



# City-Wide Flooding and Community Flood & Storm Protection Initiative

July 2023

# OBJECTIVES

- 1 Provide overview of the City's stormwater system
- 2 Review preliminary findings by Schaaf & Wheeler on New Year's Eve flooding
- 3 Discuss Community Storm and Flood Protection Initiative
- 4 Listen to community concerns

# Background

## Watersheds



### Population

105,000



### Area

12 sq. mi.  
land

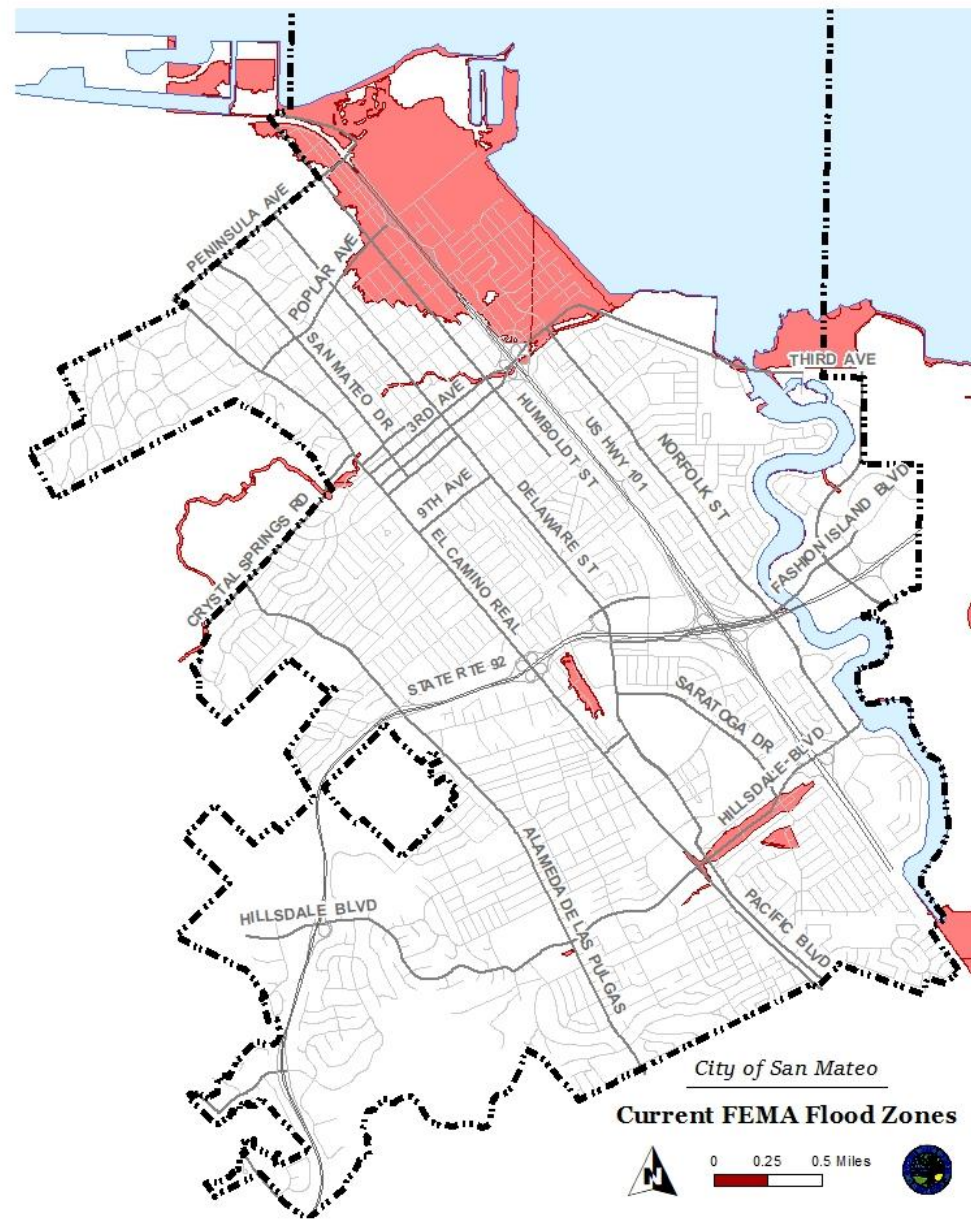


### Seven major watersheds

- North Shoreview District
- San Mateo Creek
- East Third Avenue
- 16<sup>th</sup> Avenue
- 19<sup>th</sup> Avenue
- Laurel Creek
- Direct drainage to Marina Lagoon

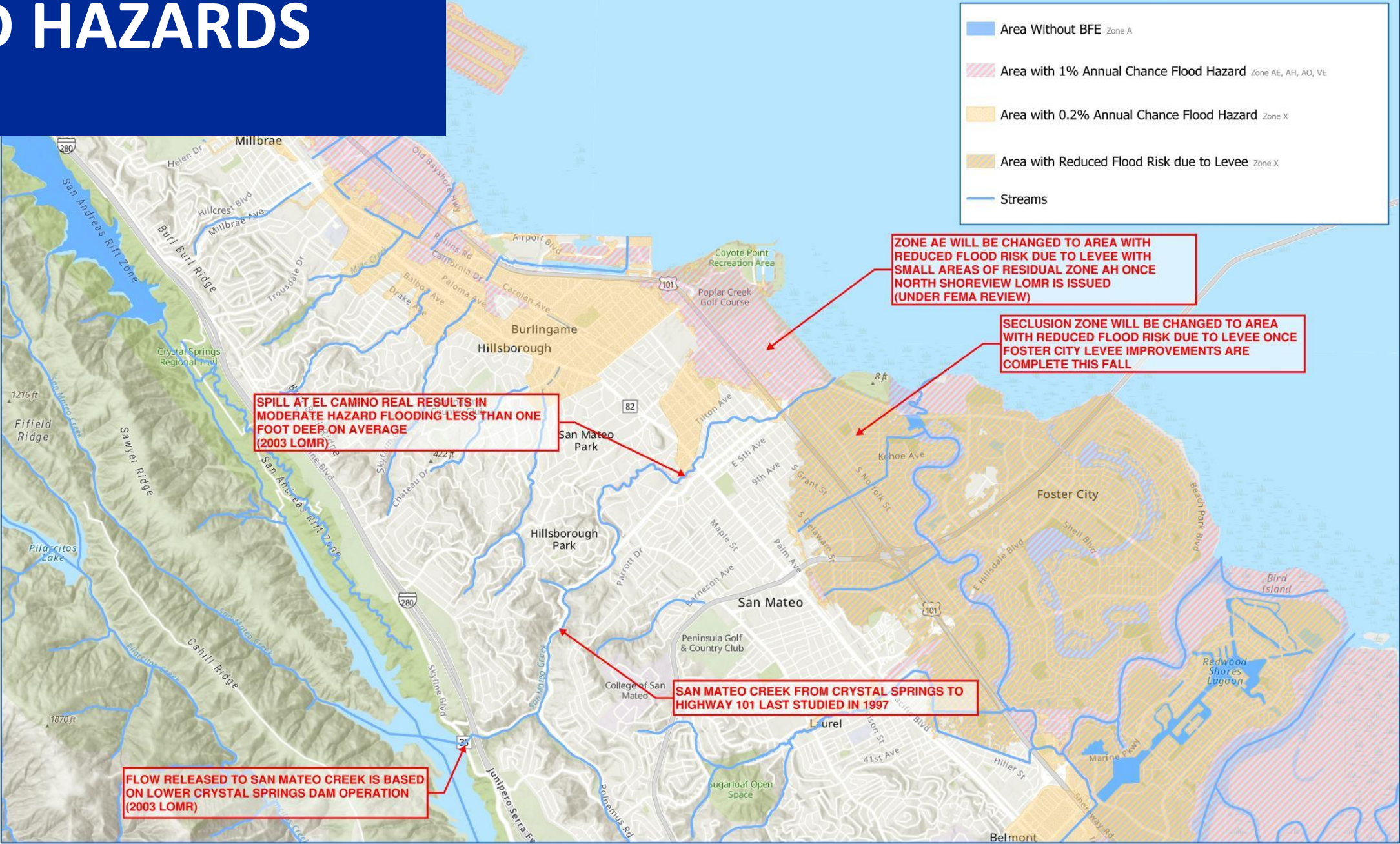


# FEMA 100 Year Flood Zones





# FLOOD HAZARDS



# Stormwater System

Our stormwater system is comprised of:



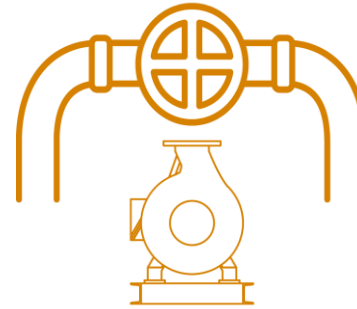
**130 miles**  
of storm drains



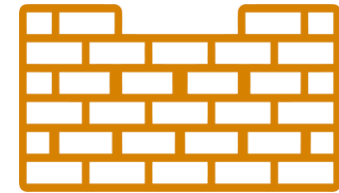
**20 miles**  
open creeks &  
drainage channels



**1**  
flood control  
lagoon  
(Marina Lagoon)



**10**  
pump stations

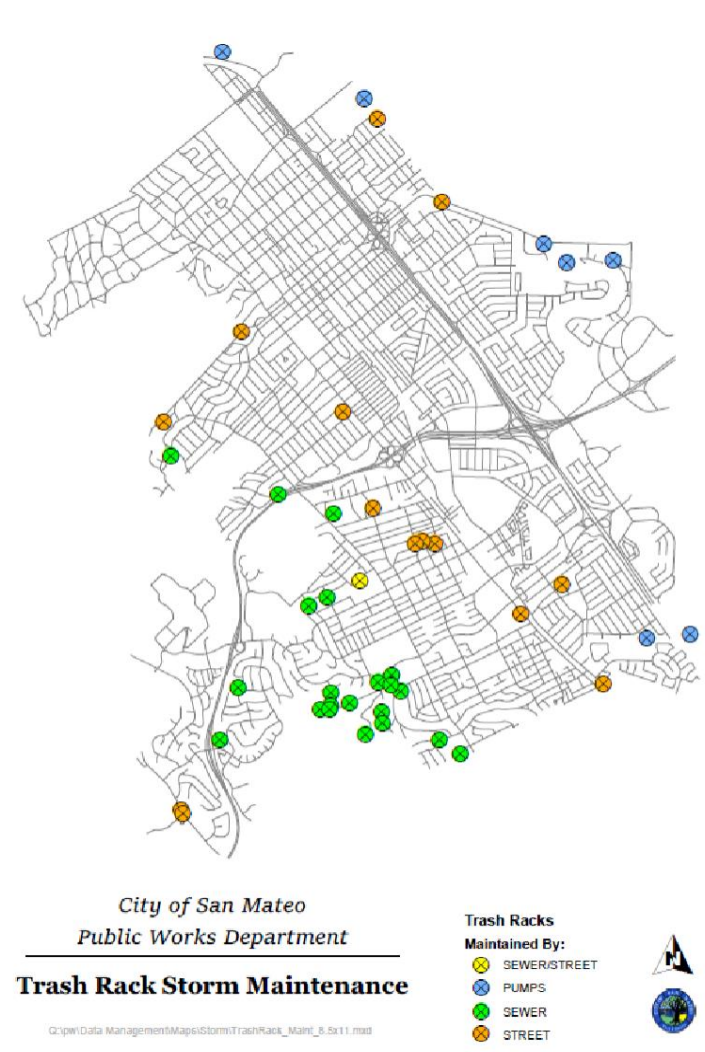
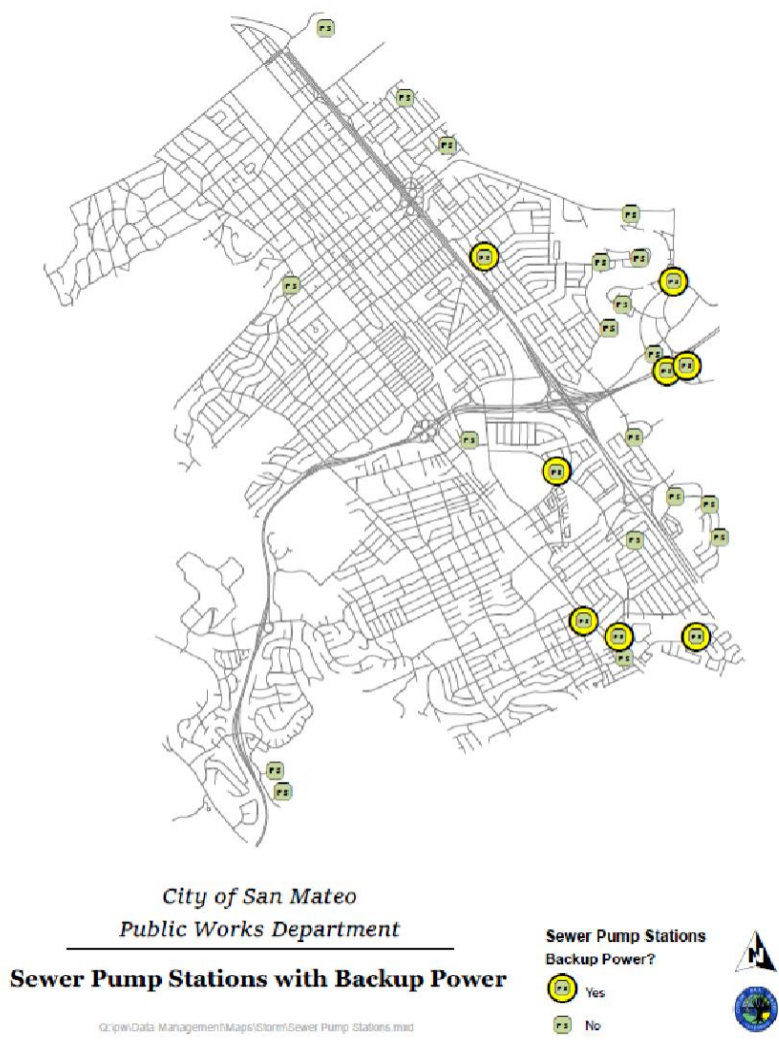
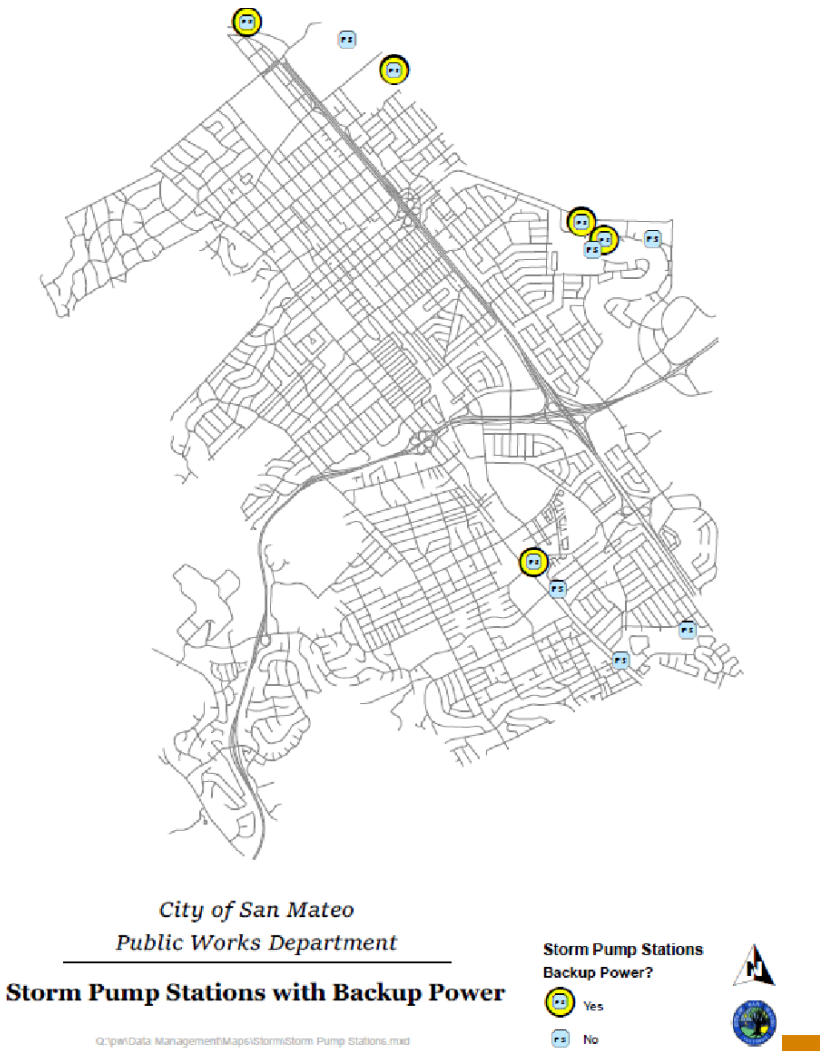


**3-mile**  
Bayfront levee

Our stormwater system was built in the middle of the 20th century and is **aged** and **degraded**.



# Pump Stations and Trash Racks



# San Mateo Levees







# A Closer Look

## The Marina Lagoon System

### Inflow:

- O'Neill Tide Gate (south end)
- Creeks/Channels
  - Laurel Creek
  - 19th Avenue Channel/Borel Creek
  - 16th Avenue Channel/Leslie Creek
- Direct Marina Lagoon Drainage
- Fill Pump (north end)
  - 1 – 75,000 gallons per minute (gpm) pump

### Outflow:

- Discharge Pumps
  - 5 – 150,000 gpm pumps

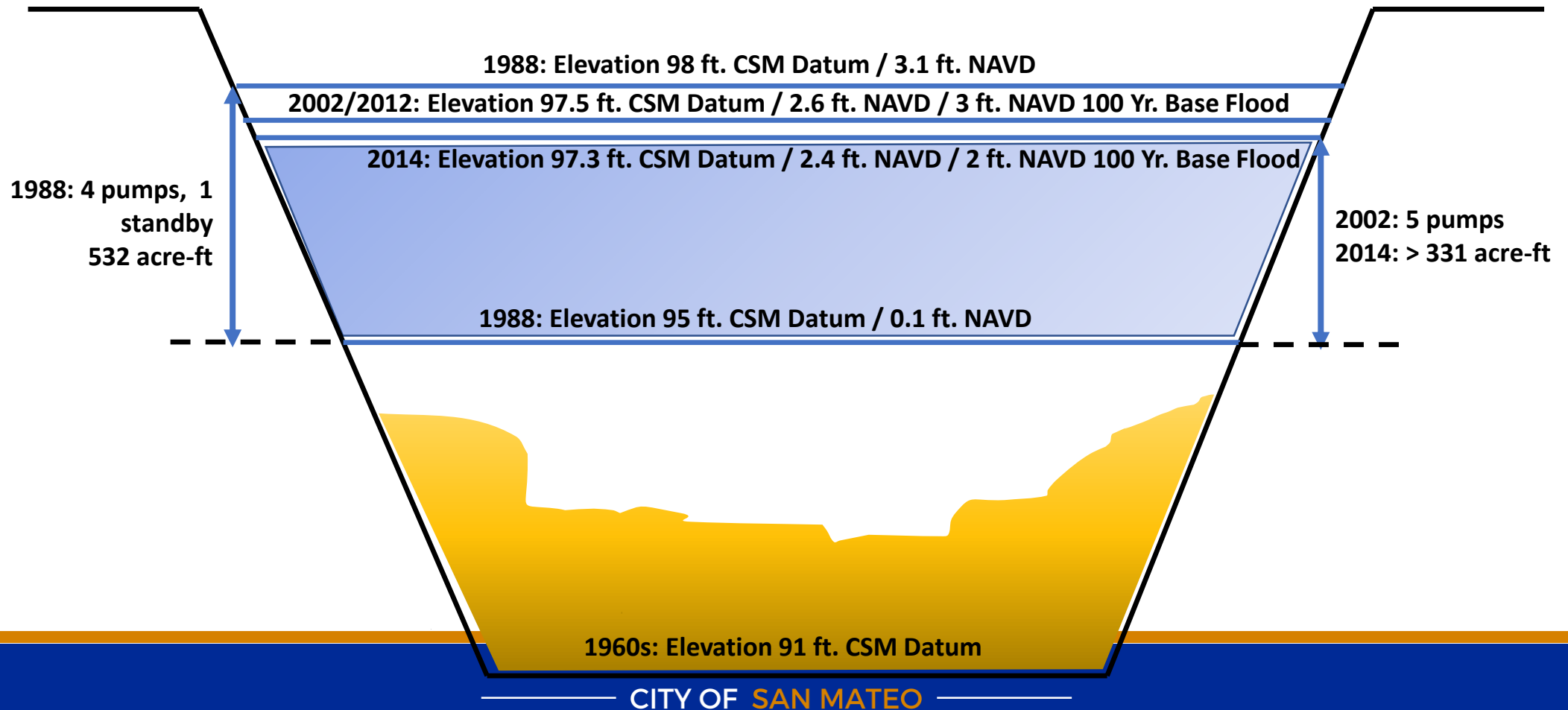


# MARINA LAGOON PUMPS



# PUMP OPERATION

## Volume

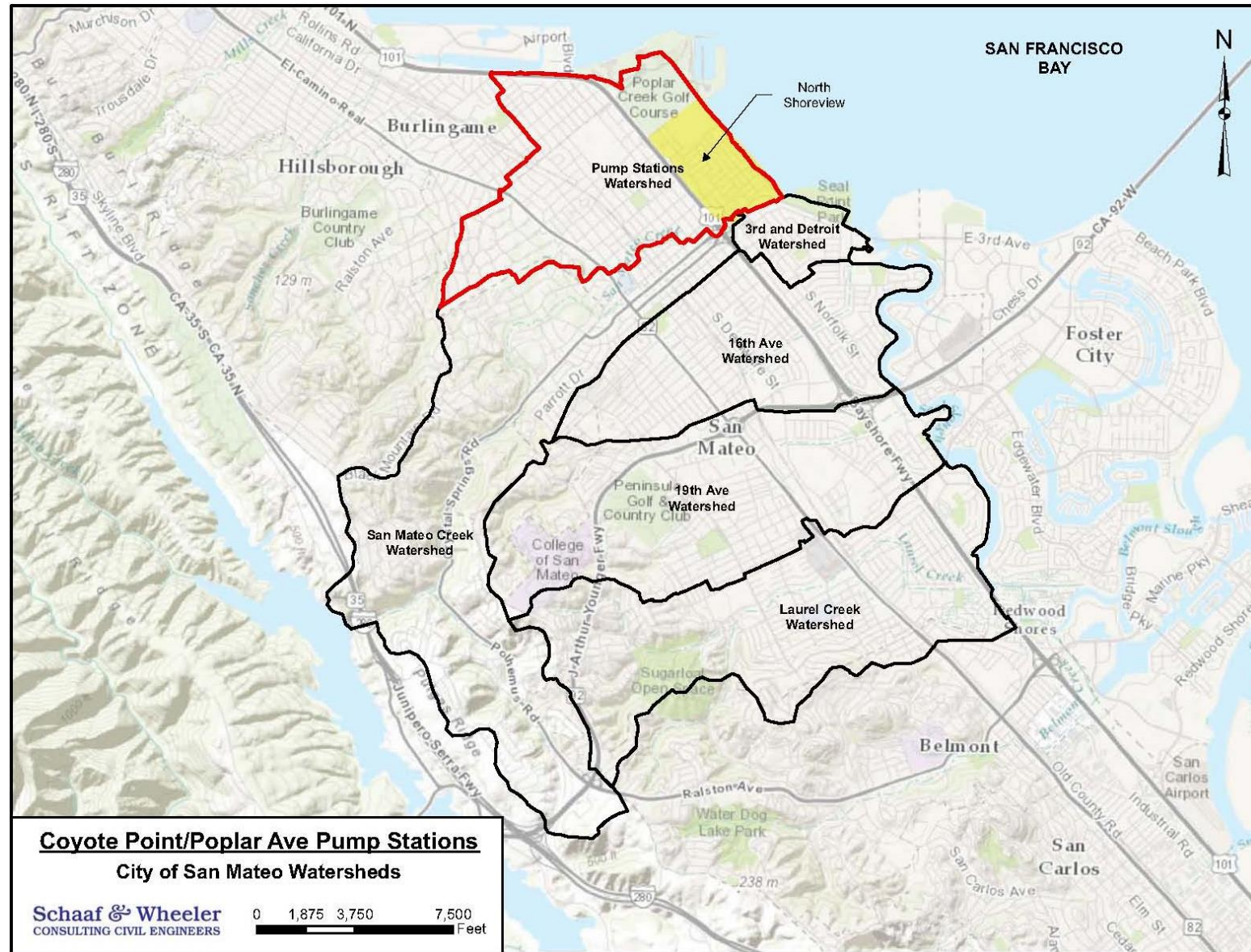




# North Shoreview

## Improvements

- North Shoreview / Central – in 100-year flood zone
- Pump stations deficiencies and lower levee height
- Major replacements at two pump station sites
- Raised 1,300 feet of levee
- Project Duration: 2 years, 7 months
- Funding: Measure S and formation of an assessment





