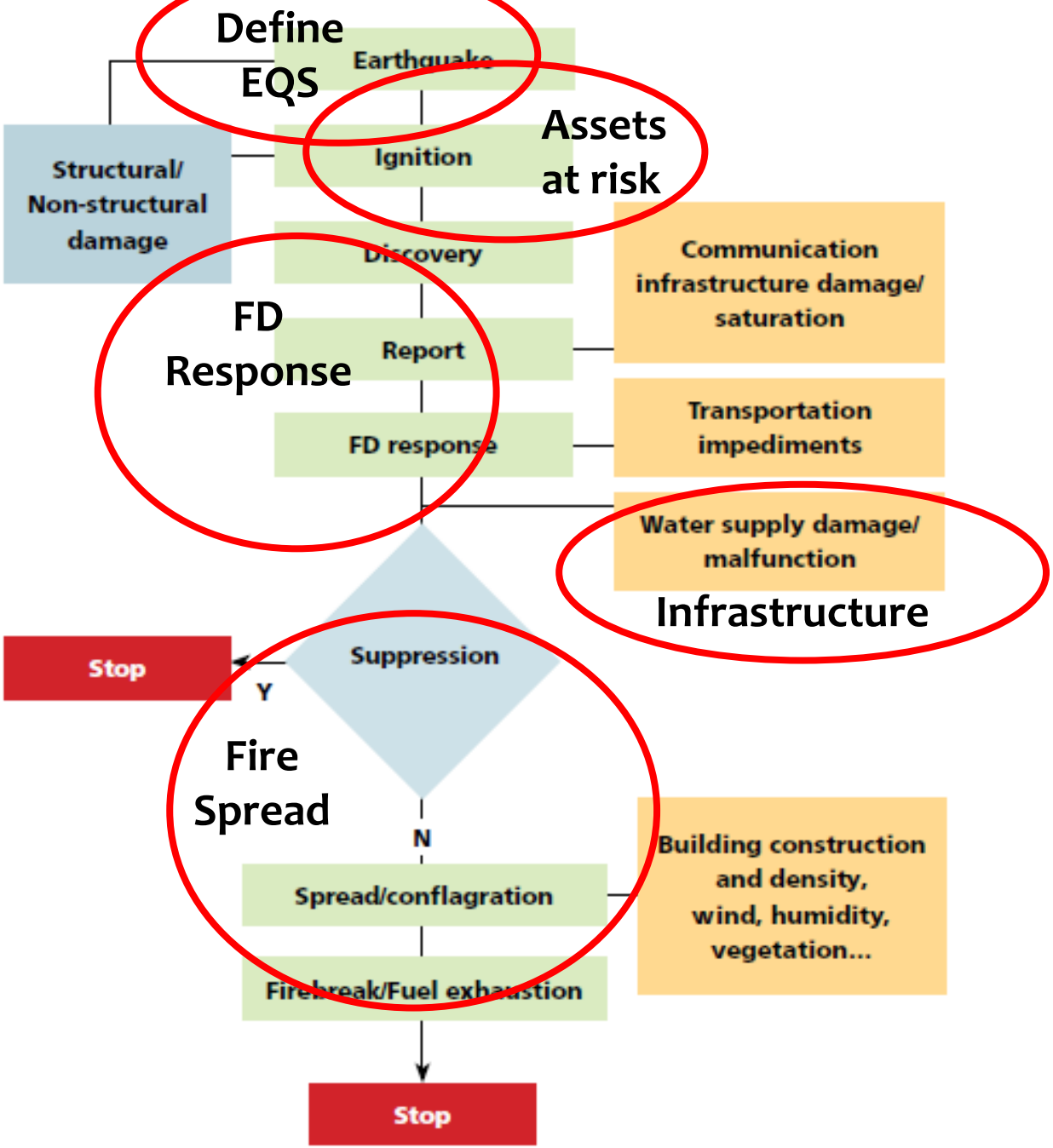
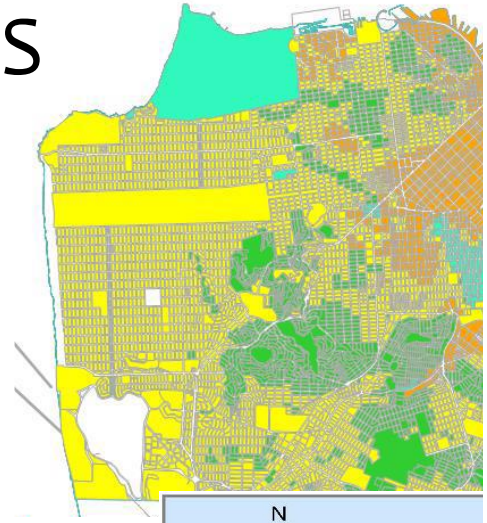
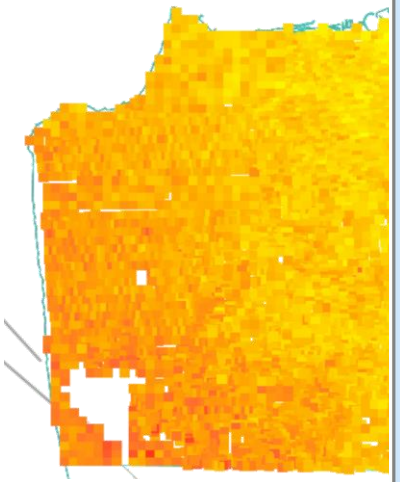