# San Mateo Creek



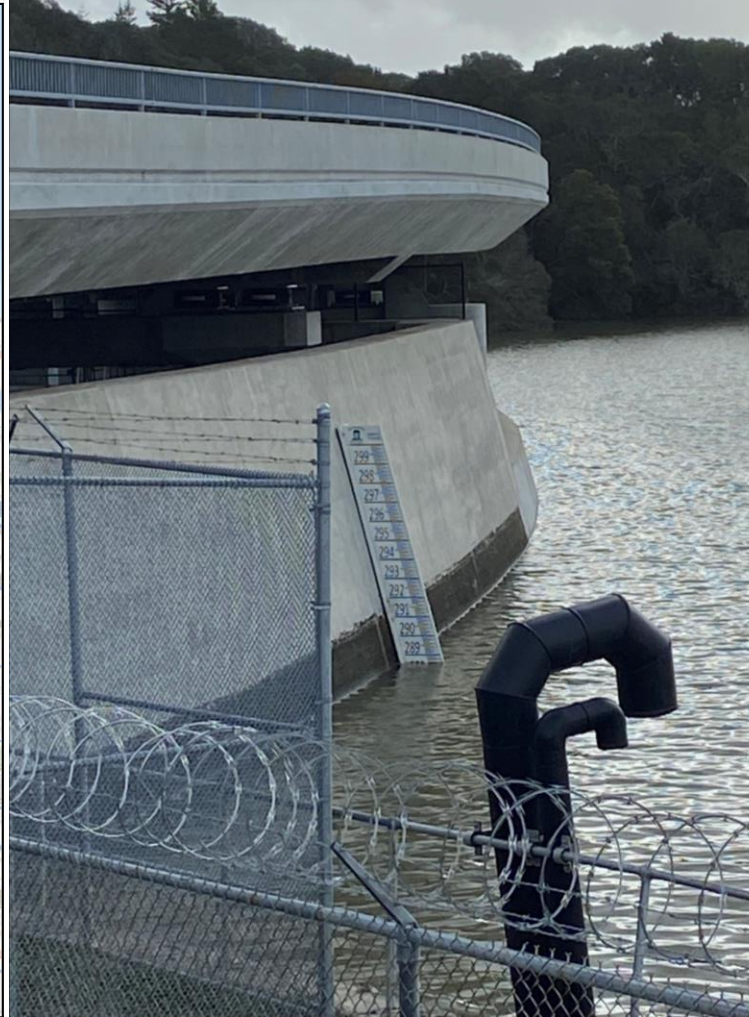
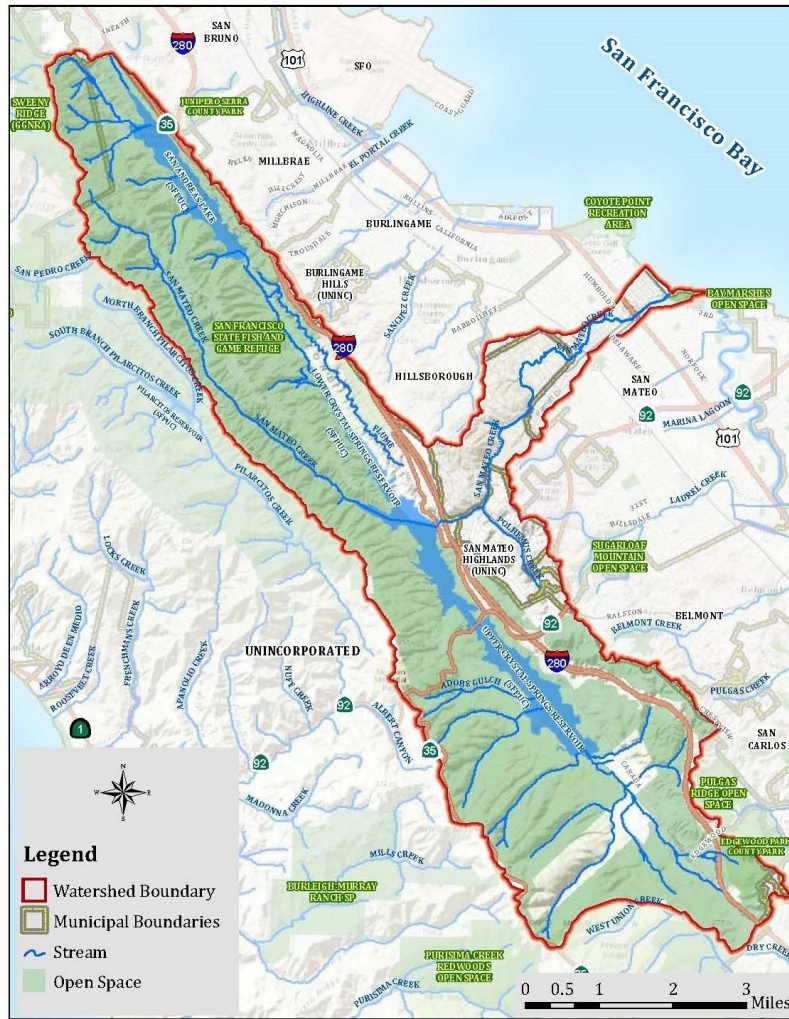
Arroyo Court via SM Daily Journal





# San Mateo Creek Crystal Springs Reservoir

- Coordination with the San Francisco Public Utilities Commission
- Reservoir releases during no rain





# Wet Weather Preparation

- **Pump Crew:**
  - 27 sanitary sewer pump stations
  - 11 storm water pump stations
  - 3 Mechanics + 1 Laborer
- **Sewer Crew:**
  - Sewers, catch basins, trash tracks
- **Streets Crew:**
  - Potholes, catch basins, trash racks
  - 24/7 public sandbag station
- **24/7 Wastewater treatment plant**
- **Staff on standby for wet weather events, after-hours**





# System Deficiencies

## Undersized Infrastructure

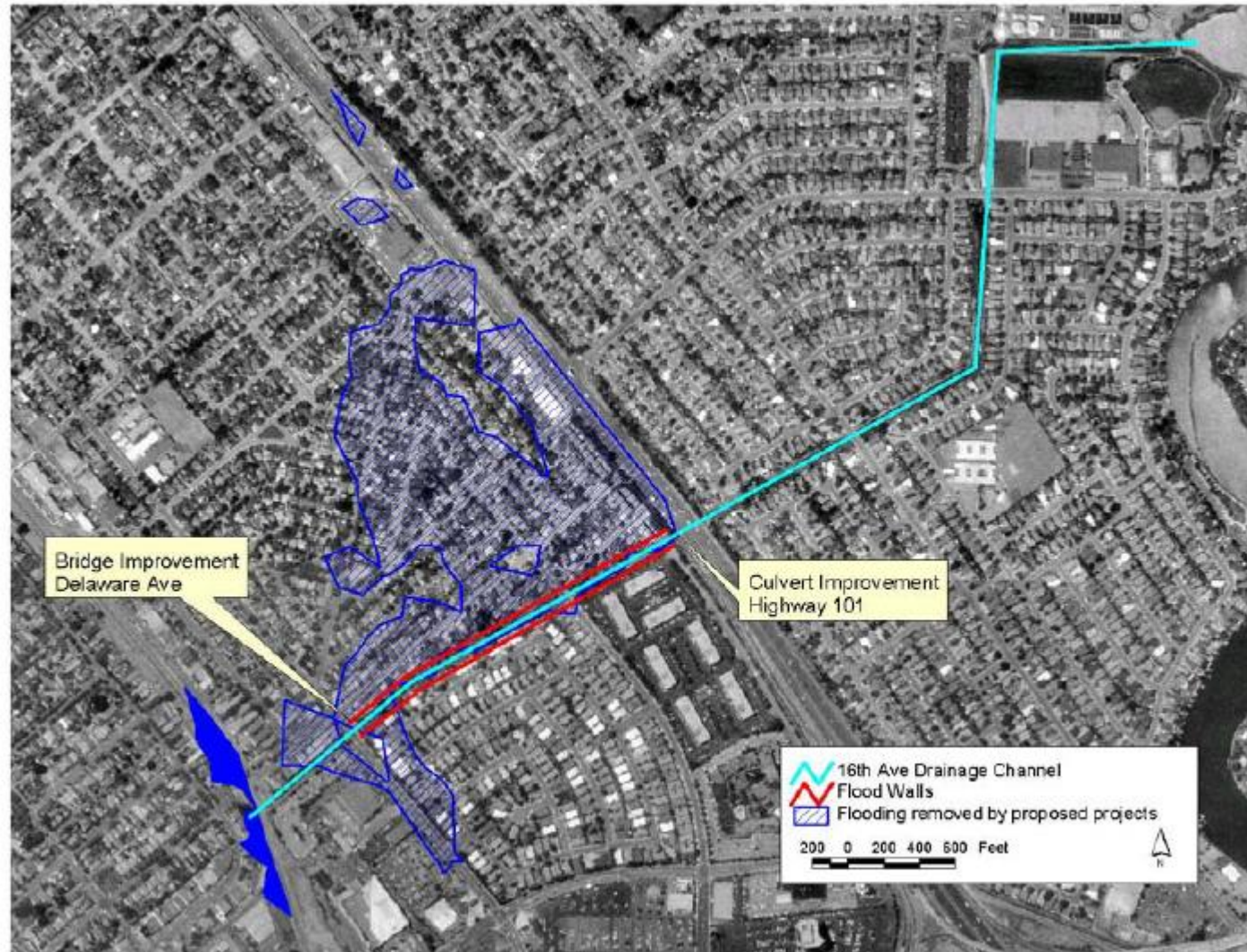


Figure 5-2: Recommended 16<sup>th</sup> Avenue Drain Projects (Flood hazard reduction in blue.)



# System Deficiencies

## Undersized Infrastructure

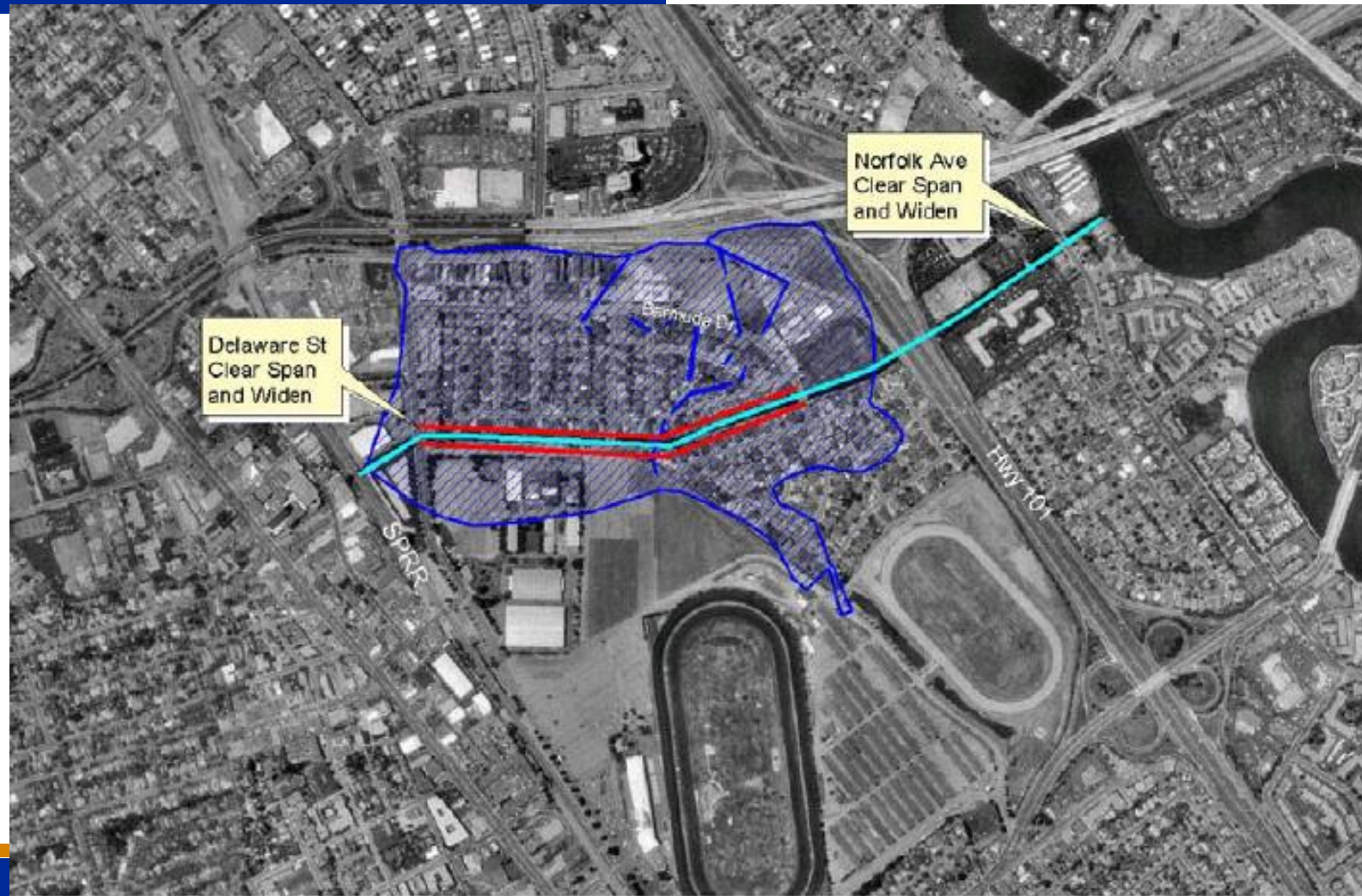


Figure 5-3: Recommended 19<sup>th</sup> Avenue Drain Projects (Flood hazard reduction in blue.)



# System Deficiencies

## Undersized Infrastructure

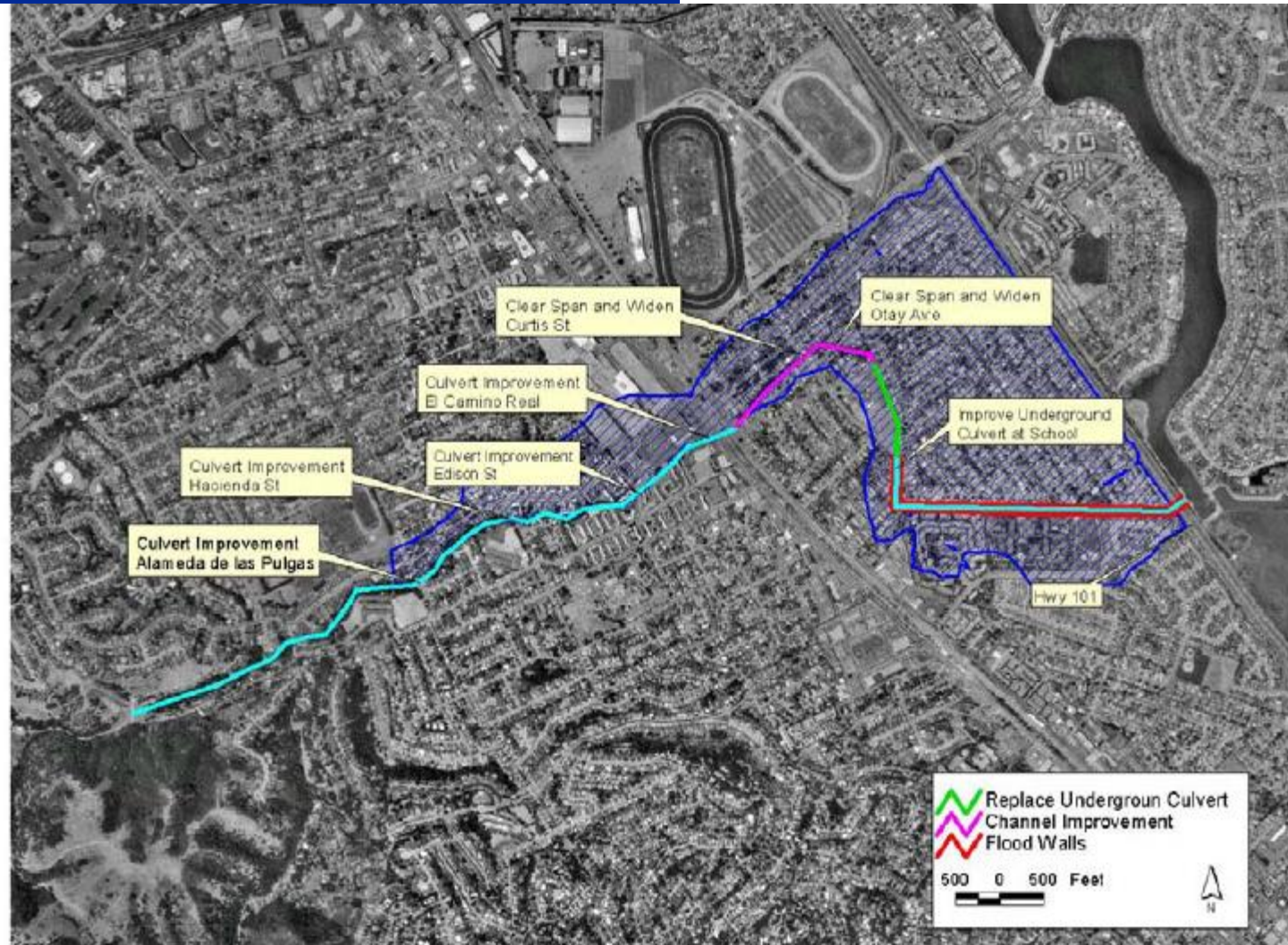
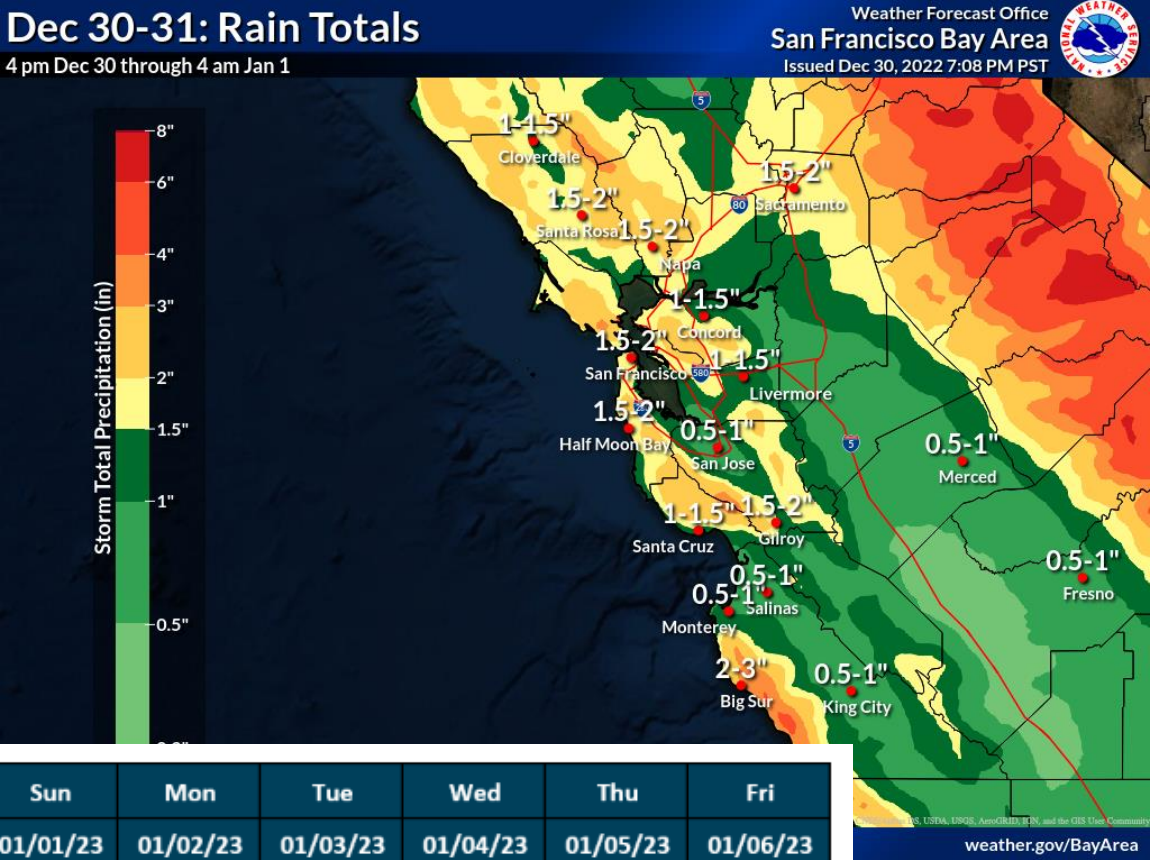


Figure 5-4: Recommended Laurel Creek Improvements (Flood hazard reduction in blue.)

# NEW YEAR'S EVE

## Weather Patterns



|                        |          |          |          |          |          | Fri      |      | Sat      |      | Sun      |      | Mon      |      | Tue      |      | Wed      |      | Thu      |      | Fri      |      |
|------------------------|----------|----------|----------|----------|----------|----------|------|----------|------|----------|------|----------|------|----------|------|----------|------|----------|------|----------|------|
|                        |          |          |          |          |          | 12/30/22 |      | 12/31/22 |      | 01/01/23 |      | 01/02/23 |      | 01/03/23 |      | 01/04/23 |      | 01/05/23 |      | 01/06/23 |      |
| Rain Station           | 12/25/22 | 12/26/22 | 12/27/22 | 12/28/22 | 12/29/22 | %        | Amt  | %        | Amt  | %        | Amt  | %        | Amt  | %        | Amt  | %        | Amt  | %        | Amt  | %        | Amt  |
| San Mateo WWTP - AU221 | 0.000    | 0.190    | 0.260    | 0.000    | 0.260    | 95%      | 0.43 | 95%      | 0.95 | 0%       | 0.00 | 95%      | 0.41 | 70%      | 0.39 | 90%      | 1.81 | 70%      | 1.15 | 50%      | 0.16 |
| San Mateo WWTP - AU981 | 0.000    | 0.220    | 0.420    | 0.020    | 0.310    | 95%      | 0.43 | 95%      | 0.95 | 0%       | 0.00 | 95%      | 0.41 | 70%      | 0.39 | 90%      | 1.81 | 70%      | 1.15 | 50%      | 0.16 |
| San Mateo WWTP - C4751 | 0.000    | 0.150    | 0.350    | 0.000    | 0.330    | 95%      | 0.43 | 95%      | 0.95 | 0%       | 0.00 | 95%      | 0.41 | 70%      | 0.39 | 90%      | 1.81 | 70%      | 1.15 | 50%      | 0.16 |
| San Mateo WWTP - E4076 | *0.00*   | *0.00*   | *0.00*   | *0.00*   | *0.00*   | 95%      | 0.43 | 95%      | 0.95 | 0%       | 0.00 | 95%      | 0.41 | 70%      | 0.39 | 90%      | 1.81 | 70%      | 1.15 | 50%      | 0.16 |
| San Mateo WWTP - KSFO  | 0.000    | 0.220    | 0.190    | 0.000    | 0.298    | 95%      | 0.43 | 95%      | 0.95 | 0%       | 0.00 | 95%      | 0.41 | 70%      | 0.39 | 90%      | 1.81 | 70%      | 1.15 | 50%      | 0.16 |

if 50% or greater chance of rain, cell is highlighted in yellow.

if previous day's actual precipitation is greater than 0.00", cell is highlighted in orange.

A value of \*0.00\* indicates that no data were available and the assumed rainfall is 0.00".