Define EQS
Earthquake
Assets at risk
Structural/ Non-structural damage
Ignition
Discovery
Communication infrastructure damage/ saturation
FD Response
Report
Transportation impediments
FD response
Water supply damage/ malfunction
Infrastructure
Stop
Suppression
Y
Fire Spread
N
Building construction and density, wind, humidity, vegetation...
Spread/conflagration
Firebreak/Fuel exhaustion
Stop

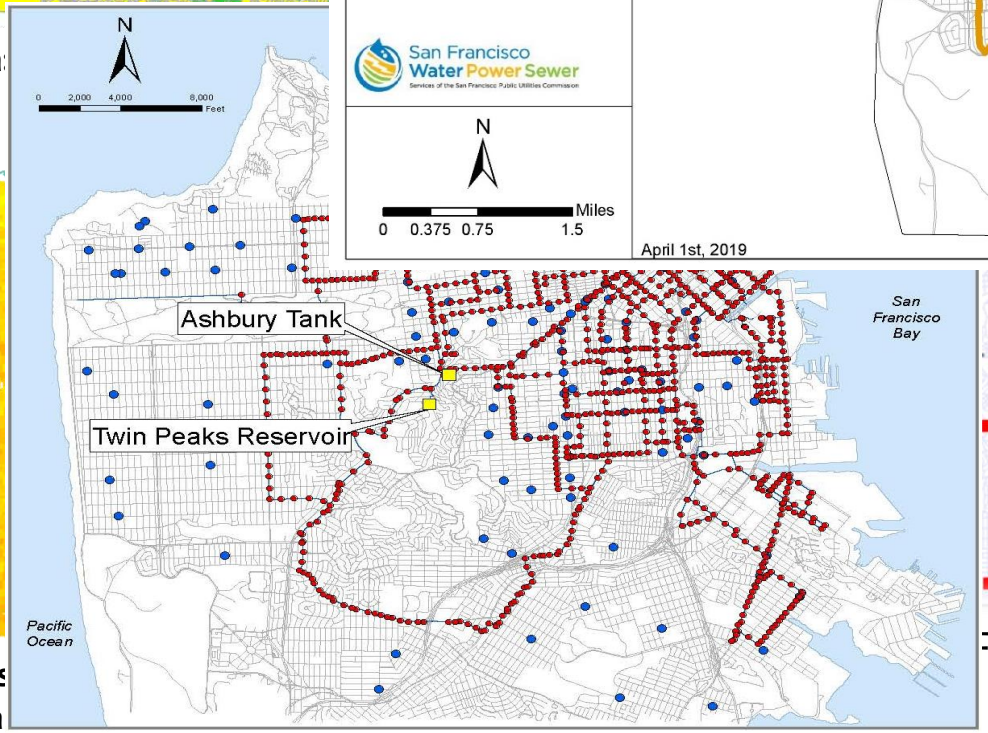
INPUTS

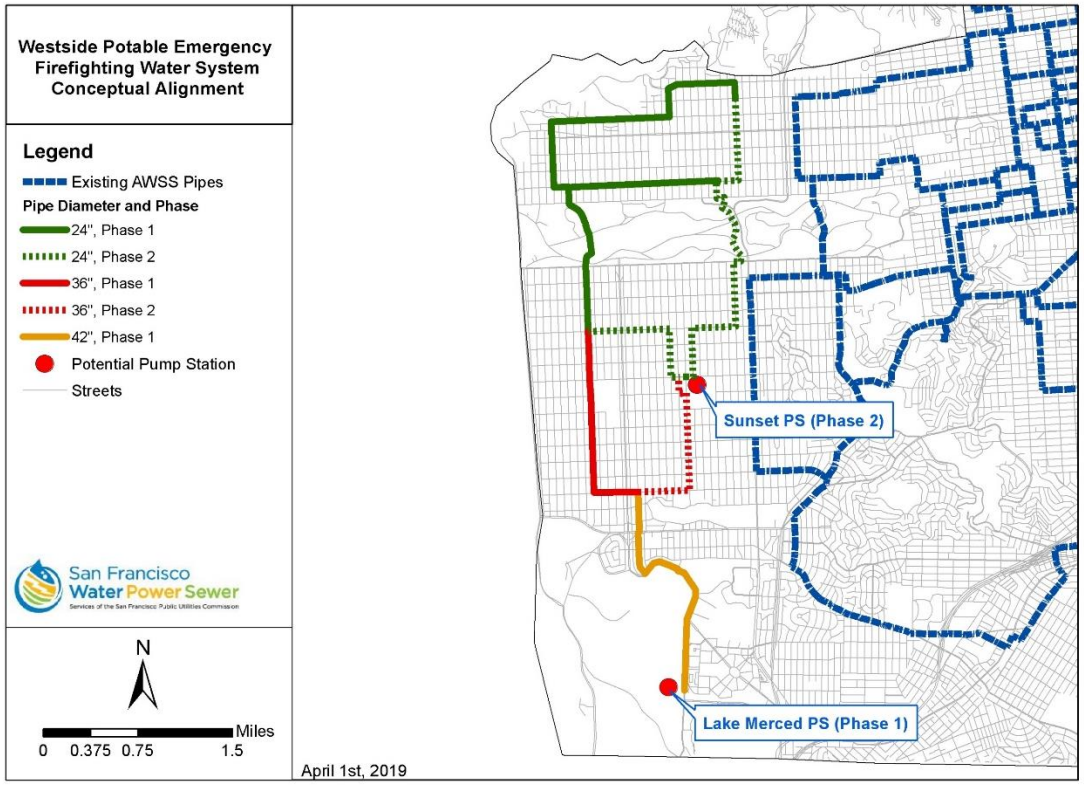


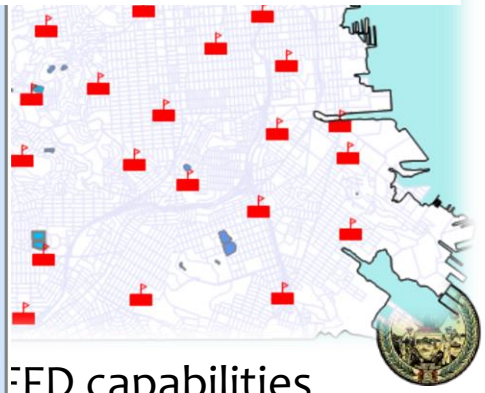
Building data



1. **Mw 7.9 on San Andreas**
2. Mw 7.0 on same fault a
3. Mw. 7.05 on Hayward fault







FD capabilities

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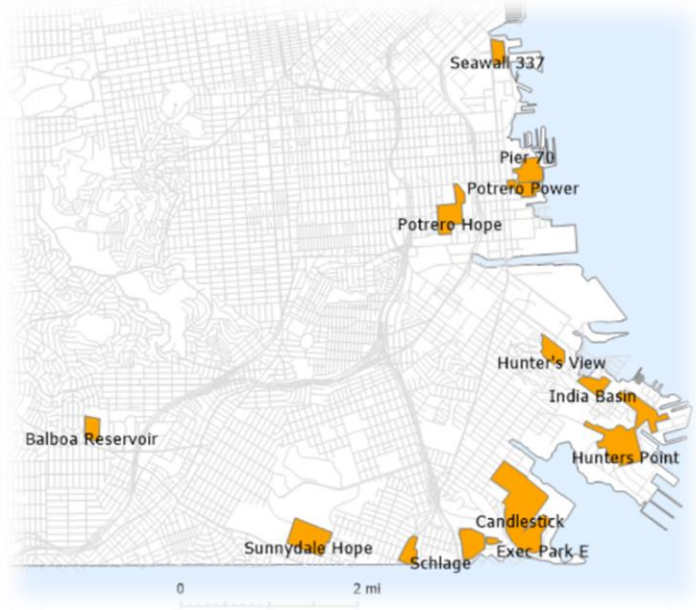
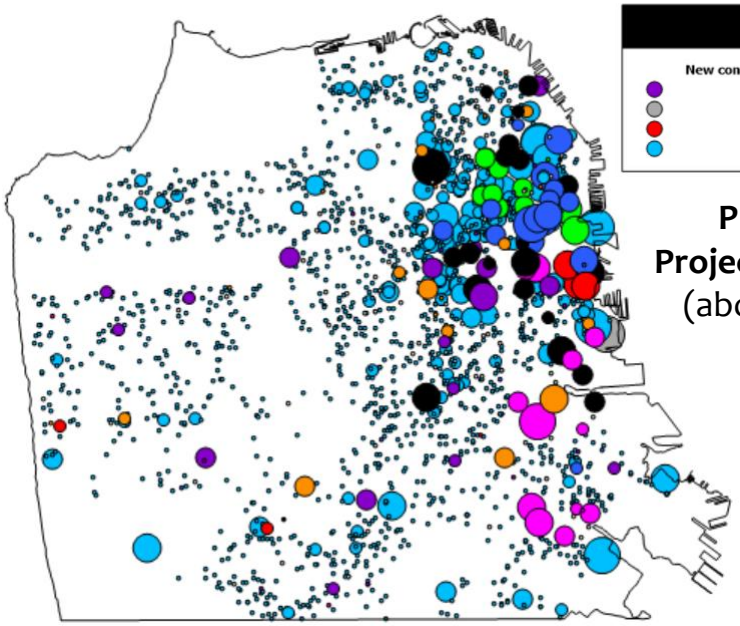
Analysis for 2020, 2030, 2040, and 2050