Conditions Experienced After Storms in the City



# Schaaf & Wheeler

CONSULTING CIVIL ENGINEERS

**Marina Lagoon – New Years Eve 2022**  
**Hydrologic/Hydraulic Analysis**



# Topics

Modeling Overview

Rainfall

- NYE Event Rainfall

- Comparison to Design Rainfall

Runoff

- Marina Lagoon Watershed

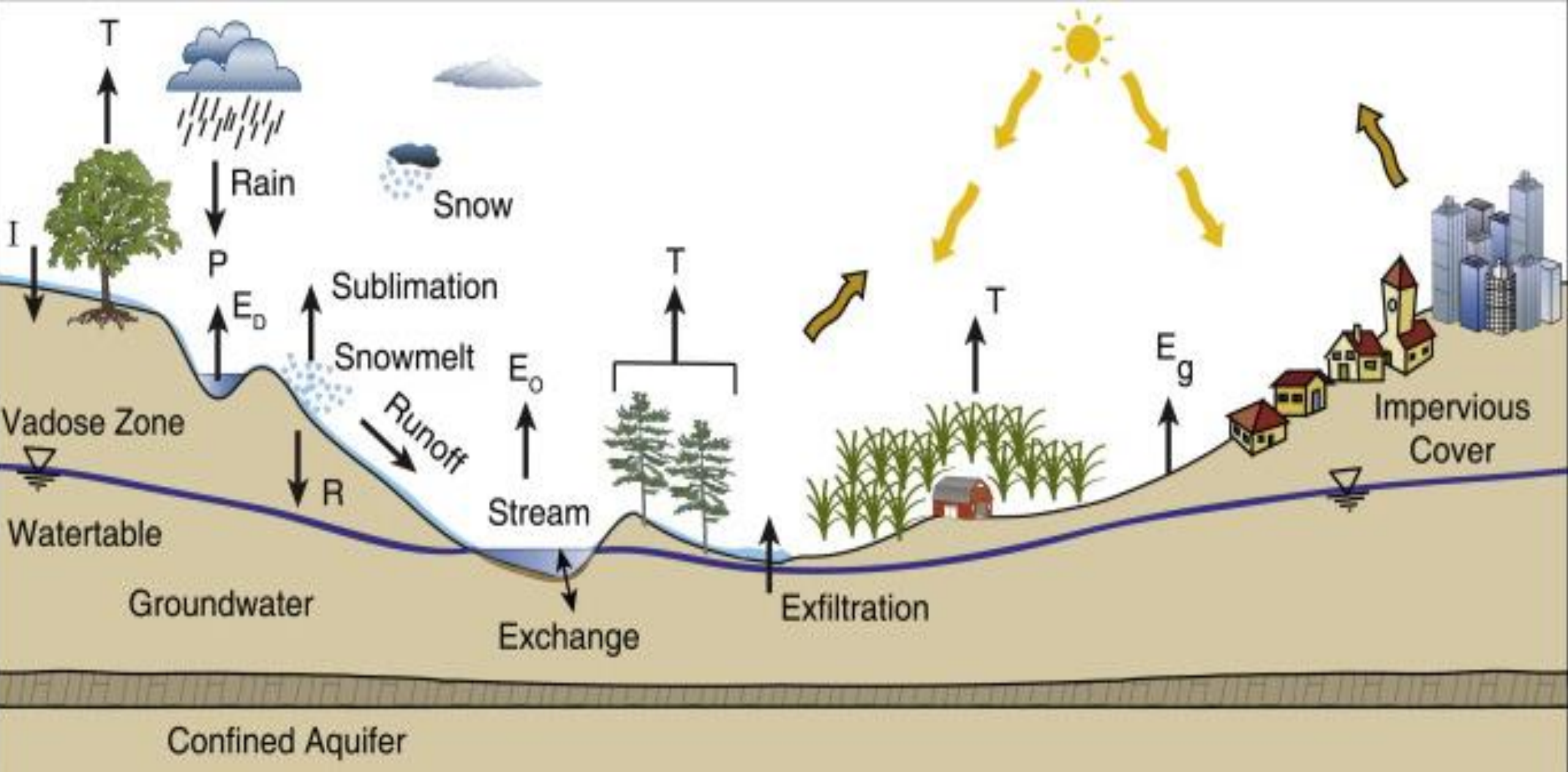
- Pump Station Operation

- Verification using NYE Observations

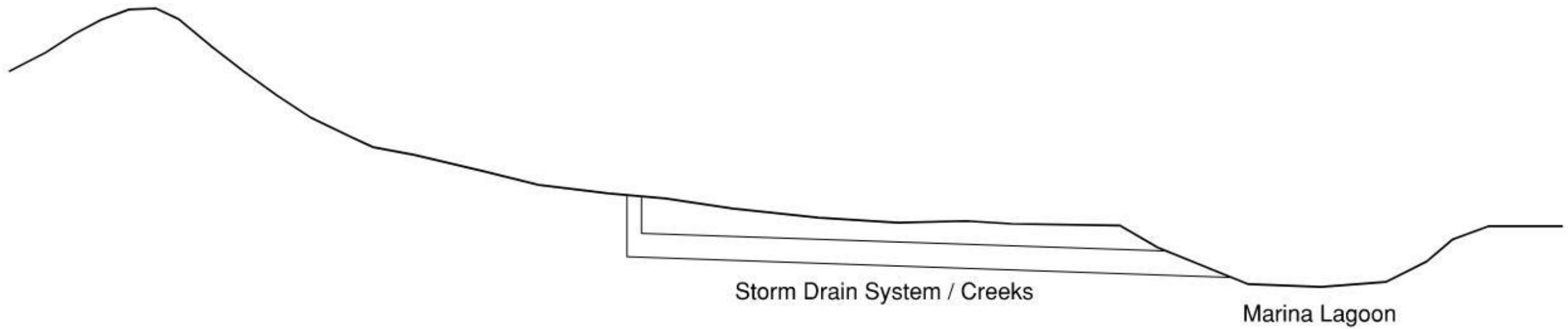
Results and Findings

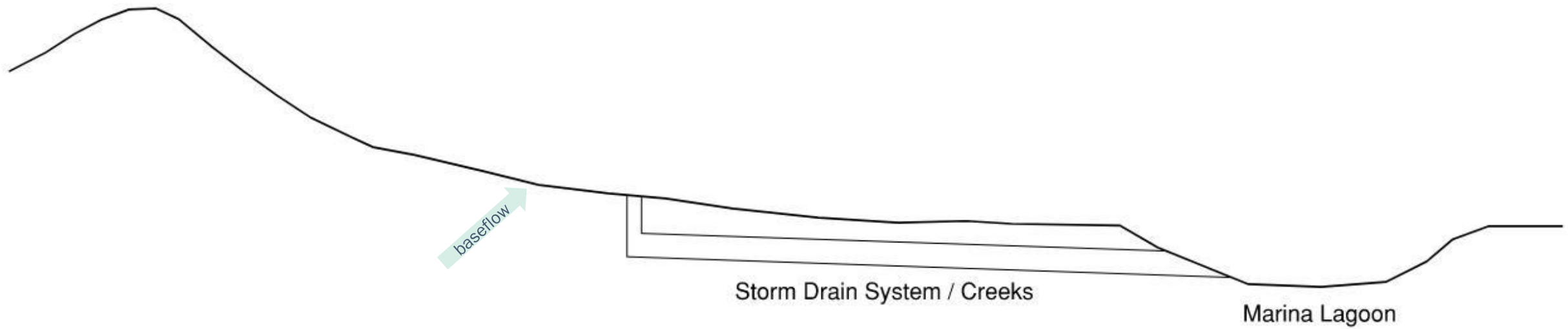
- Model Scenarios



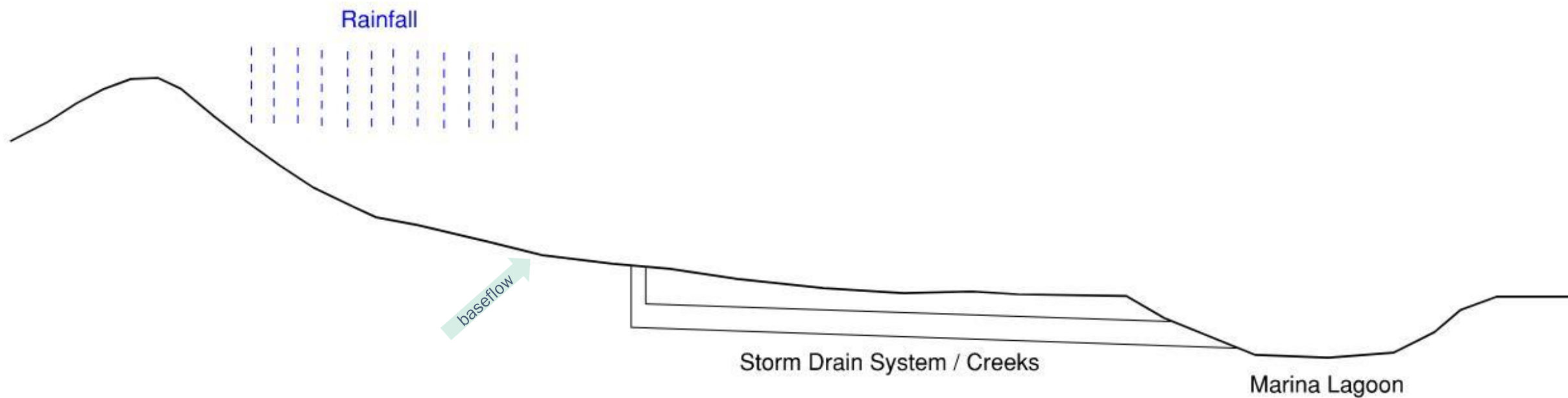


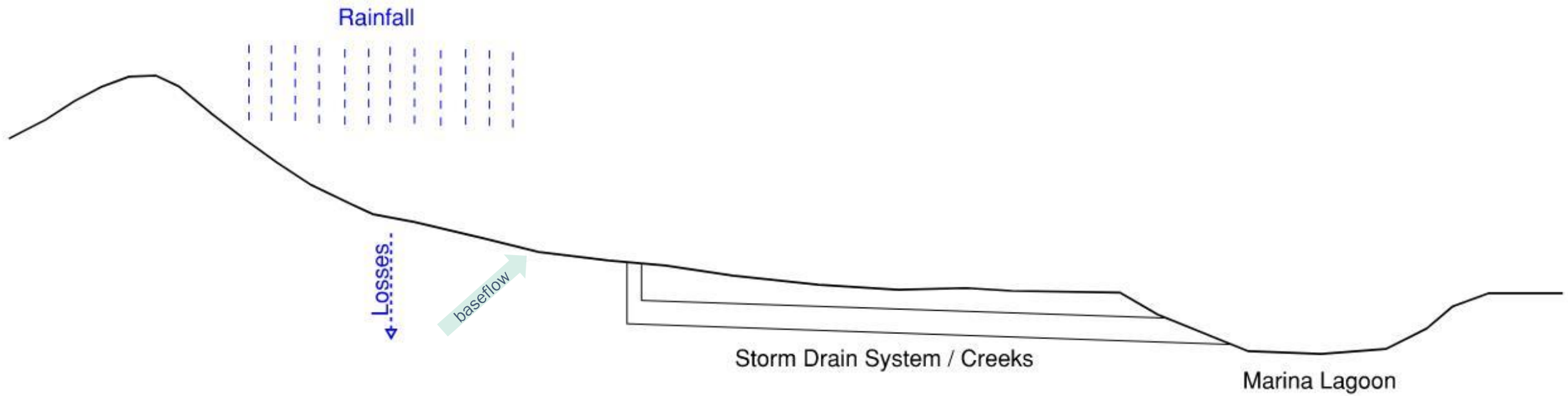




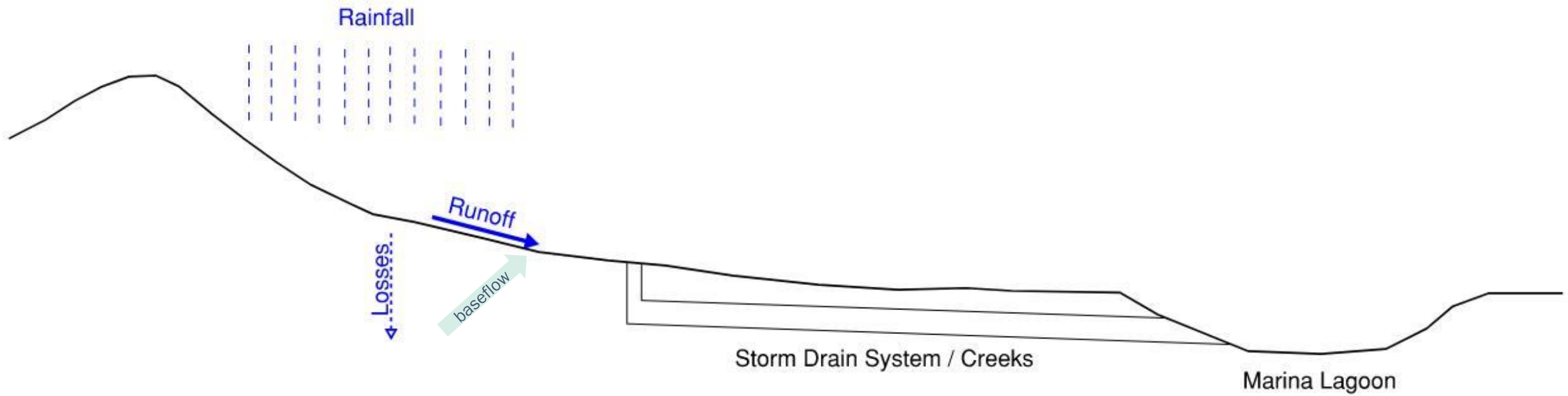


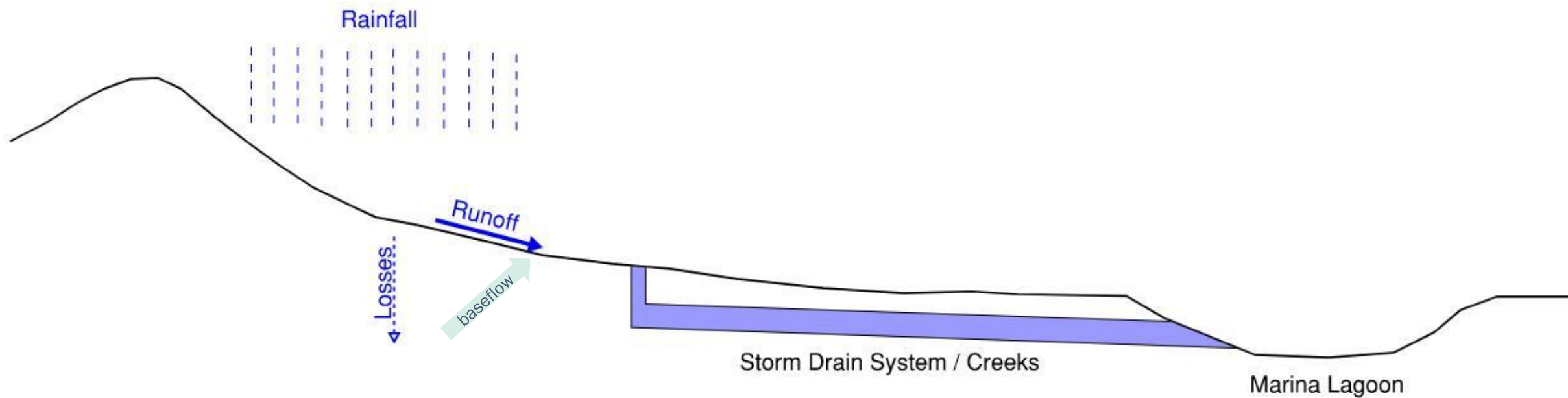




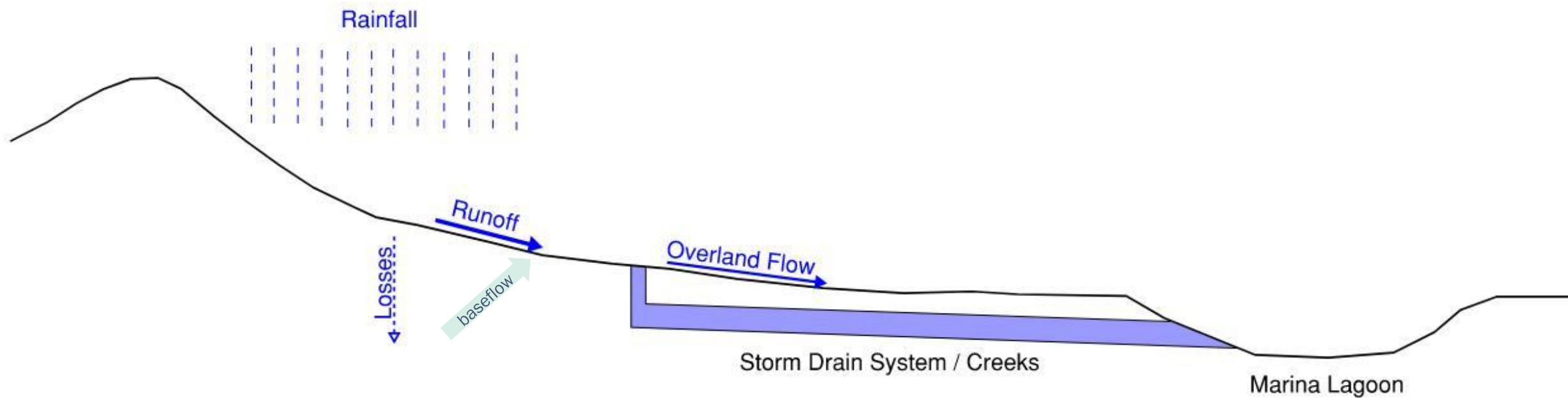


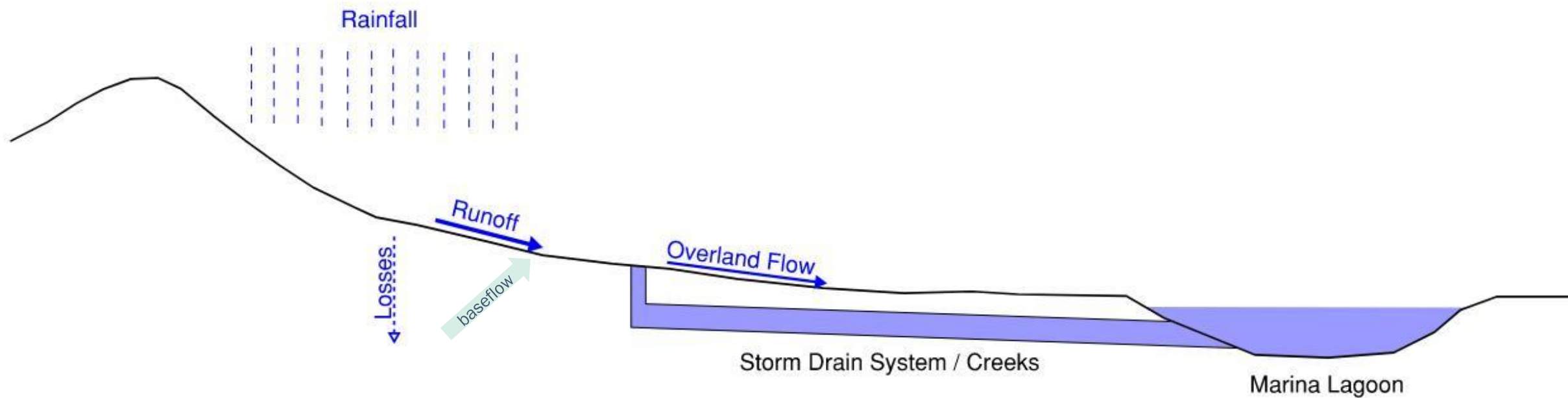




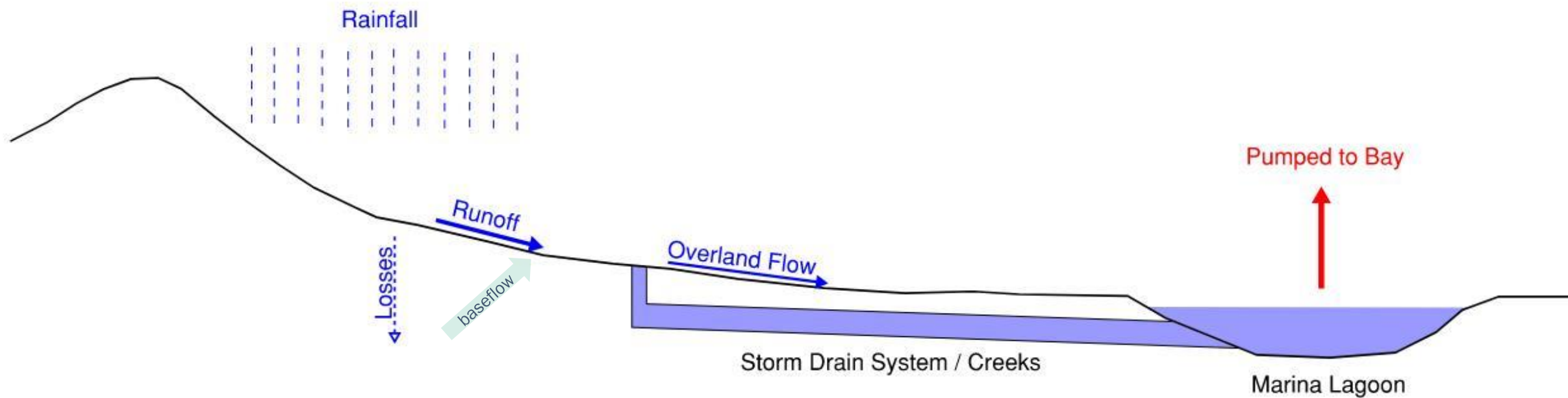


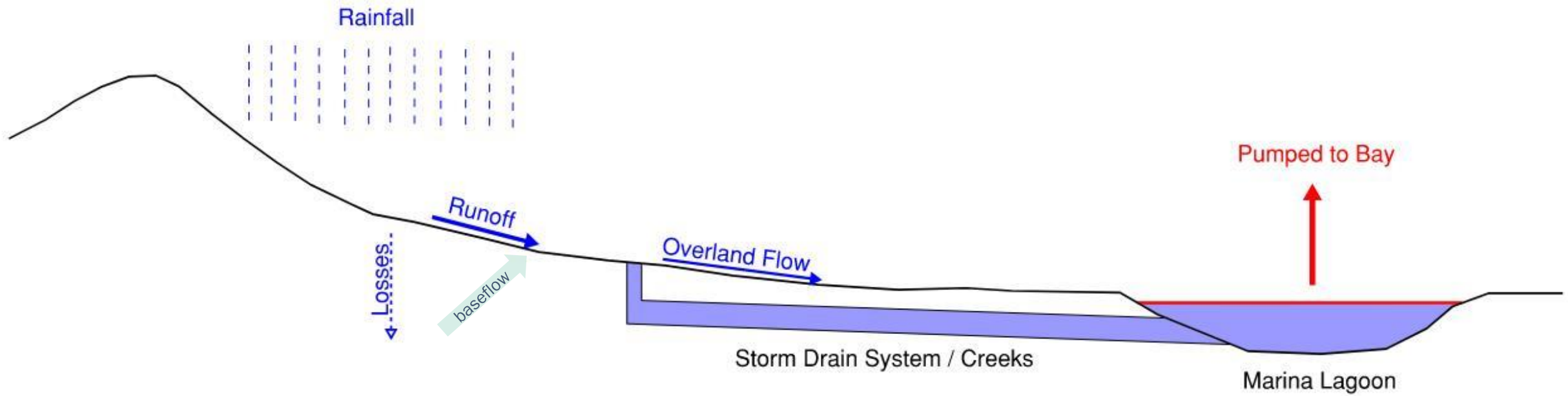




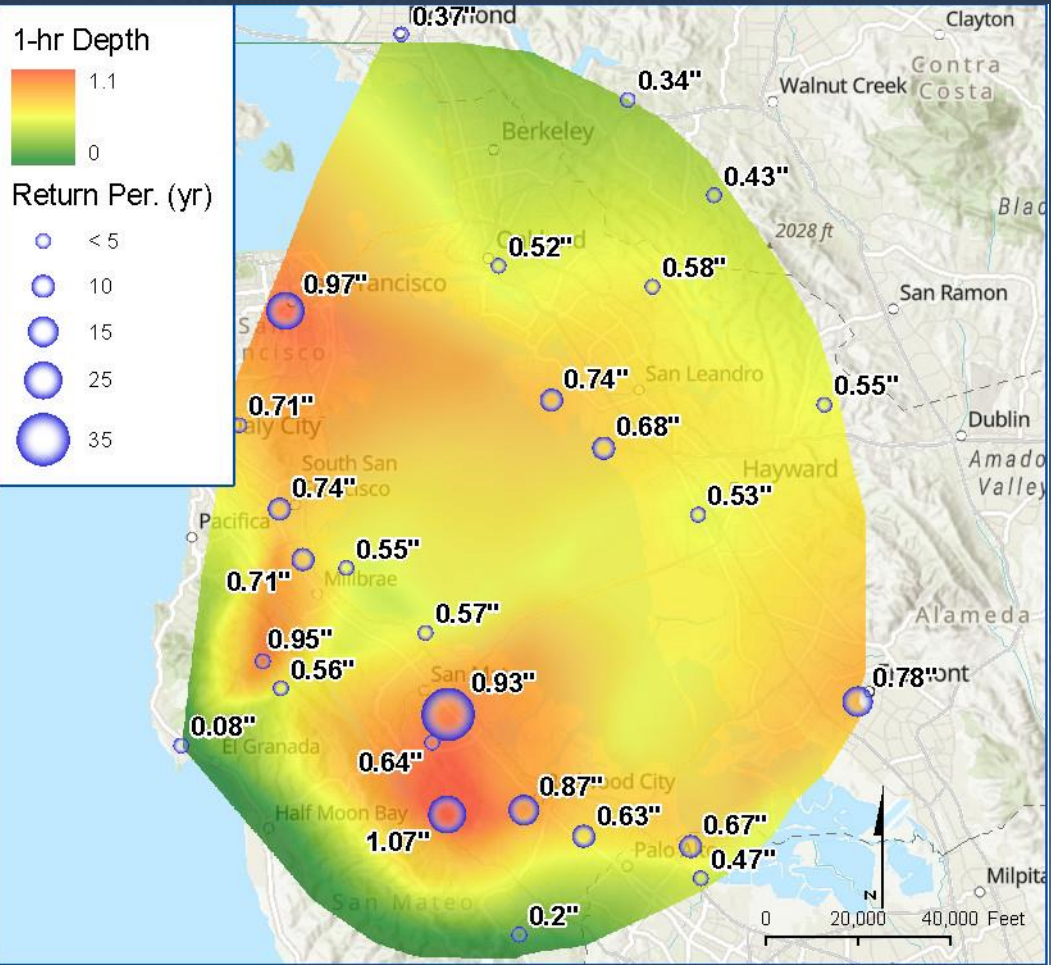










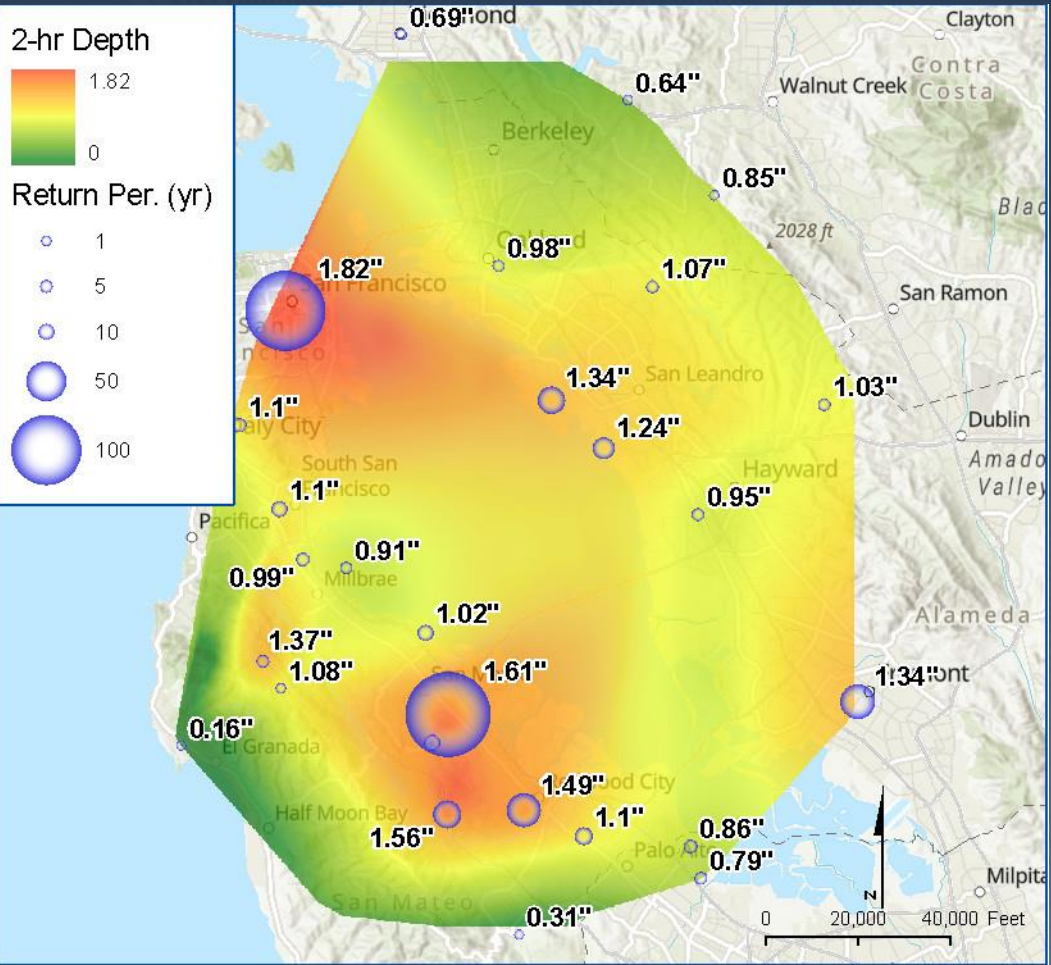


San Mateo, particularly south of Highway 92 and northeast of Interstate 280, had some of the heaviest local rainfall totals during the NYE 2022 storm event.

1-hour

Rainfall





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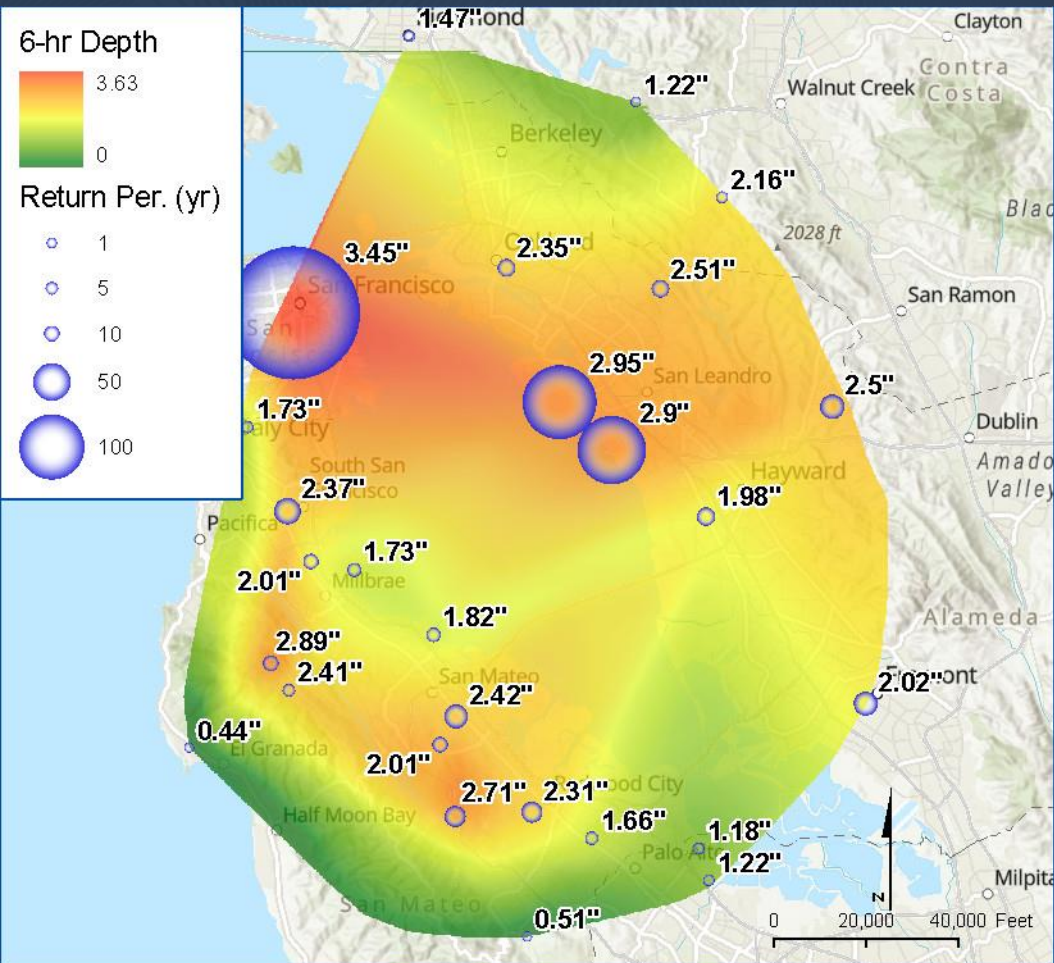
2-hour

Rainfall





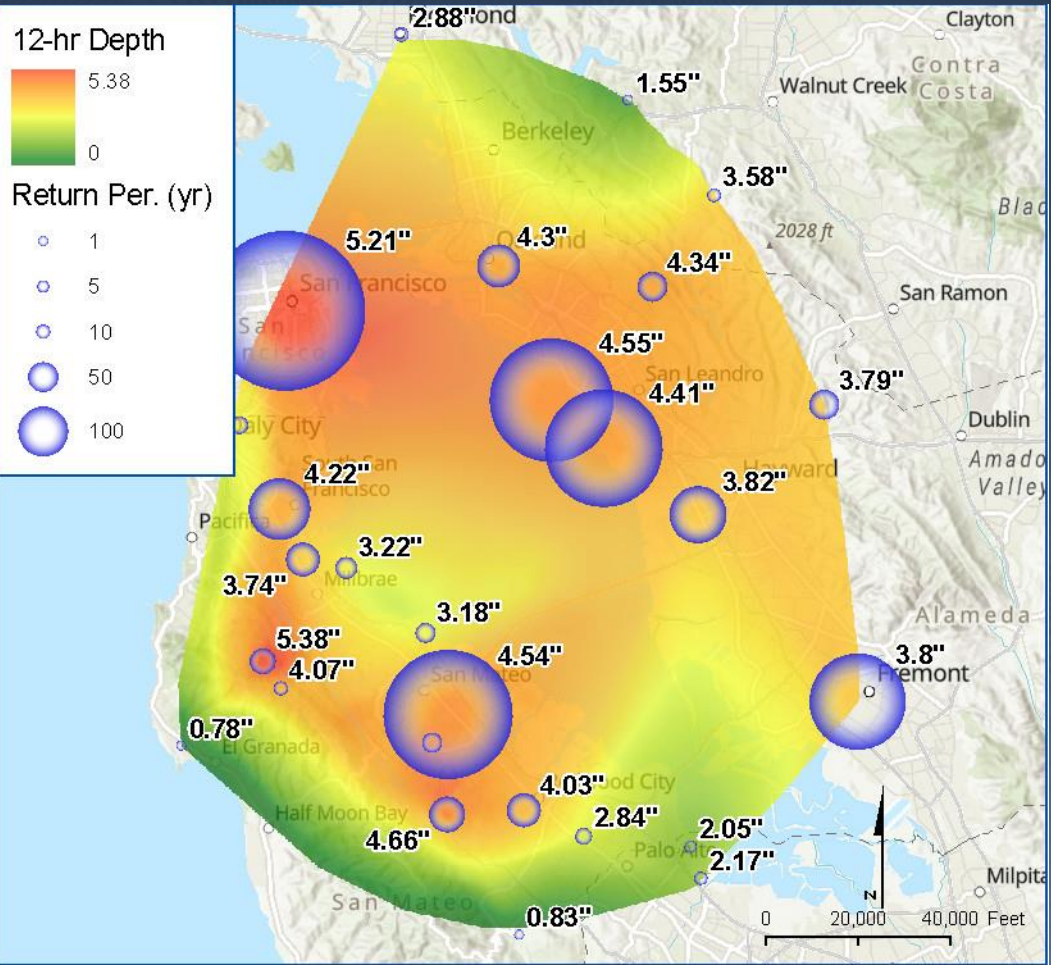




San Mateo, particularly south of Highway 92 and northeast of Interstate 280, had some of the heaviest local rainfall totals during the NYE 2022 storm event.

6-hour

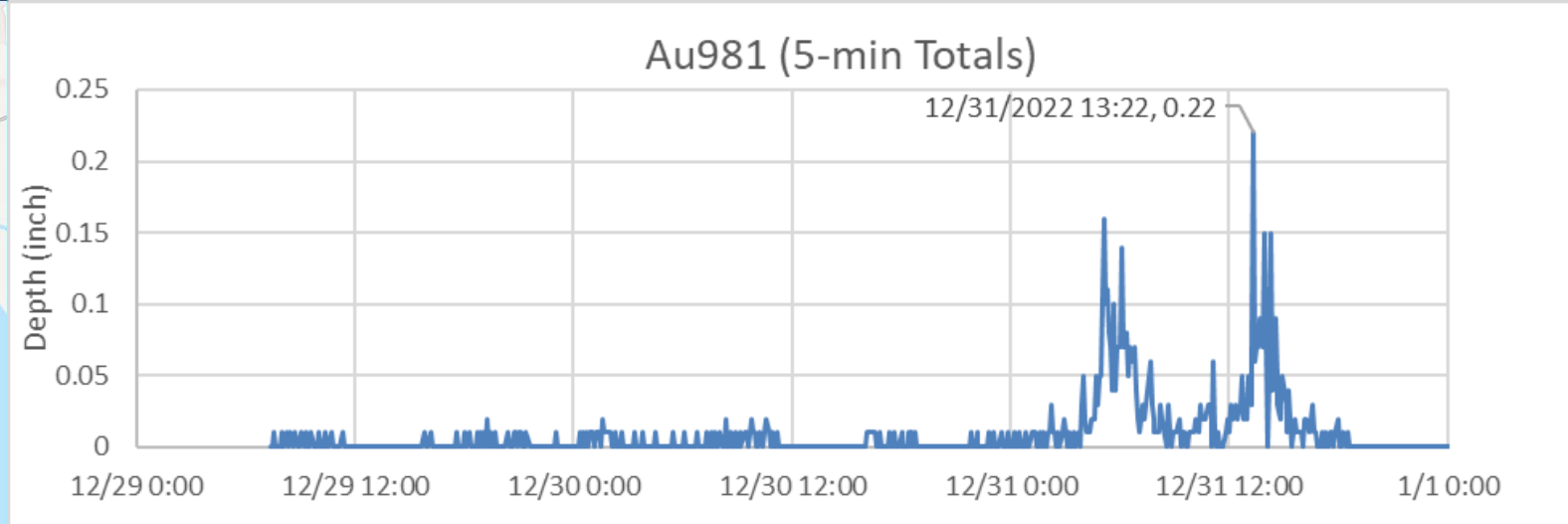
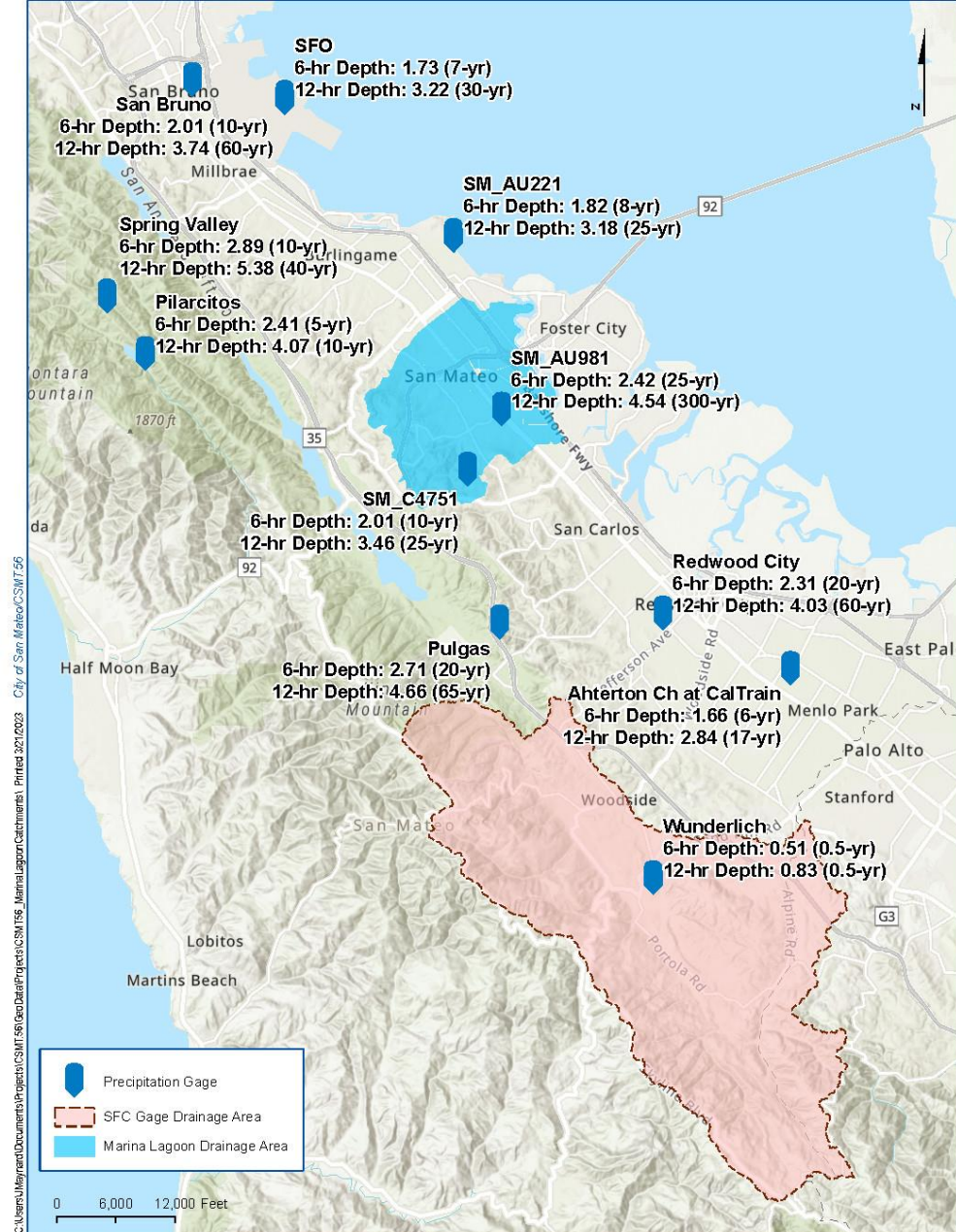