- 12 Projects 2020-2035
- 60 million sq ft floor area (7% entire city)
- $17 billion construction



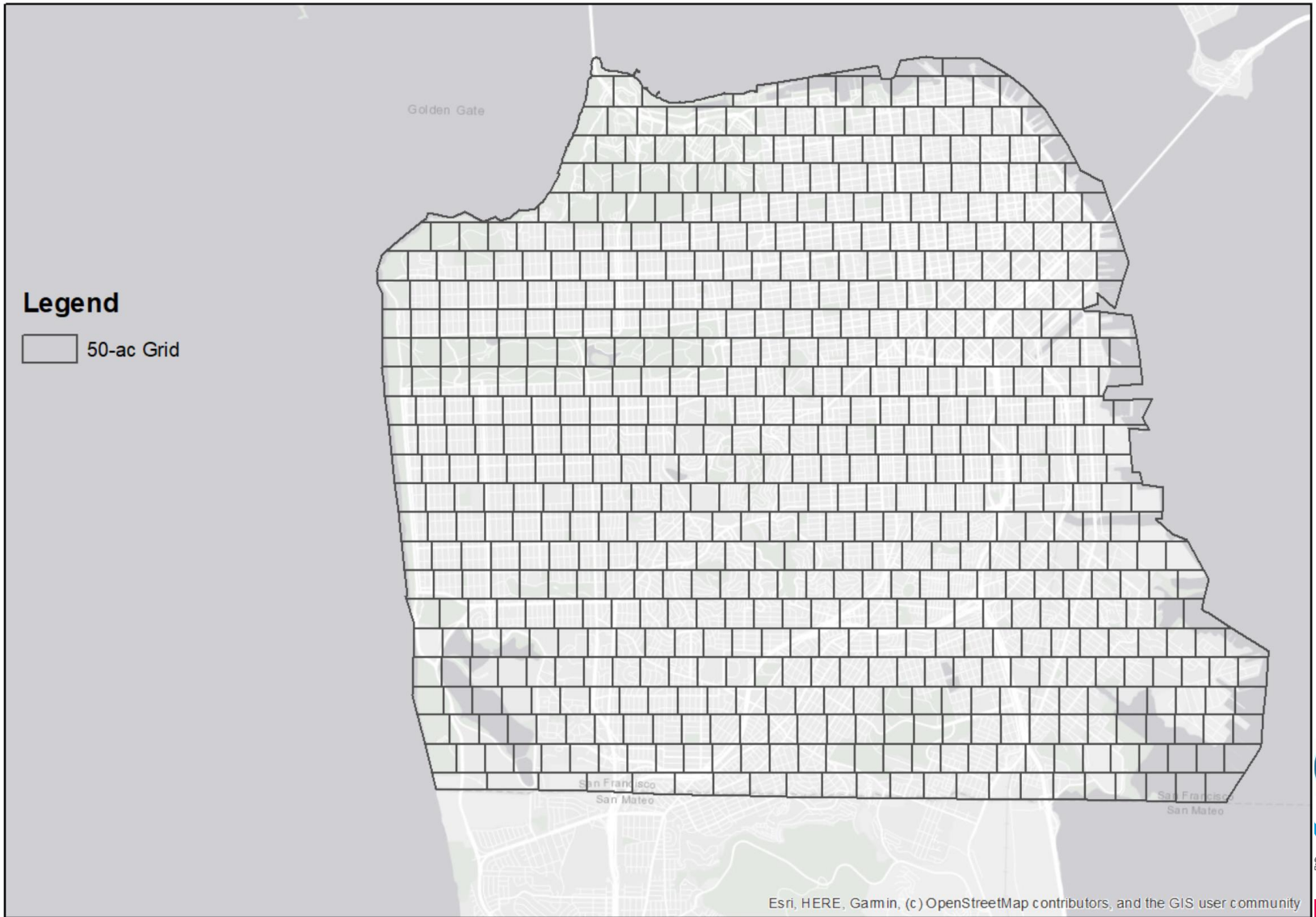
Planning Department Project Development Pipeline
(about 5 years of projects)
45 million sq ft TFA