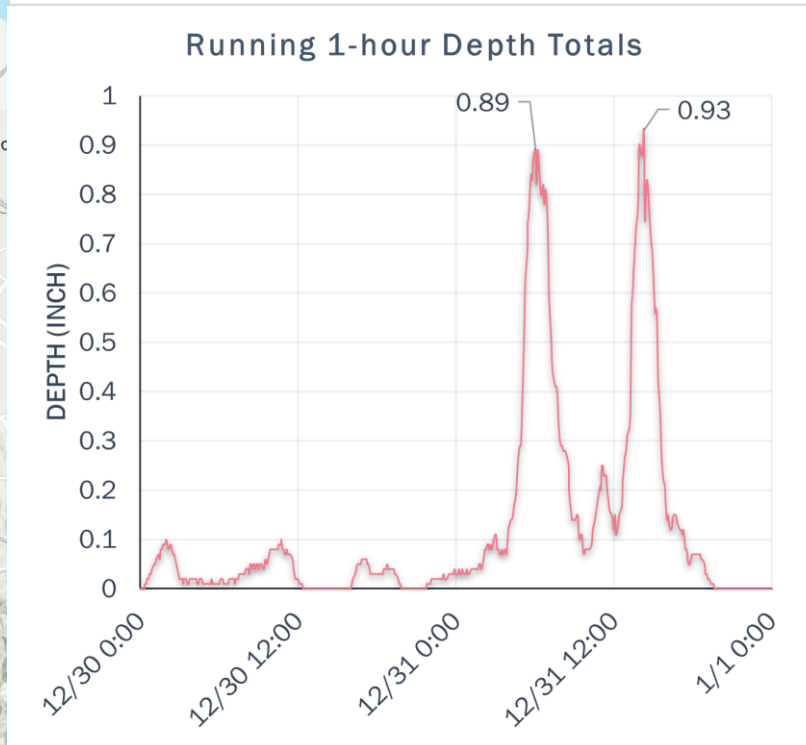
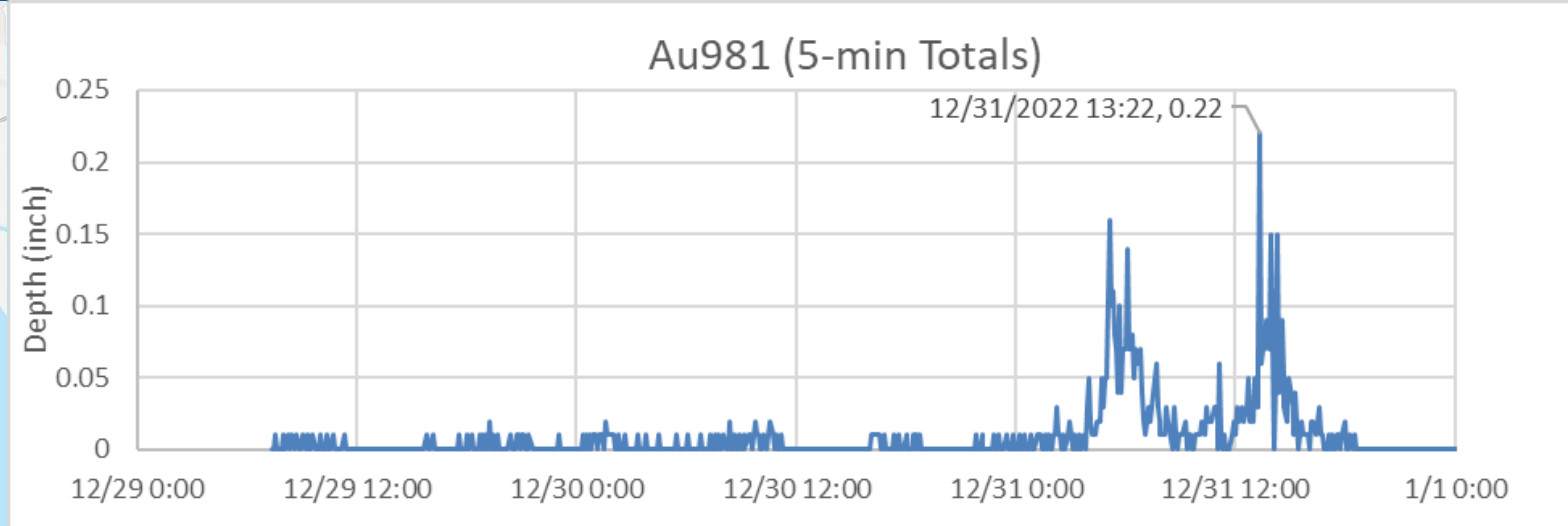
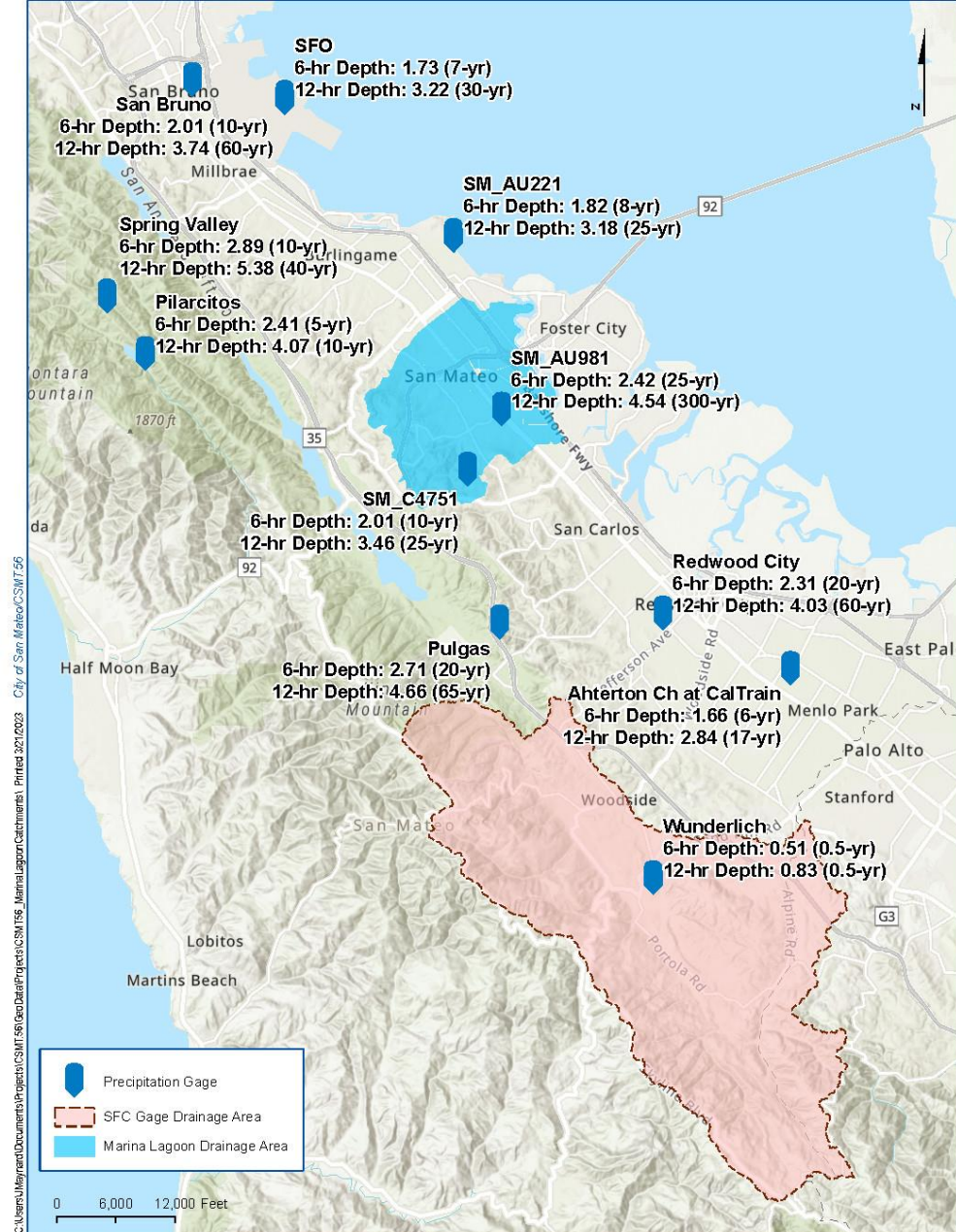
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12-hour



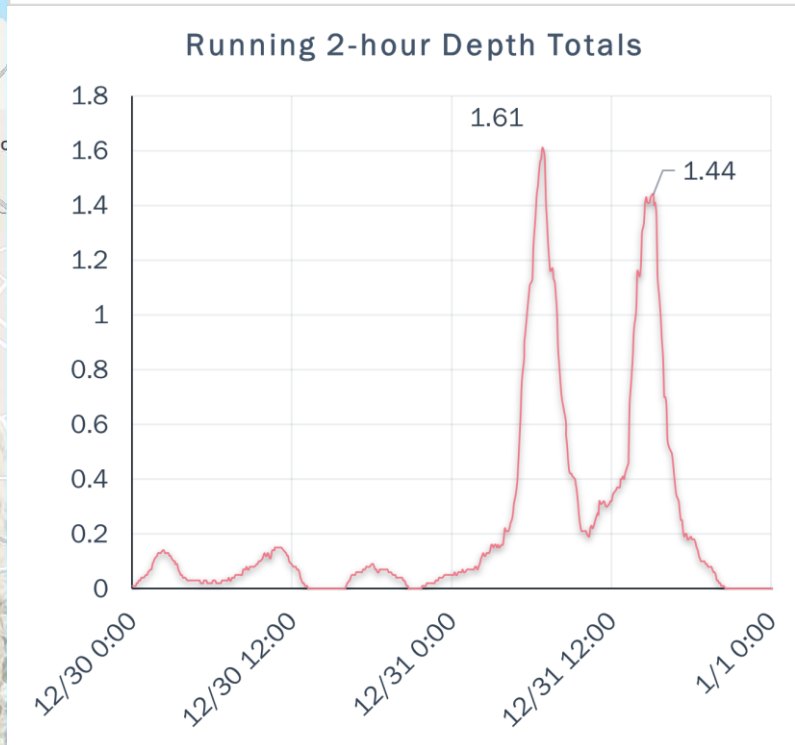
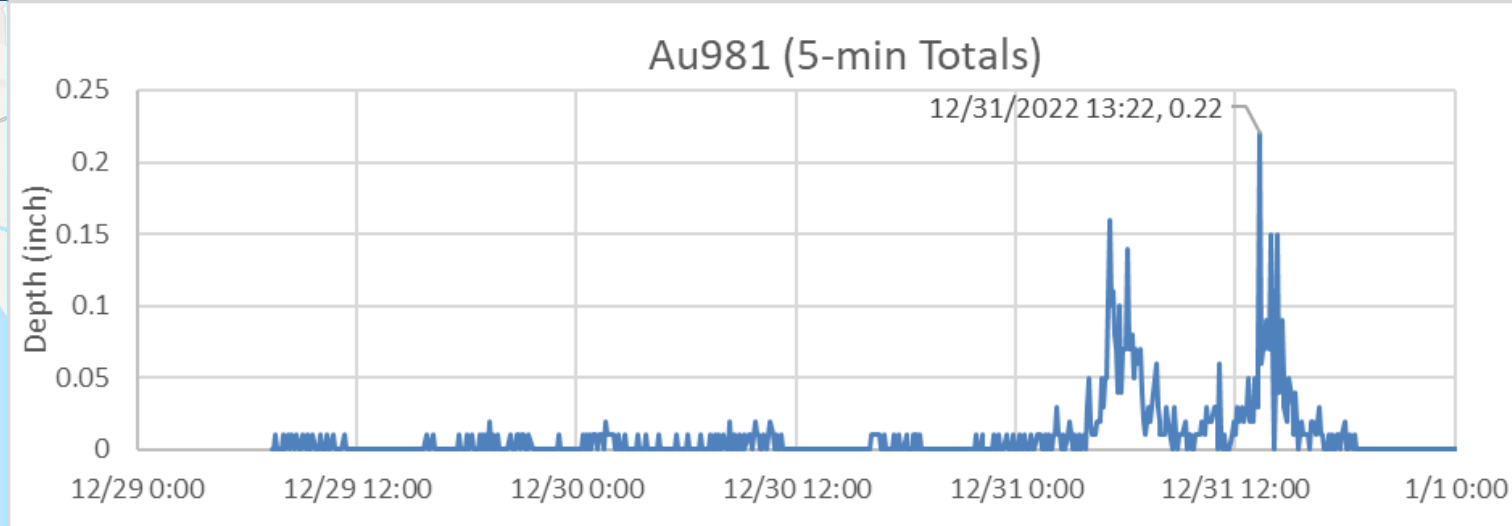
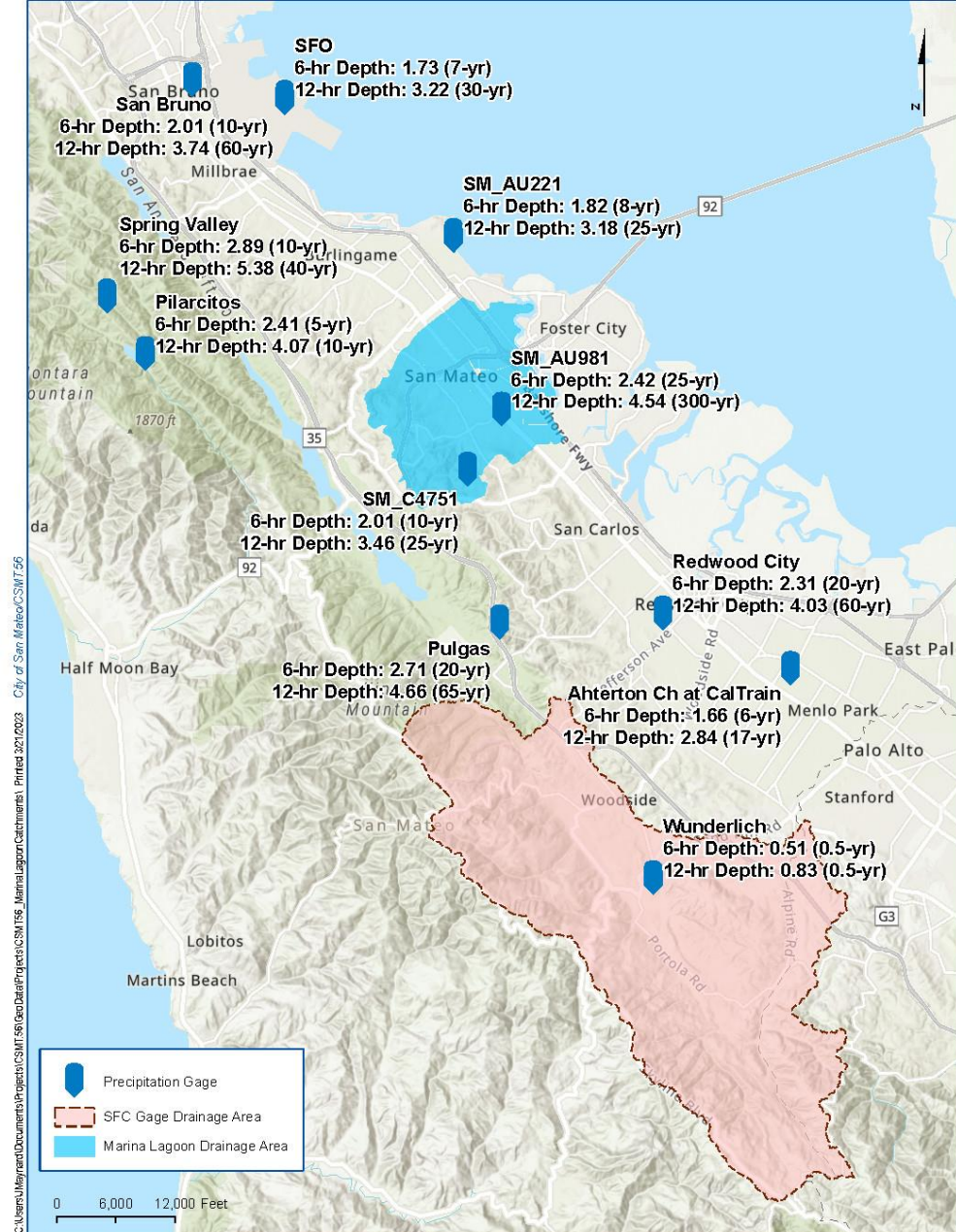






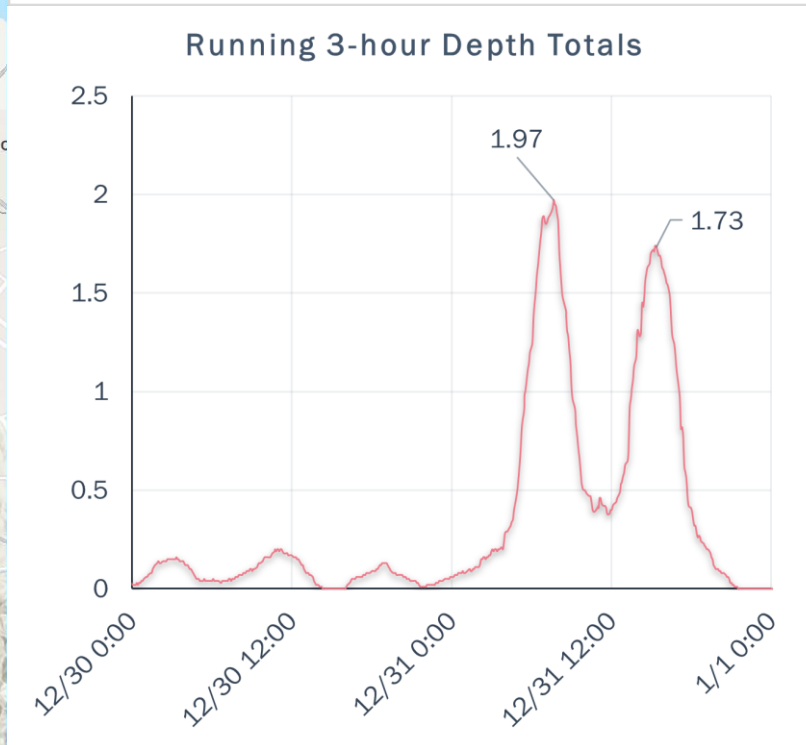
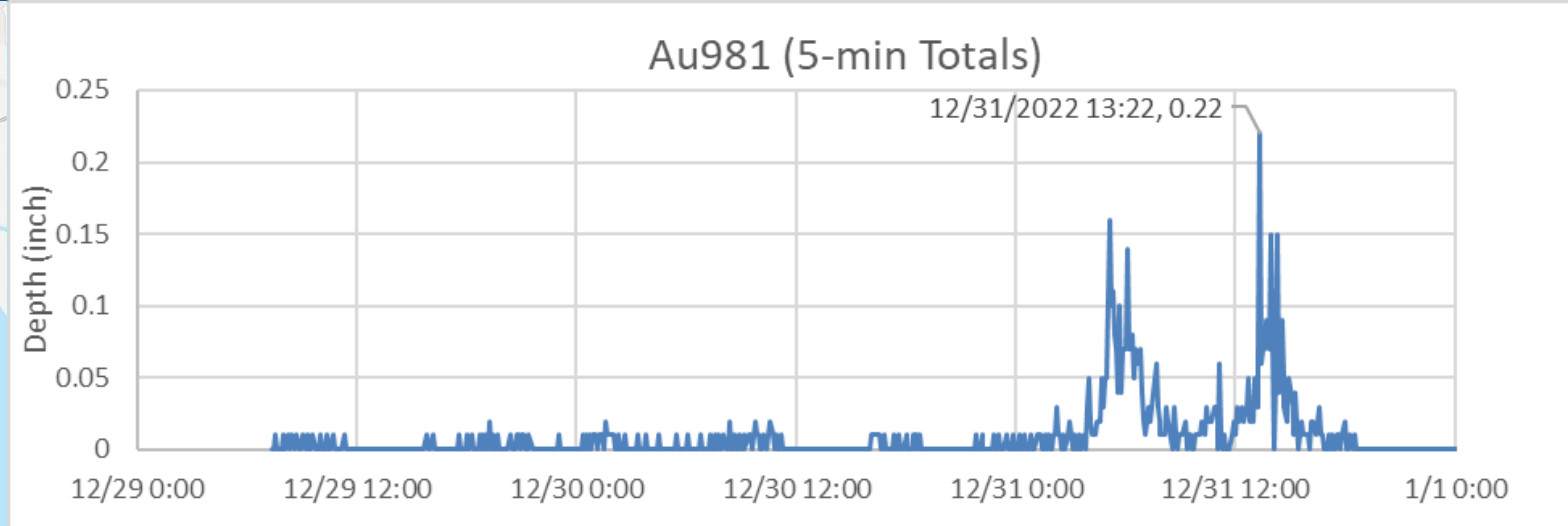
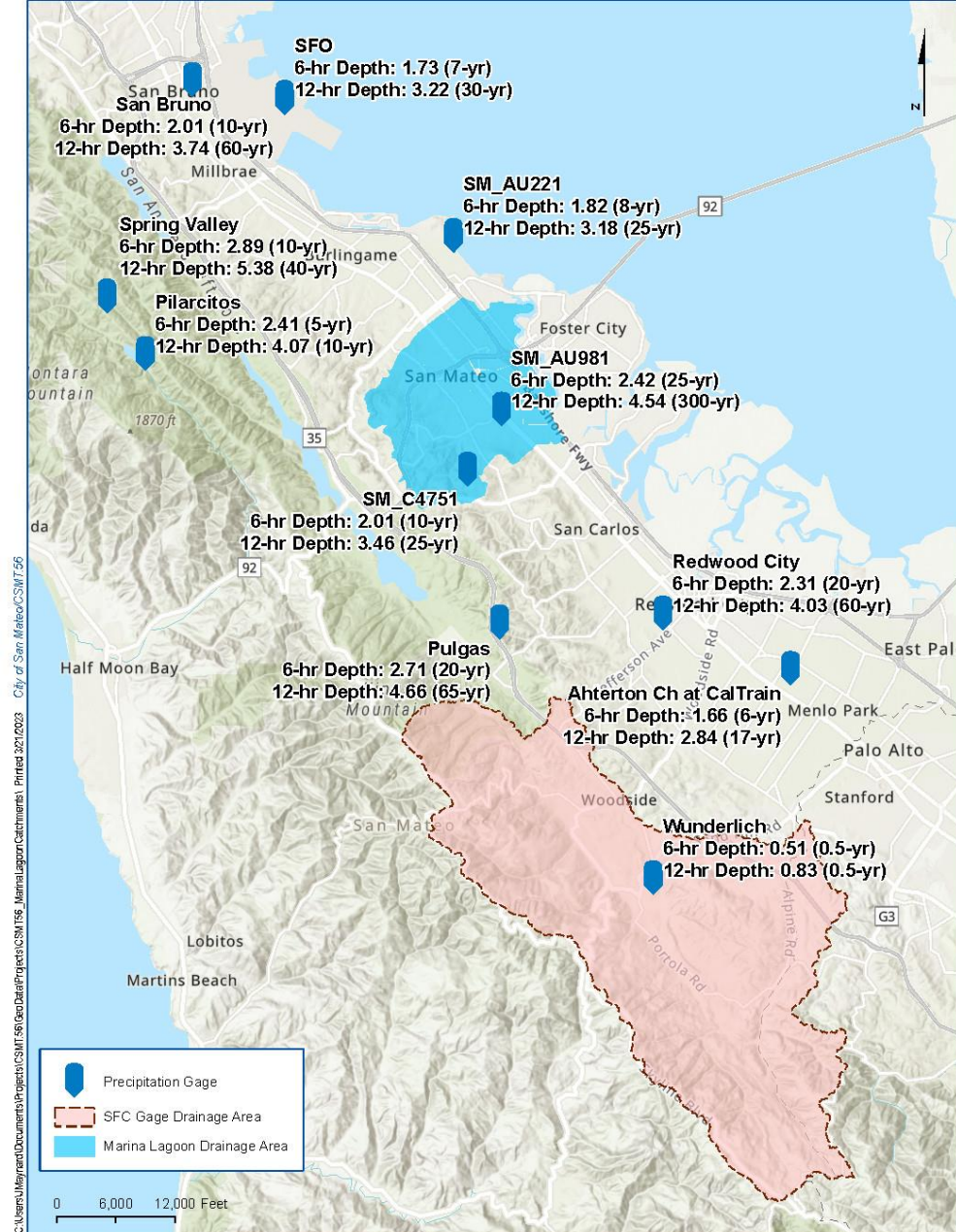
35-year





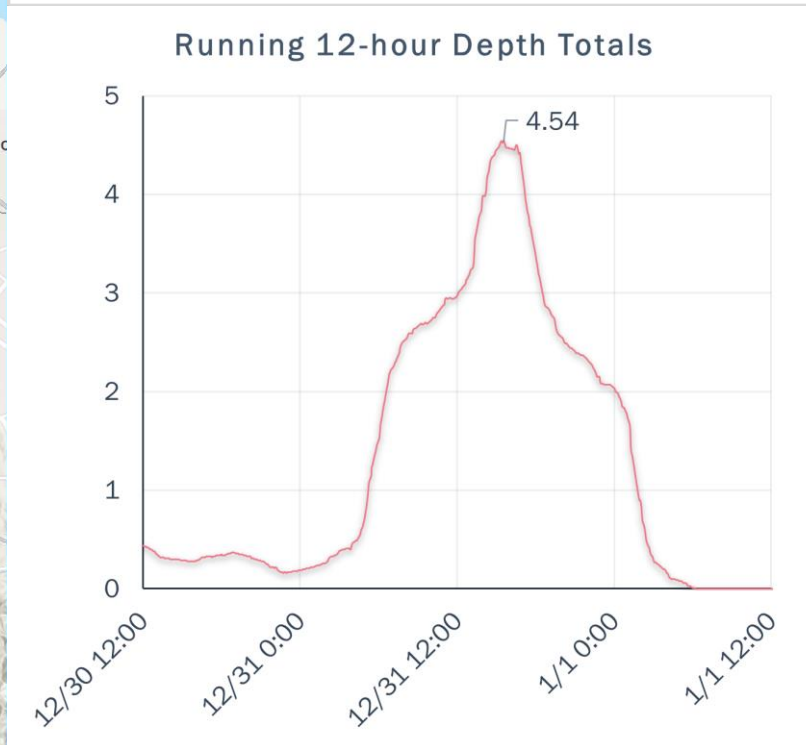
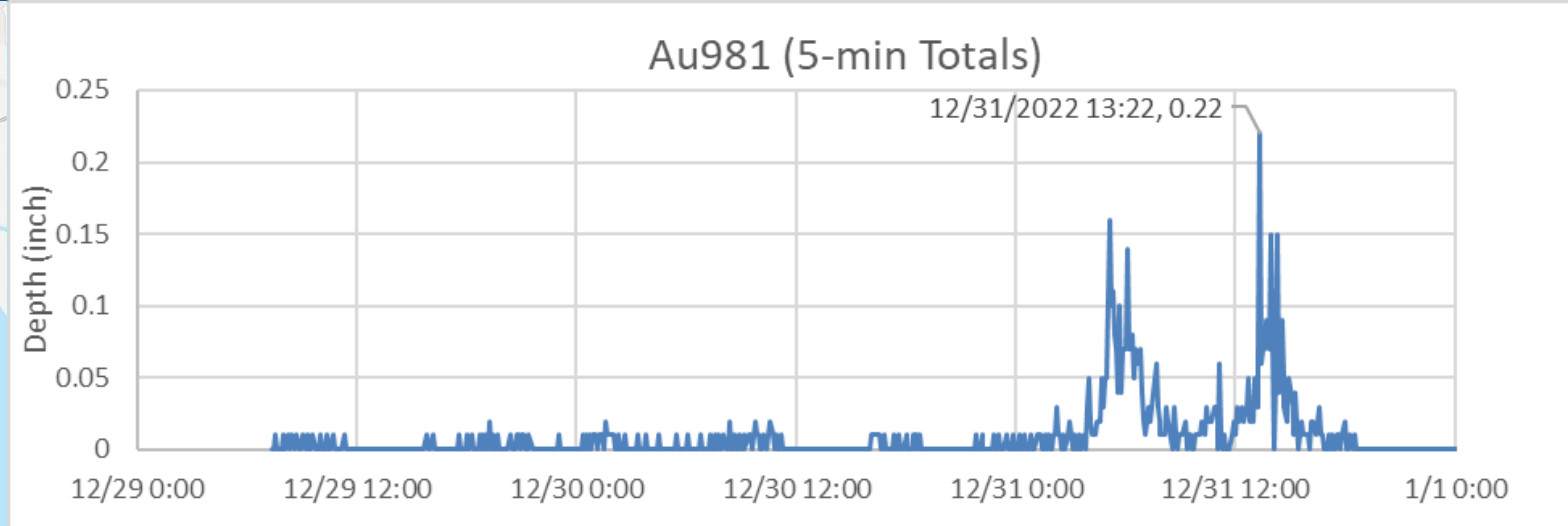
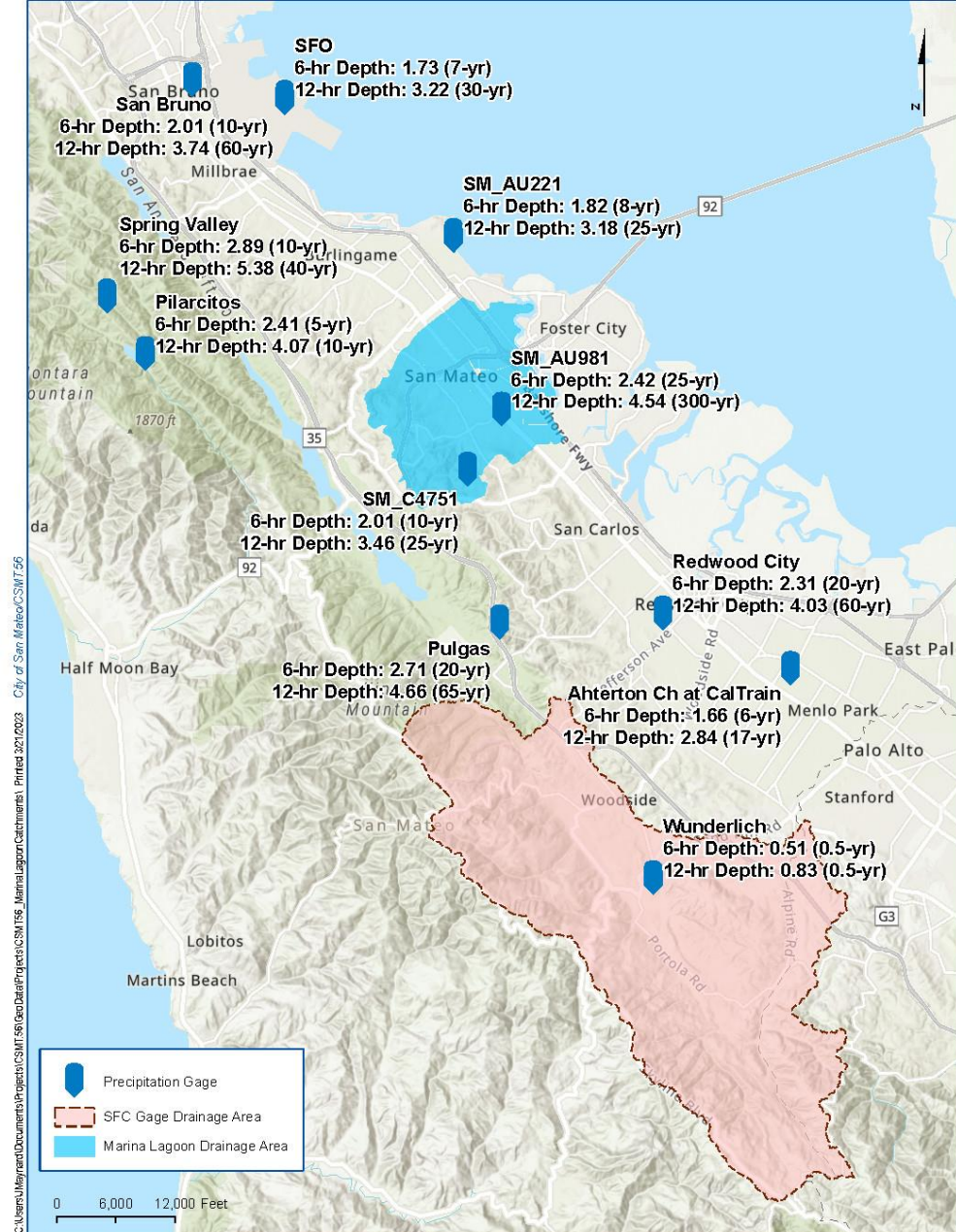
125-year





115-year

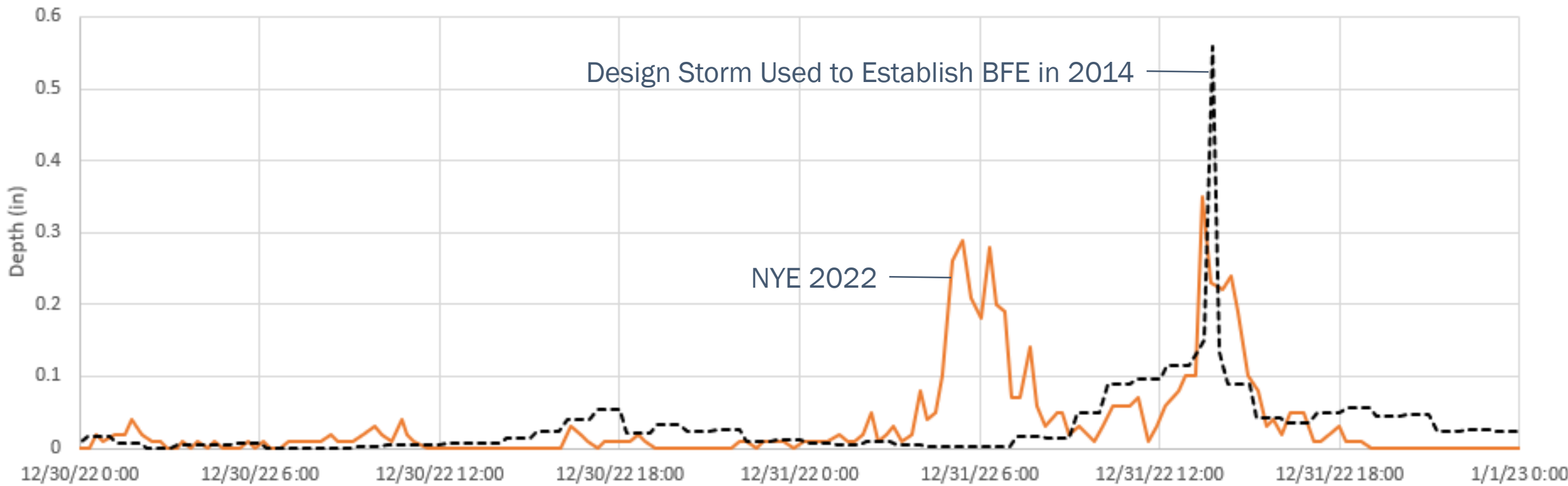




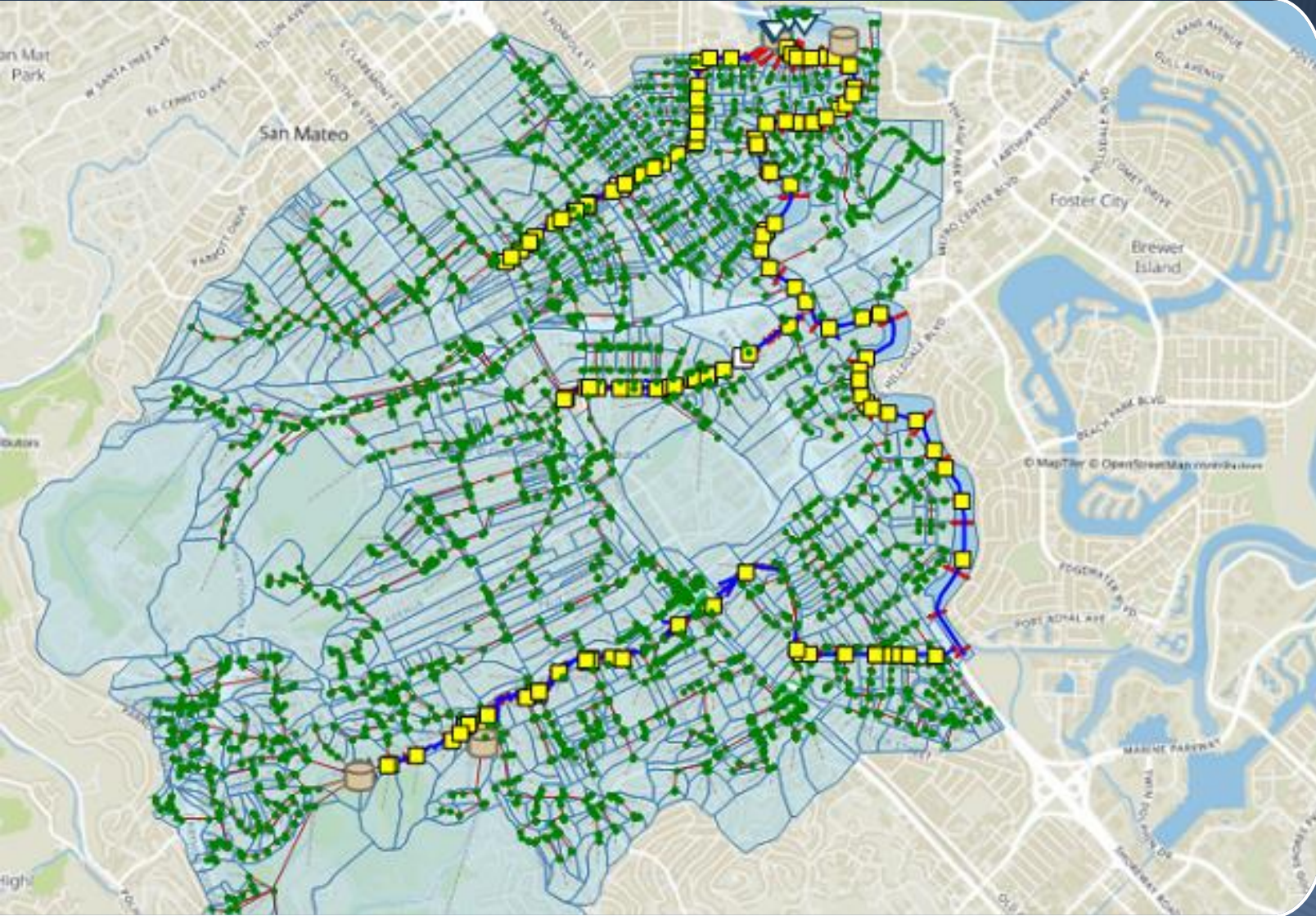
300-year



## New Years Eve Storm (15-minute Precip) with 100-yr Design Storm Overlay

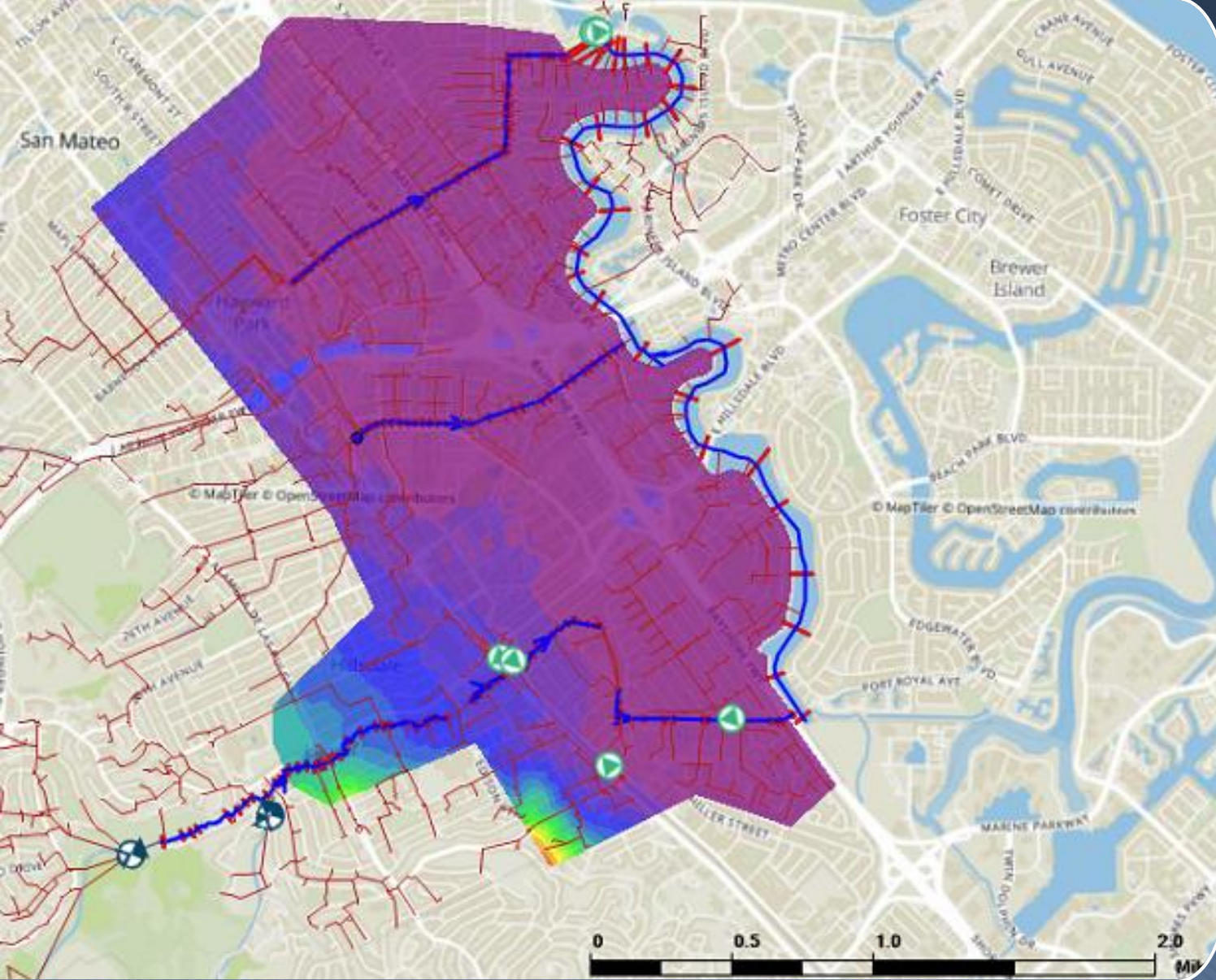






- Important Elements:
  1. Catchments
  2. Pipe System
  3. Three Channels (16<sup>th</sup> Ave, 19<sup>th</sup> Ave, and Laurel Creek)
  4. Lagoon (modeled as a river)
  5. Pumps
  6. 2D Domain





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  4. Lagoon (modeled as a river)
  5. Pumps
  6. 2D Domain