Best estimates – some uncertainty

Year	2020	2030	2040	2050
Population	883,000	960,000	1,035,000	1,112,000
Bldg GSF (mills)	877	970	1,071	1,184
GSF growth	0%	11%	22%	35%

Data Source: San Francisco Planning Department

Future Deliverables: 2020-2050 Maps



Next Steps: Neighborhood Fire Analysis

- Continue to refine inputs for model simulations for 2020, 2030, 2040, and 2050.
- Complete maps for 2020, 2030, 2040, and 2050.
- Use the analysis to inform the development of the comprehensive, citywide EFWS action plan (due to Board: 12/31/2021)

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Seawater Pumpstation Report

High-level Evaluation:

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

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Regulatory & Permitting

Primary Shoreline Regulatory Jurisdictions

- **Ocean side:** California Coastal Commission (CCC) & National Park Service (NPS)
- **Bay side:** SF Bay Conservation and Development Commission (BCDC) & NPS

Secondary Shoreline Regulatory Jurisdictions

- **Ocean side:** State Lands Commission; State Water Resources Control Board; Regional Water Quality Control Board; US Army Corps of Engineers; National Marine Fisheries Service (NMFS); California Department of Fish and Wildlife (CDFW); U.S. Coast Guard (USCG)
- **Bay side:** All of the above, plus Port of San Francisco

City Interior Potentially Affected Regulatory Jurisdictions

- City Planning Department; California Department of Transportation (Caltrans); Regional Transit Agencies; Region 2 Water Quality Control Board; Presidio Trust; CDFW; U. S. Fish and Wildlife Service (UFWS); California State Parks (East Bayfront); and Bay Area Air Quality Management District (BAAQMD)