Ground elevations are from  
2017 San Mateo County LiDAR

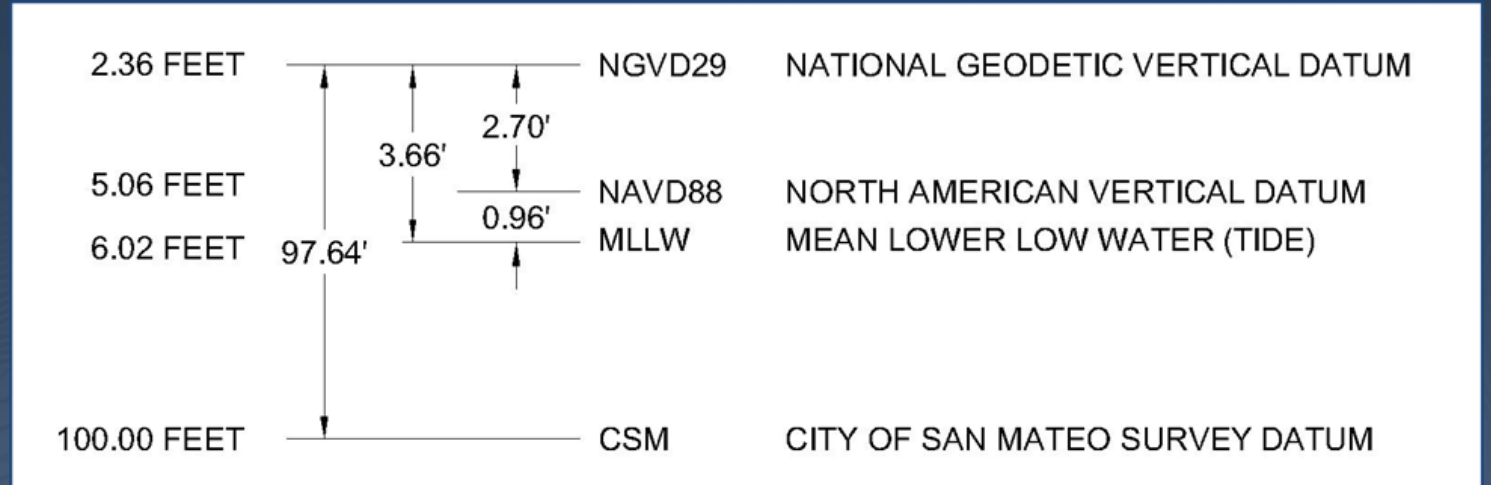






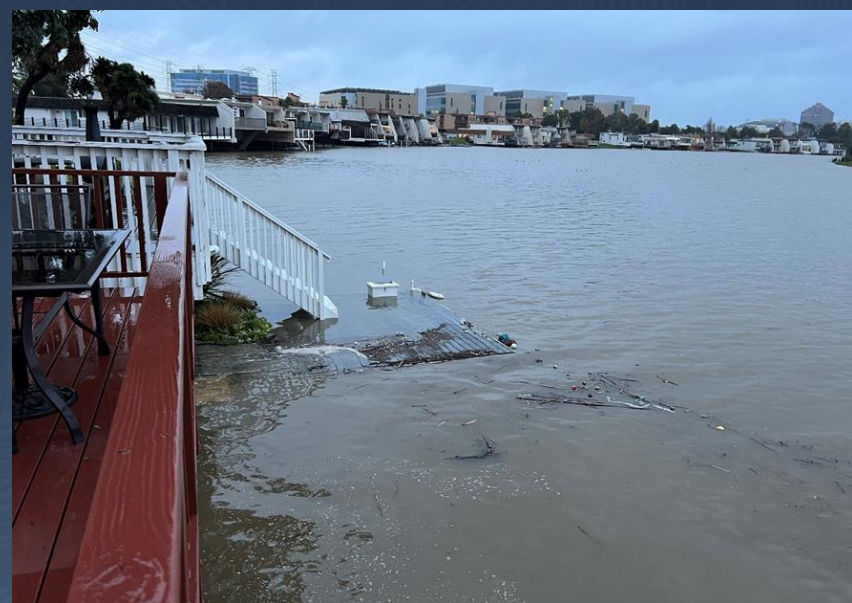


12/31/22, 4:40 PM

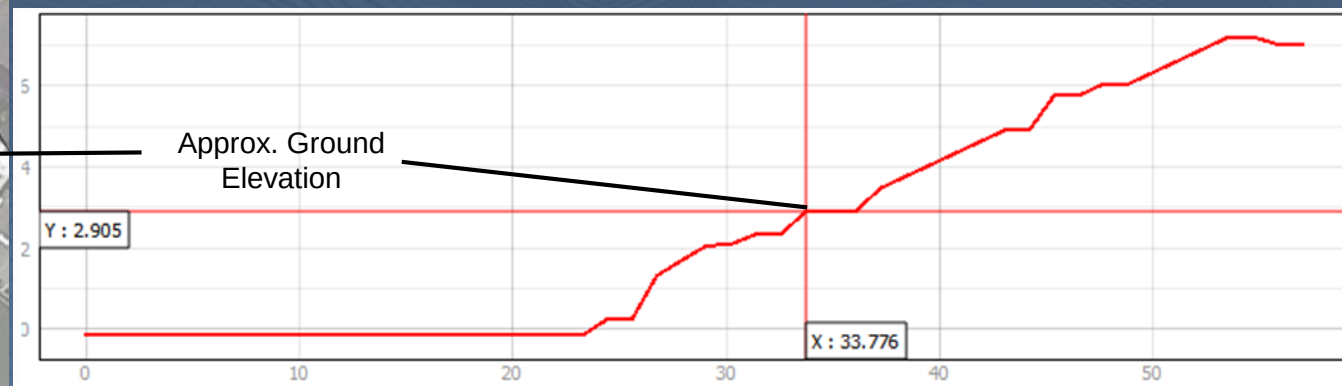
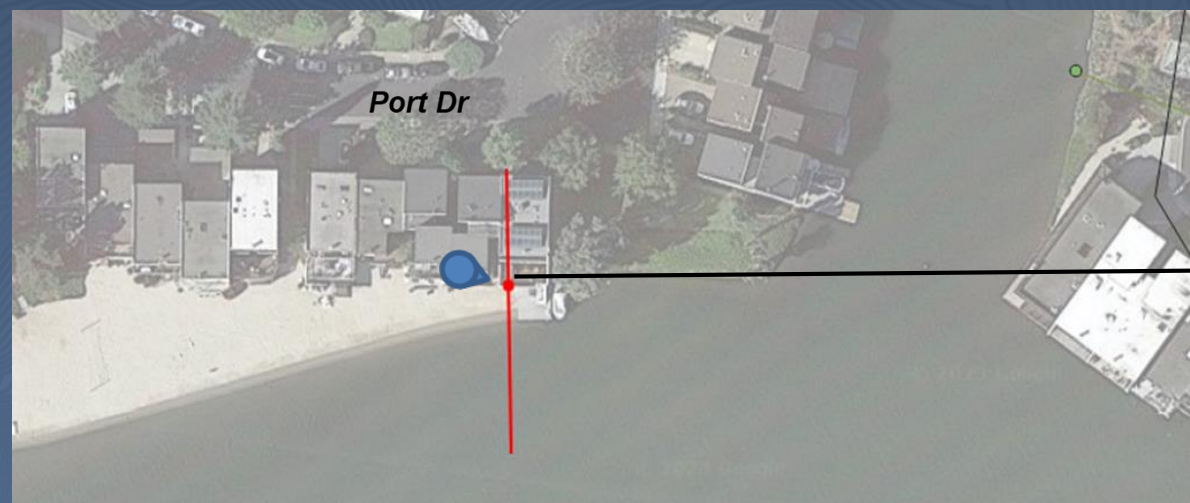


$$98.45 \text{ feet CSM} - 94.94 \text{ feet} = 3.51 \text{ feet NAVD}$$

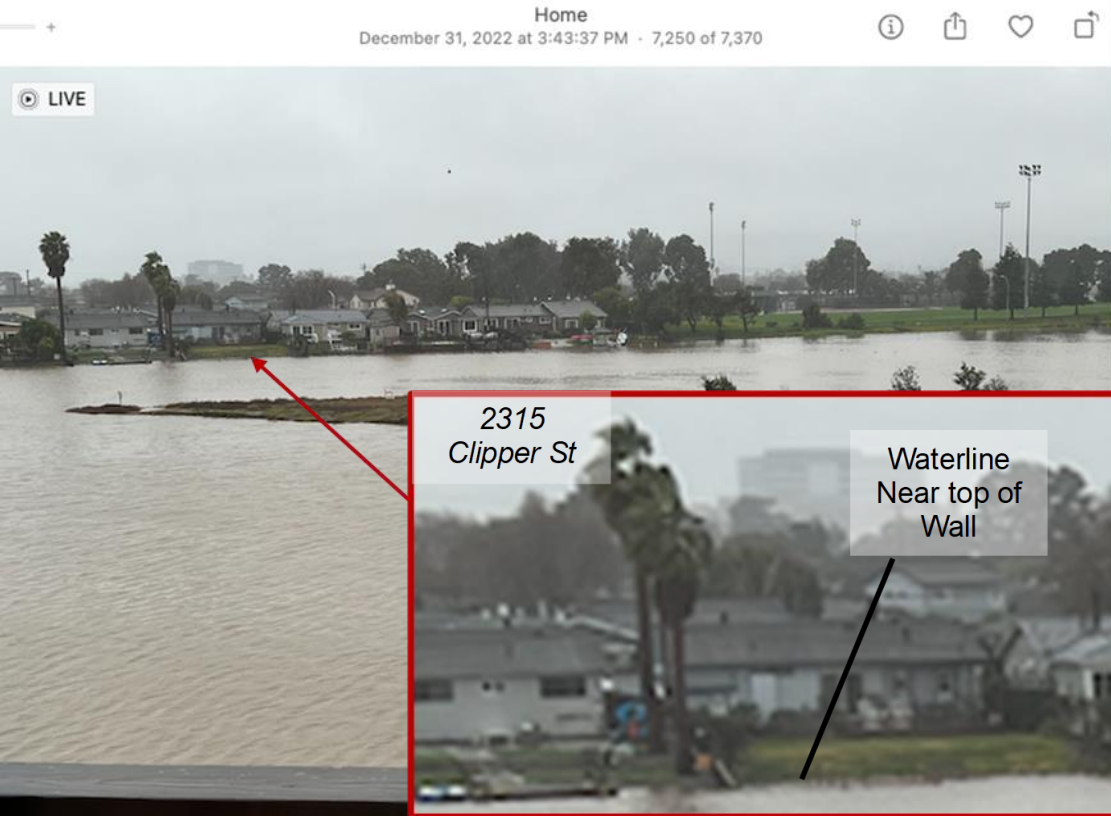




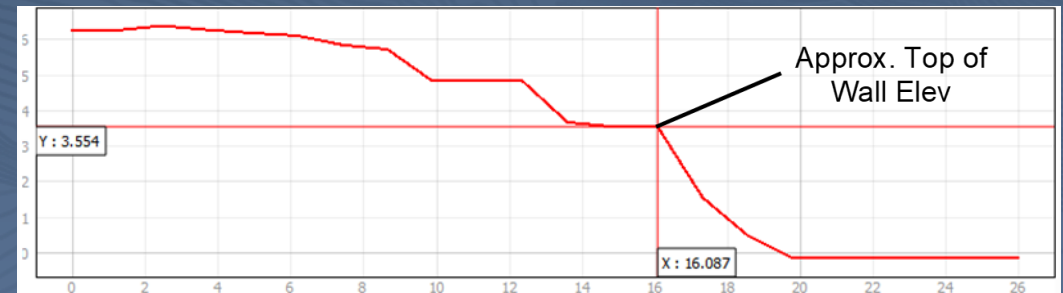
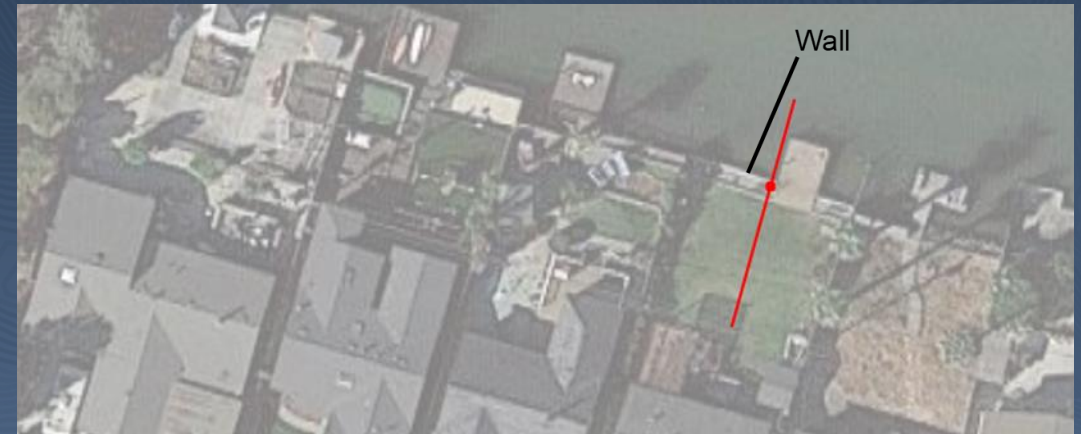
Homes on Port Drive, Facing East  
(WSEL > 98 feet CSM)



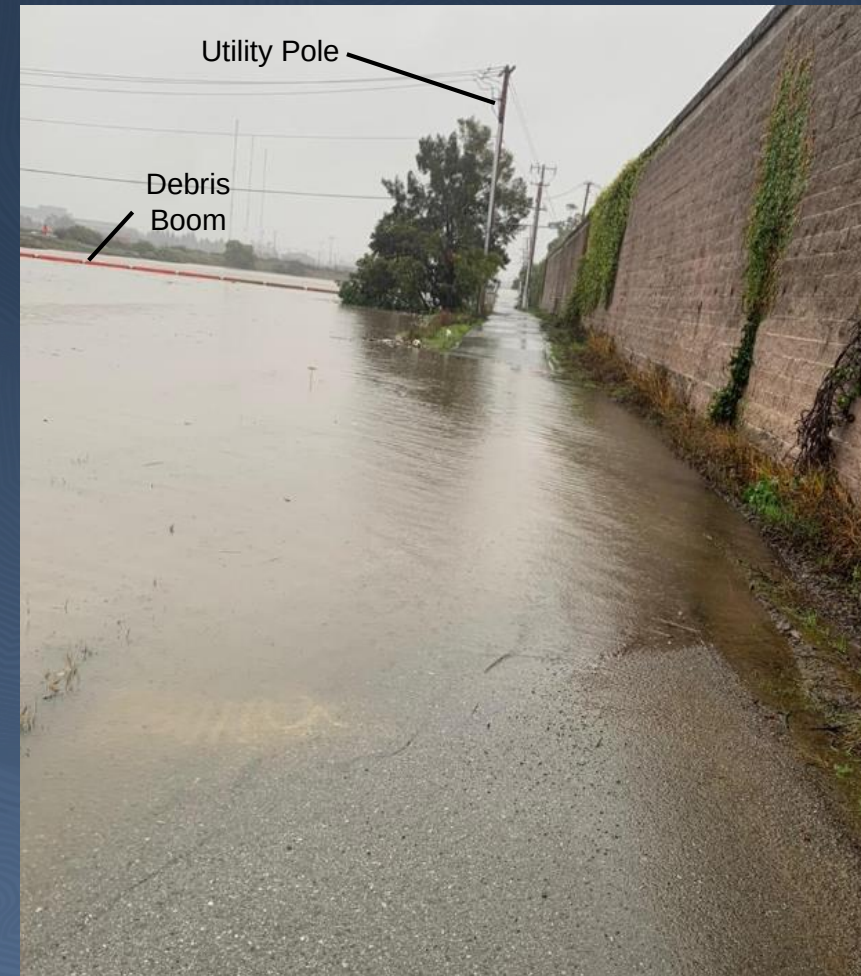
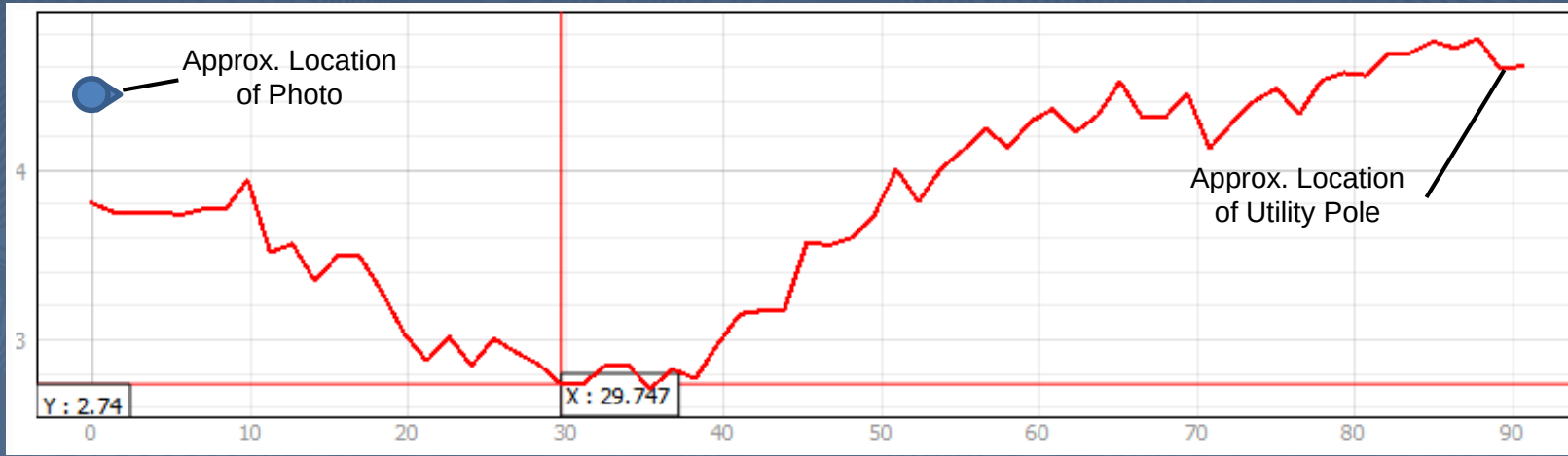
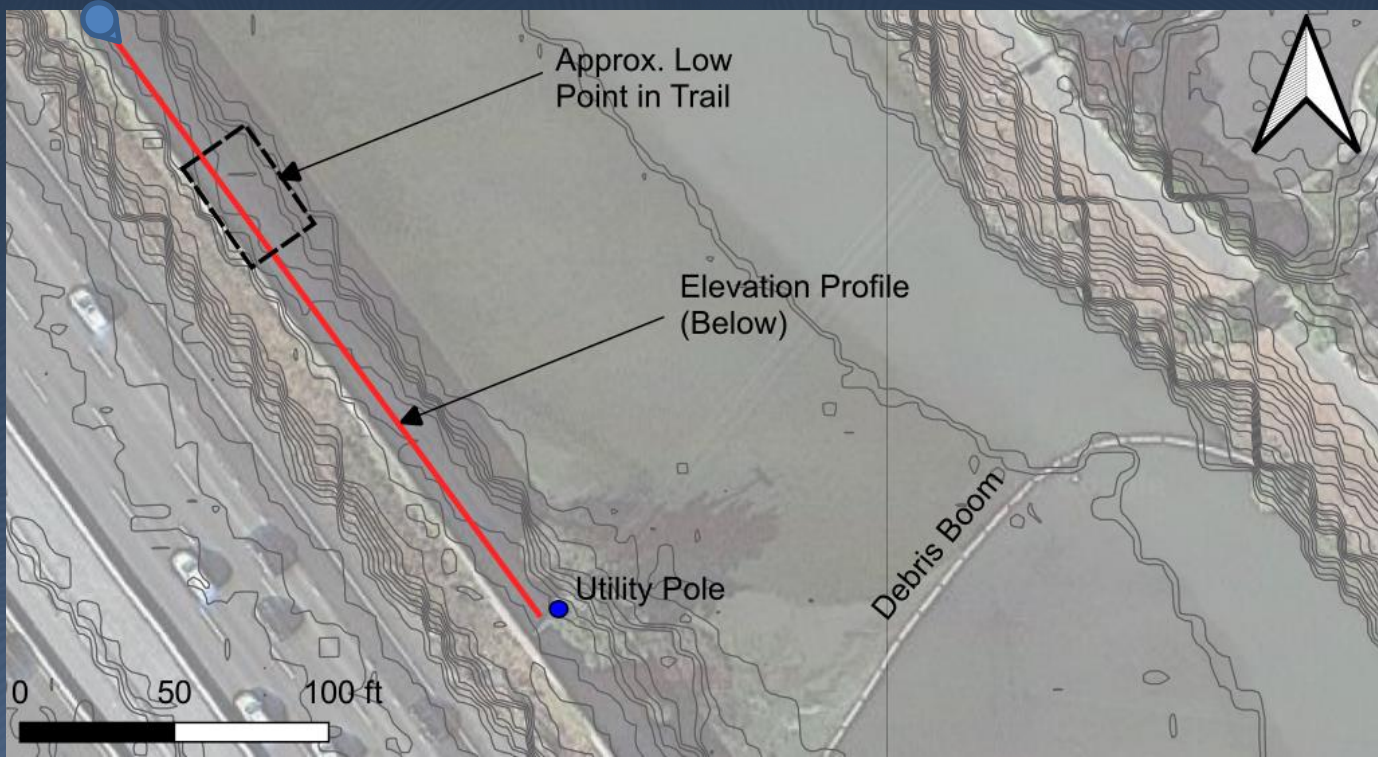




2315 Clipper Street  
(12/31/22 3:45 PM WSEL ~ 98.3 feet CSM)





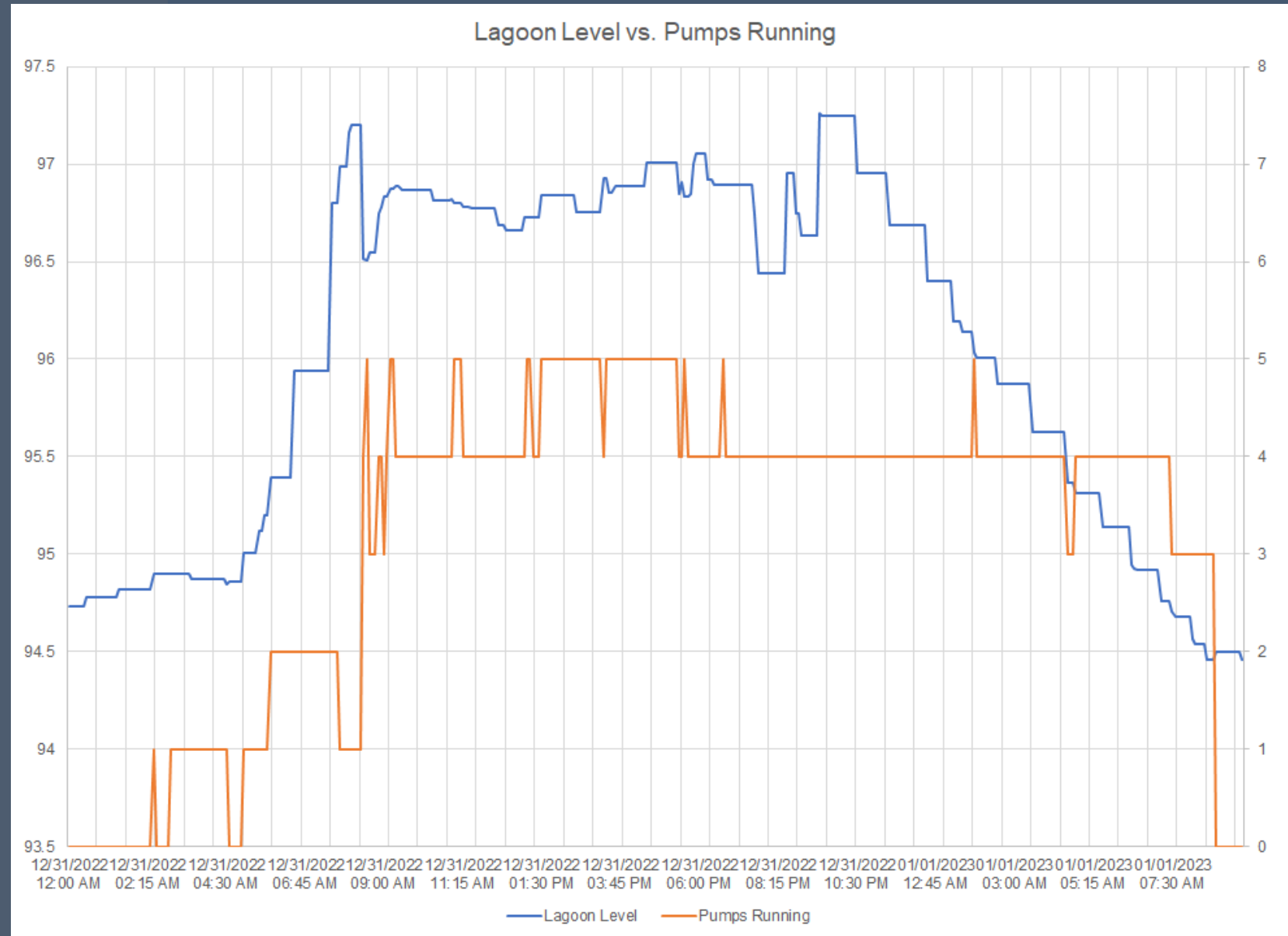


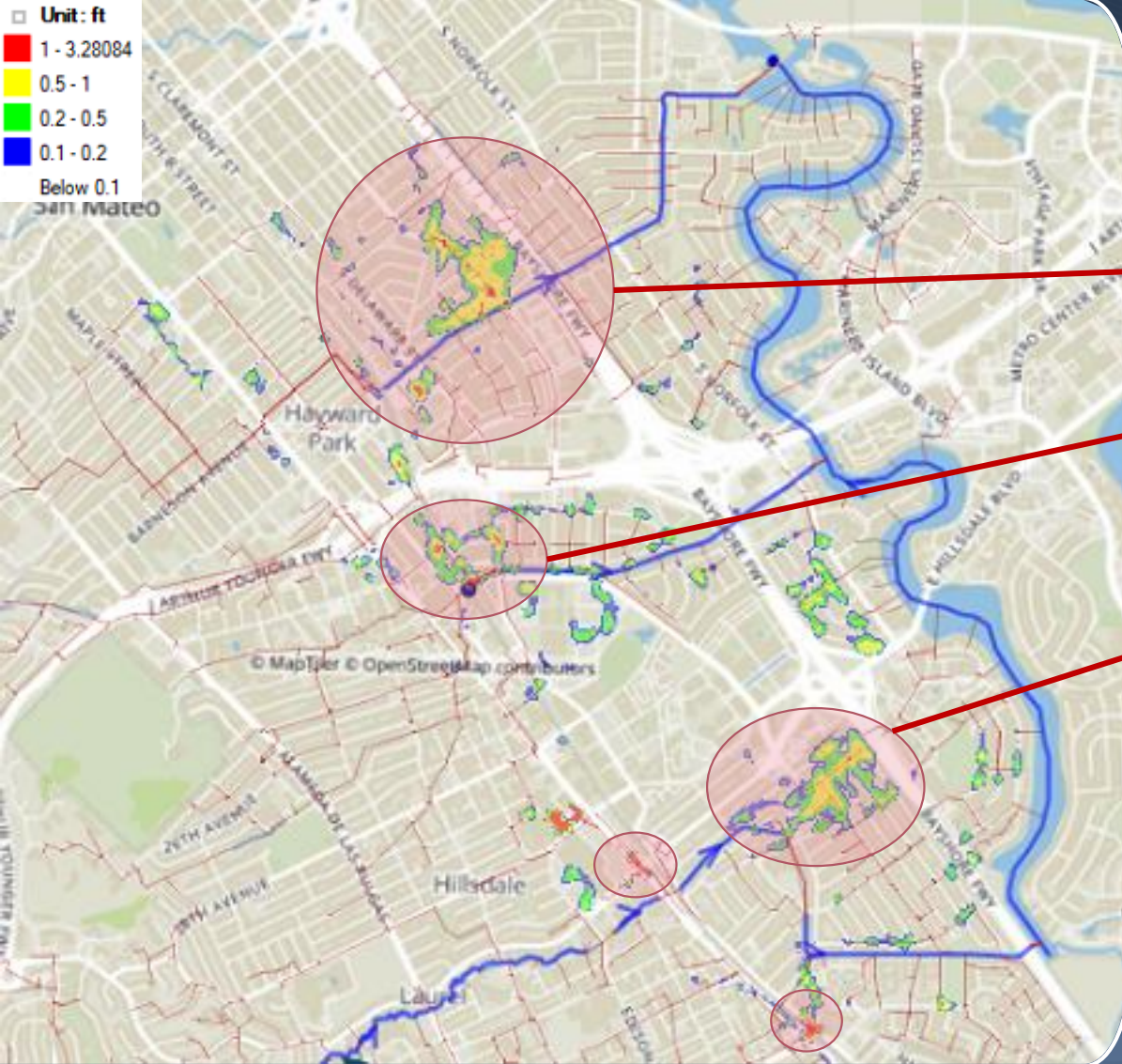
Near O'Neill Slough Tide Gate  
(High Water 98.1 – 98.6 feet CSM)



# Findings

- Rapid lagoon level rise in early hours of the storm
- Multiple pumps failed at the Marina Lagoon Pump Station between 5-8 AM
- One of the five pumps had problems all day
- Lagoon level rose to 98.4', impacting homes and docks

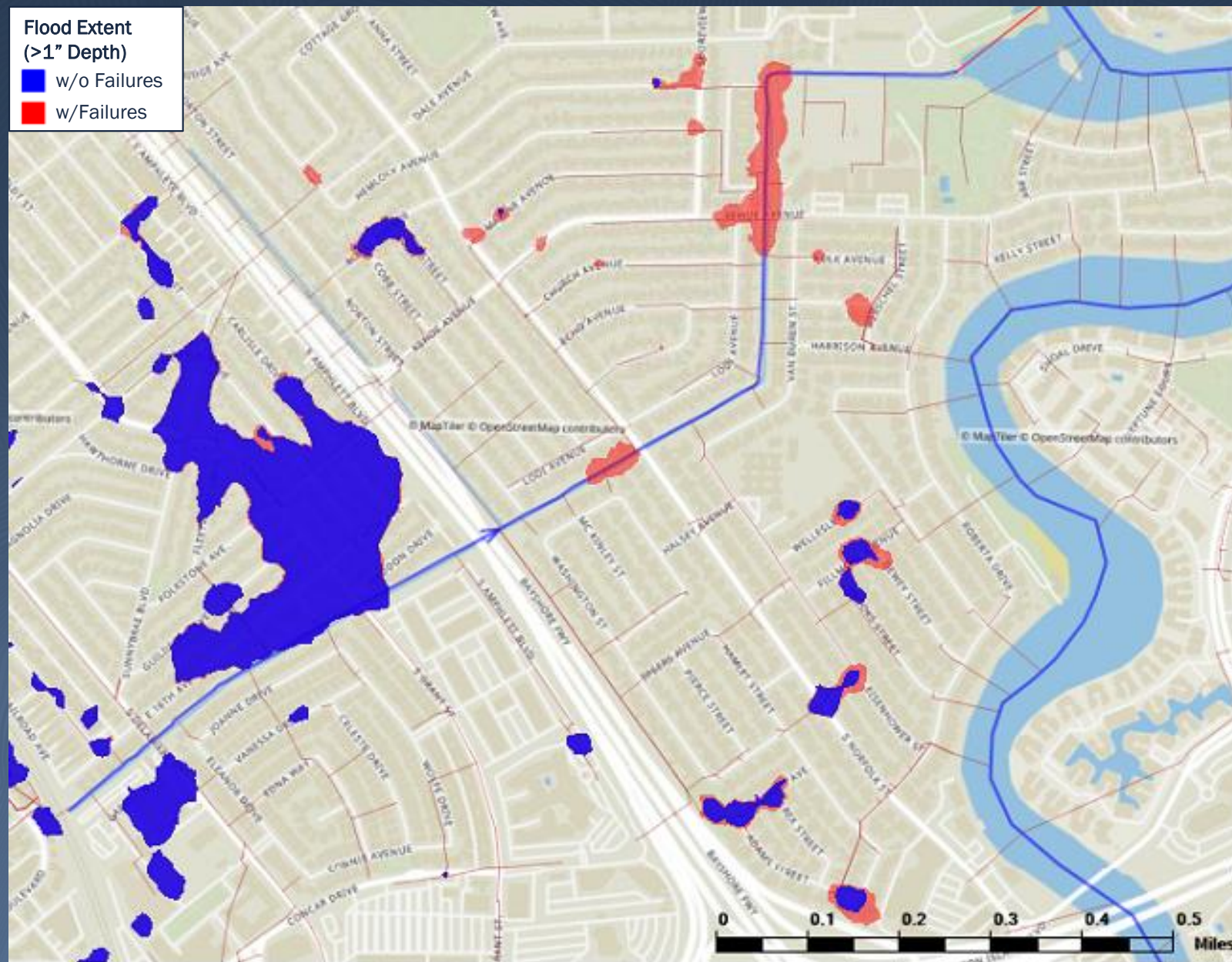




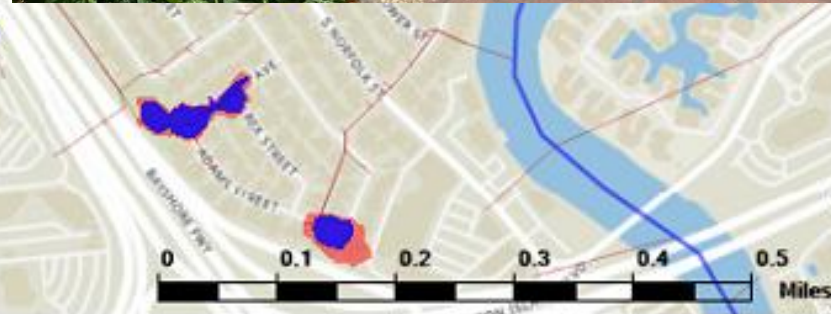
- Had All Marina Lagoon Pumps Operated when Called during NYE:
  1. Flooding from 16<sup>th</sup> Ave Channel upstream of Highway 101
  2. Some flooding around 19<sup>th</sup> Ave Channel (Borel) upstream of Highway 101
  3. Spill from Laurel Creek at George Hall School Culvert
  4. 42<sup>nd</sup> Avenue and Hillsdale Pump Stations could not keep up
  5. Isolated other flooding, mostly contained in streets downstream of Highway 101

*\*Very shallow flooding (<1" in depth) not shown*

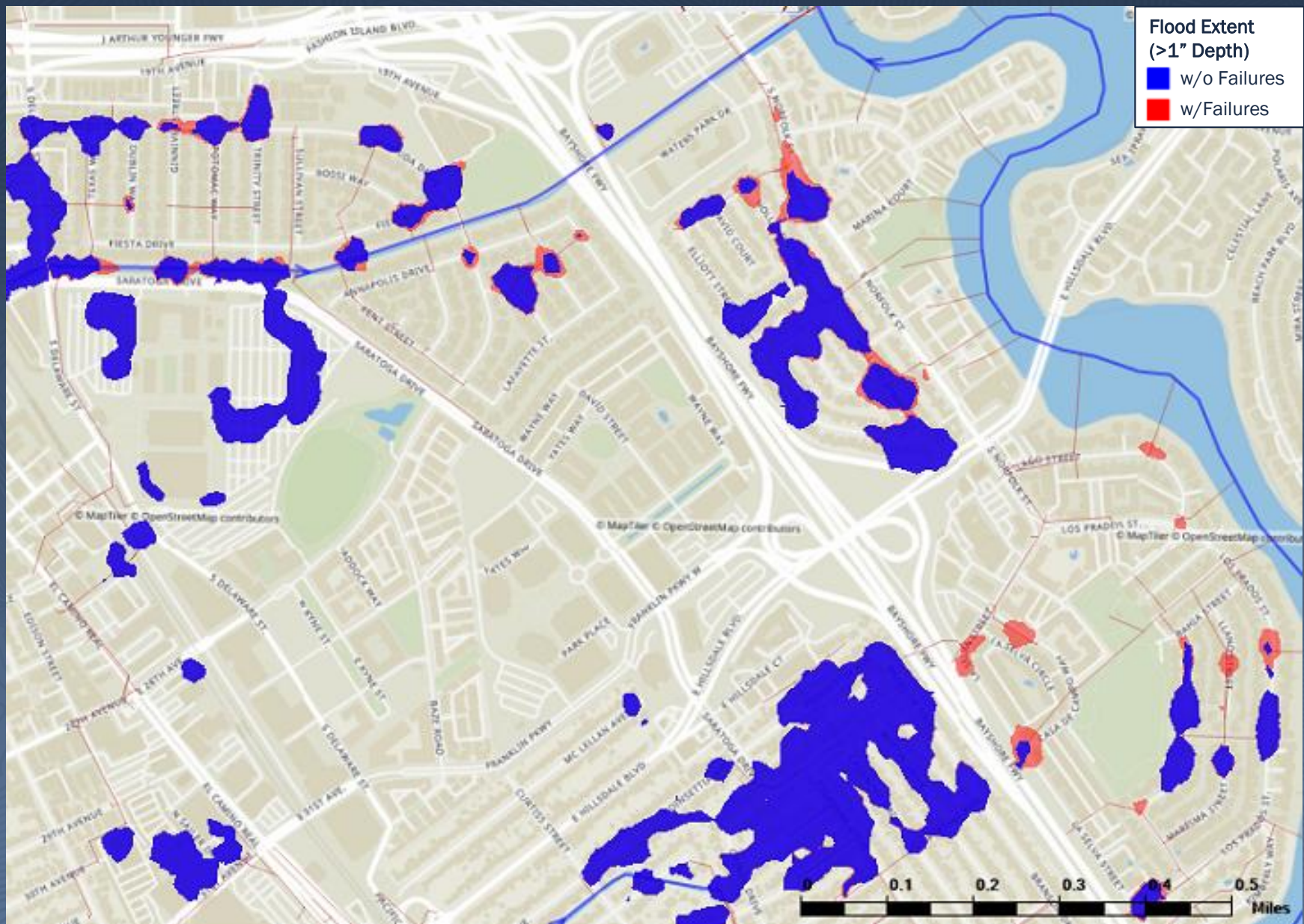




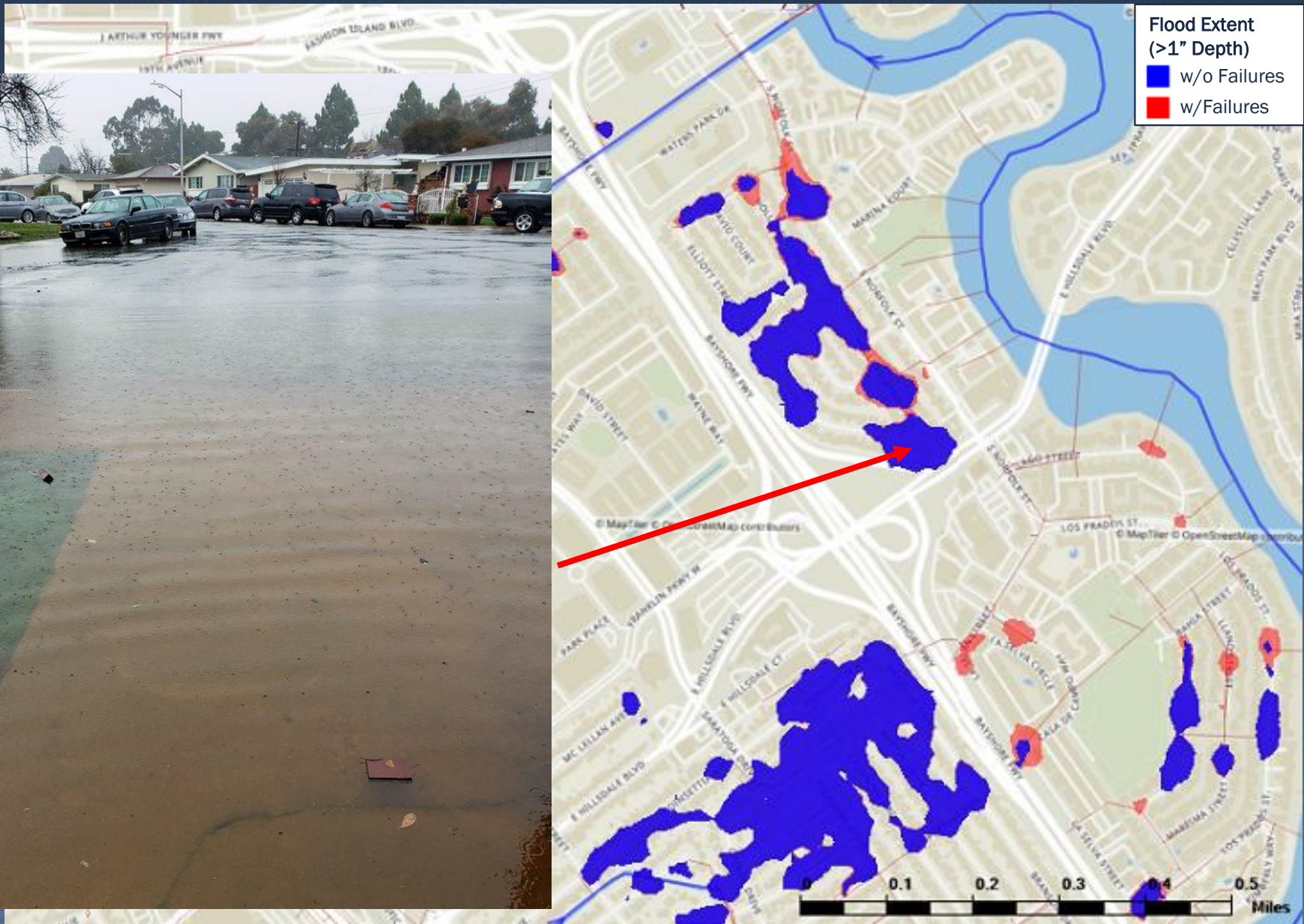




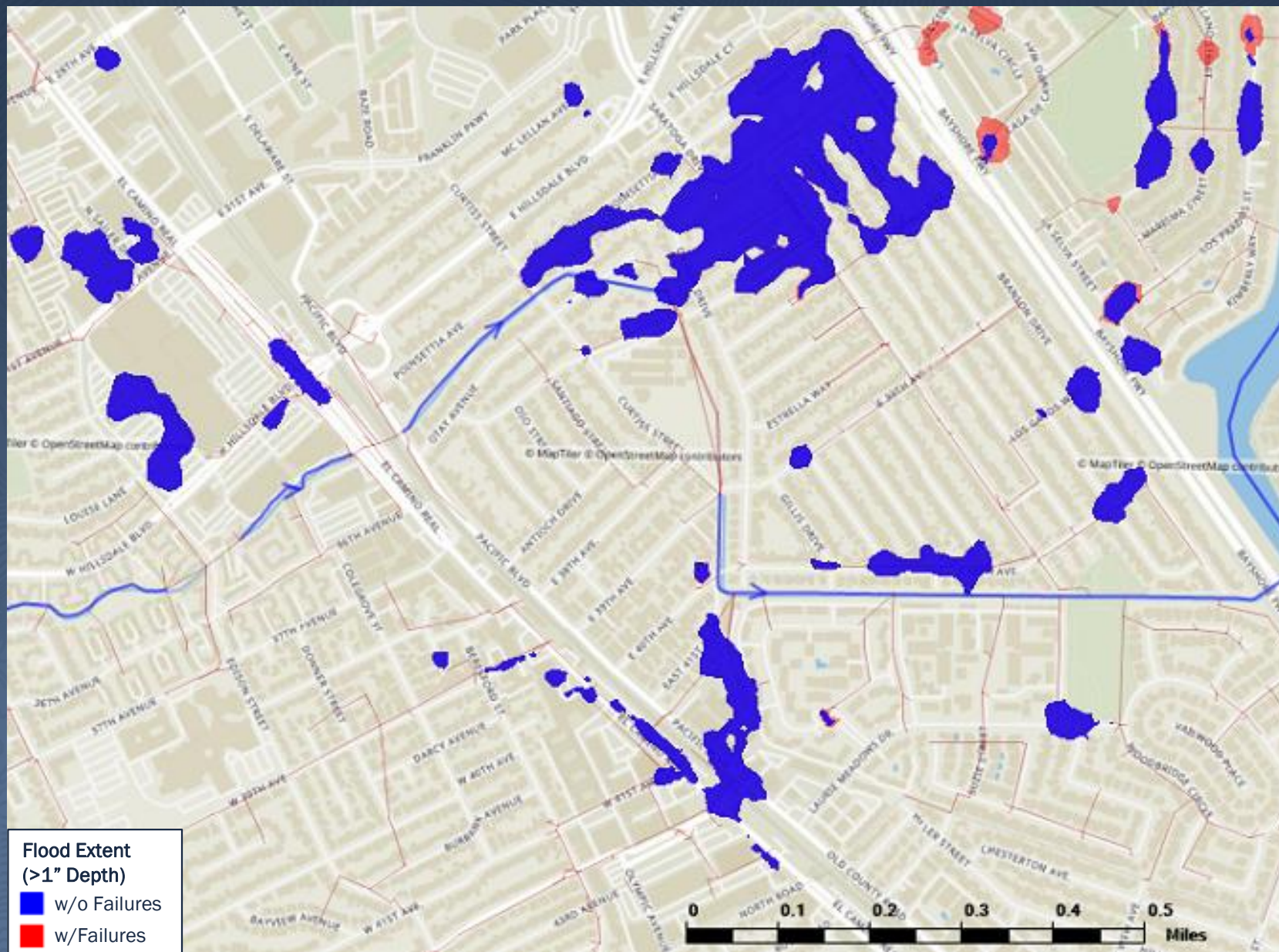


























# Summary

1. The NYE event in San Mateo was greater than the FEMA 100-year design event used to establish Marina Lagoon's base flood elevation.
2. Maximum Lagoon levels were about 1 foot higher during the storm than they would have been had pumps been called per the logbook settings and all pumps operated when called.
3. Most of the street flooding shown during the simulated storm results from inadequate storm drain and creek capacity rather than higher than expected Lagoon levels.
4. The most important preventative measure is to ensure that all pumps are operational when called.



# STORMWATER SYTEM DEFICIENCIES

## Challenges

- Aging infrastructure may malfunction, leading to costly and damaging emergency situations
- Current infrastructure and funding are insufficient for today's storms. During heavy rain events, the excess water can overwhelm the existing stormwater system, causing flooding in low-lying areas.
- Equipment failures more frequent with aging infrastructure, leading to worsened flooding conditions over time.

## Financial Needs

- City-wide infrastructure improvements - \$68M
- Marina Lagoon dredging - \$80M
- Operation and maintenance

## Stormwater Infrastructure – What it Does

- Stormwater infrastructure protects residents and businesses from flooding.
- Safe communities have robust stormwater systems that protect residents and businesses from flooding.





# COMMUNITY FLOOD & STORM PROTECTION INITIATIVE

## The City's Plan:

- Develop a financially self-supporting stormwater system through a user fee, which requires property owner approval via a City-wide ballot measure.
- **Annual Revenue:** \$4 million (less than half of what is needed)
- **Annual Cost Breakdown Per Home:** Around \$8 per month (annual increase with CPI)
- **How Would Residents Be Billed The Fee?** Included as an annual property-related fee on property tax bill
  - Would be charged annually in perpetuity unless changed by another act of Council
- **Is there a chance the fee would increase?** Yes, but the fee increase would go through a public process.





## IF PASSED, what specific projects would be funded?

- Flood prevention capacity improvement projects
- Stormwater pump station upgrades
- Levee improvements
- Marina Lagoon dredging





# NEXT STEPS

## NYE Storm reconstruction

- Marina Lagoon model update
- San Mateo Creek model update
- Marina Lagoon Pump Station – pump / engine assessments

## City-wide comprehensive stormwater assessment

- Update of the City's hydraulic models to include major public and private creeks
- Identification of storm system improvements for the City's pump stations, pipes / culverts / channels, and Marina Lagoon dredging needs.
- Implementation plan

City-wide creek monitoring program: live monitoring to include cameras, water level measurement, flow

August 21<sup>st</sup> Council Meeting – Update

October 16<sup>th</sup> – Action for a November Stormwater Fee, Ballot



# PUBLIC FEEDBACK

## Wet Weather Preparation – El Niño Year

- Additional sandbag locations
- Pump station maintenance / reliability
- Marina Lagoon Pump Station – on-line level information
- Wet Weather Operations Plan
  - Trash racks / maintenance
  - Storm drain clearing
  - Cross-training with other Departments
  - 24 hour shifts
  - Public Works dispatch



## Public Outreach

- Team Up to Clean-Up
- Adopt a Drain
- Be prepared

1. Claim your drain



2. Pick up city provided supplies



3. Clean your drains





# Community Questions?

Azalea Mitch – Public Works Director

Matt Fabry – Deputy Director – [mfabry@cityofsanmateo.org](mailto:mfabry@cityofsanmateo.org)

Jimmy Vo – Senior Engineer – [jvo@cityofsanmateo.org](mailto:jvo@cityofsanmateo.org)

For more information on the Community Flood & Storm Protection Initiative, please visit the website below:  
<https://www.cityofsanmateo.org/2288/Community-Flood-Storm-Protection-Initiat>