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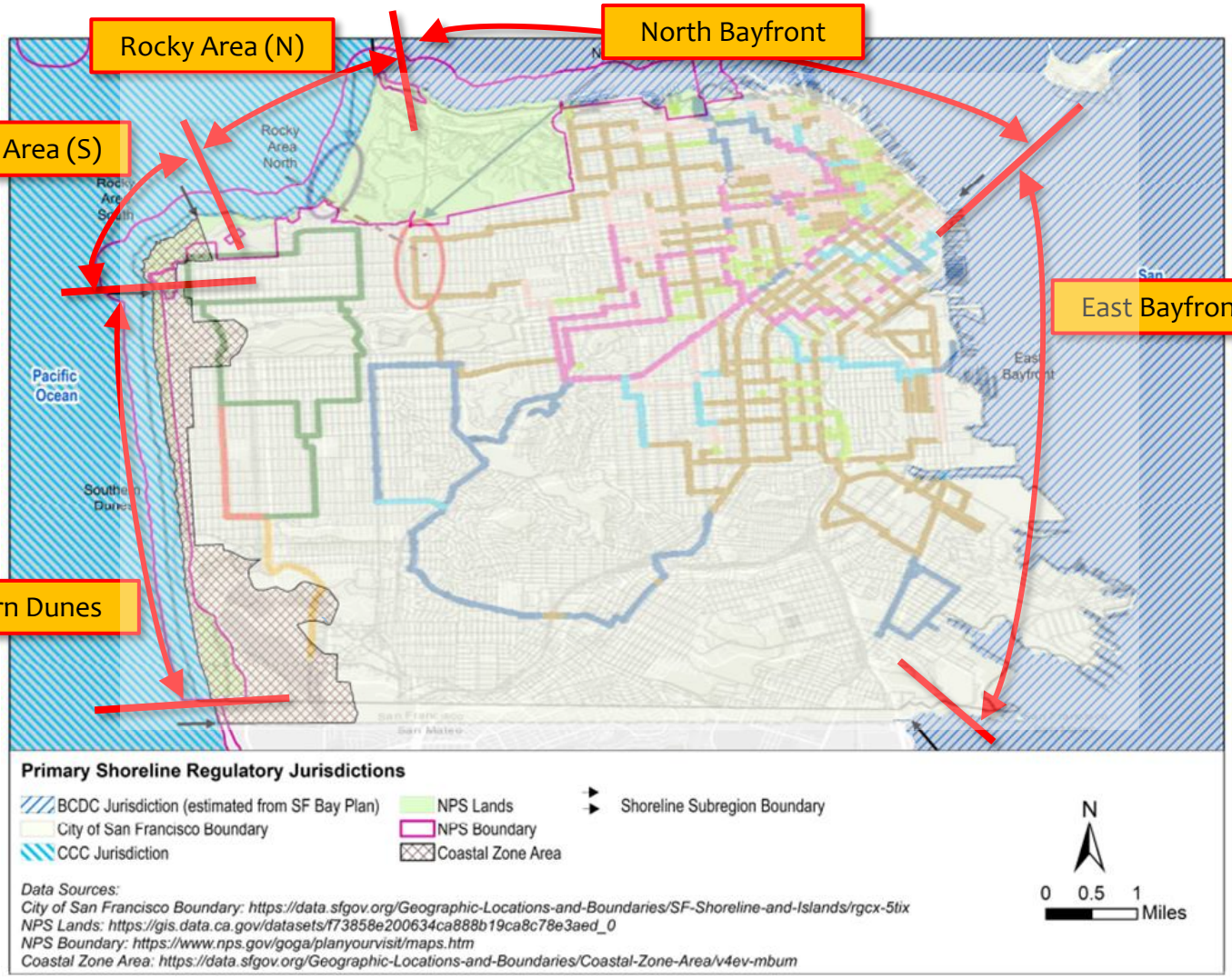
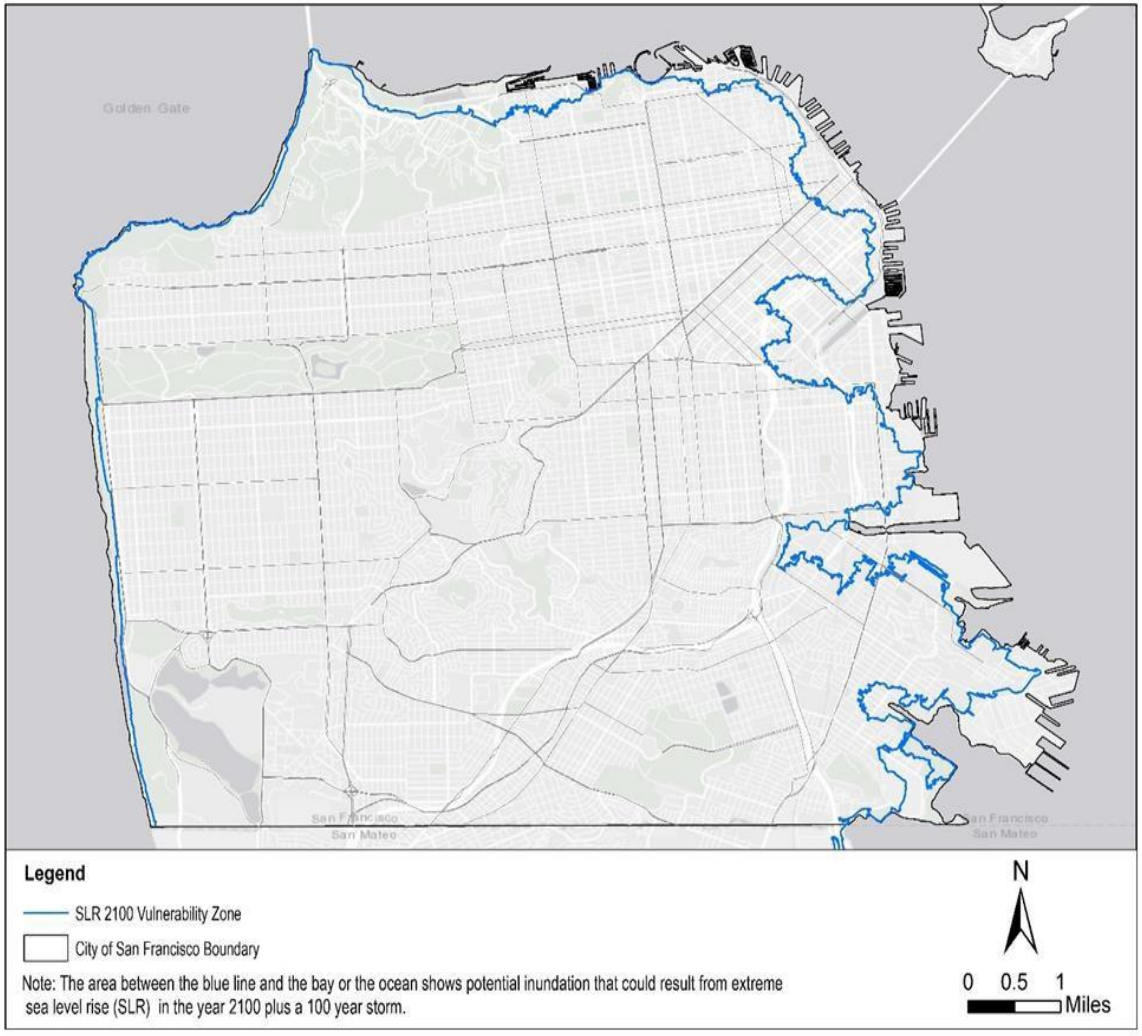
Areas of Study

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

Bay Side
North Bayfront
East Bayfront



Sea level Rise & Inundation Zones



MITIGATION MEASURES:

Hazard Avoidance

Inland or at higher elevation

Protection

Site Modifications

Raising grade

Elevating sensitive components

Flood-proofing structures

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Geological and Geotechnical

Figure 7-7: Geologic Map of San Francisco

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Elevations Analysis

Figure 5-3: Typical Cross Section – Sloat Boulevard

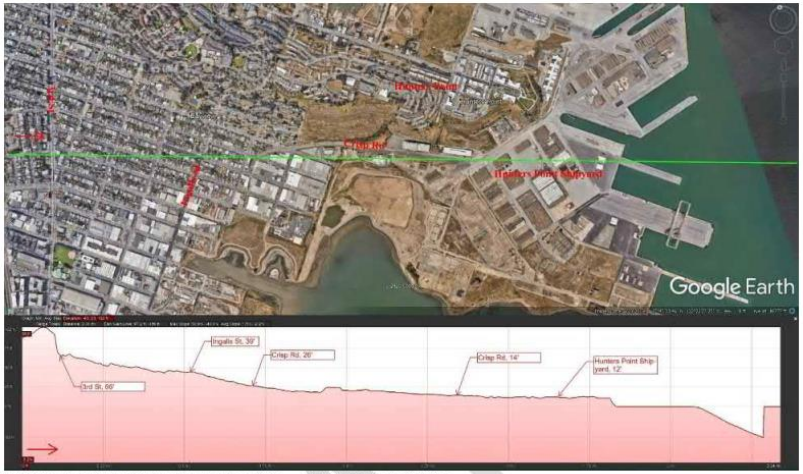

Figure 5-15: Typical Cross Section – Hunters Point Area

Figure 5-7: Typical Cross Section – Lands End Area

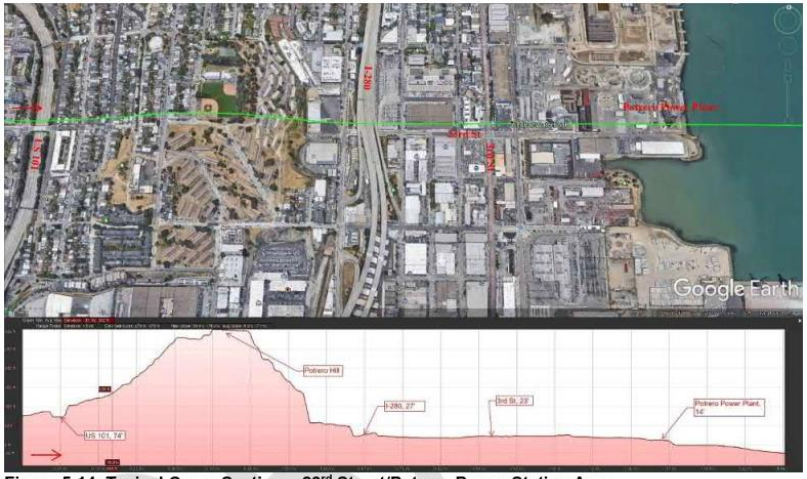

Figure 5-14: Typical Cross Section – 23rd Street/Potrero Power Station Area

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Engineering Factors to Consider

- Distance from the shoreline to the closest tie-in point of the EFWS and the elevation differences between these locations.
- Use pipeline lengths and elevations to understand pipe diameters and pump discharge pressures needed for flows ranging from 10,000 to 50,000 gpm.
- The sizes of new piping to connect new seawater intakes to the existing EFWS for flows in the 10,000 to 50,000 gpm range may require “up-sizing” (increasing the diameter) of existing EFWS piping in certain areas

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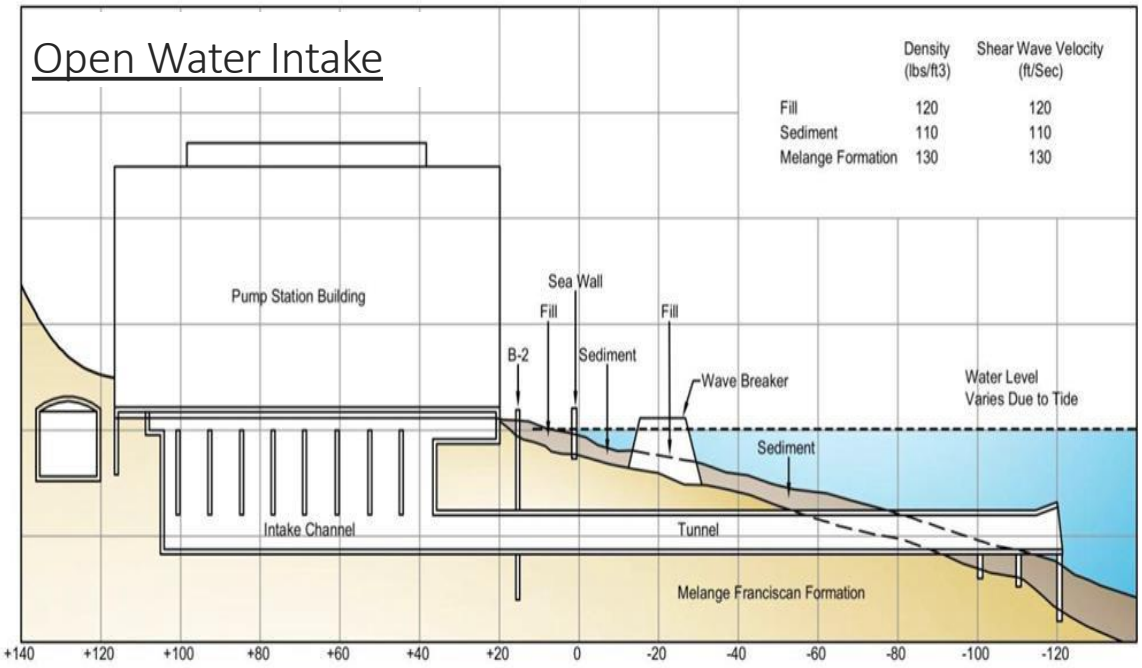
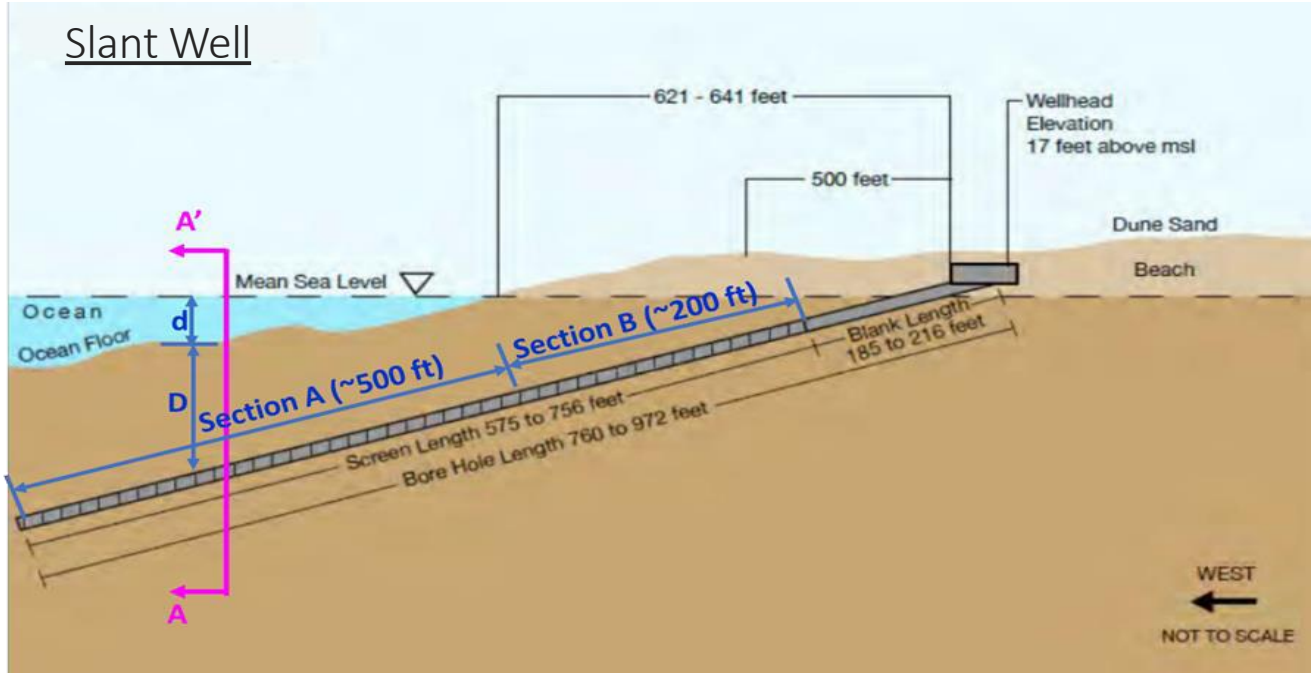
Pump Station Type





Next Steps – Seawater Report

- Continue engineering and analysis, including assessment of flow requirements, refinement of engineering aspects, and environmental / permitting requirements.

- Develop capital and operations and maintenance costs for a wide variety of options.

- Use the analysis to inform the development of the comprehensive, citywide EFWS action plan (due to Board: 12/31/2021)

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Next Steps - Programmatic

- Complete two reports (Seawater and Neighborhood demands) and submit to the Board by June 30, 2021.

- By December 31, 2021, develop and submit a comprehensive, citywide EFWS action plan.

- Present at the Board in July 2021 and January 2022

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Questions?

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