# Regional Water Board PFAS Investigation Strategy

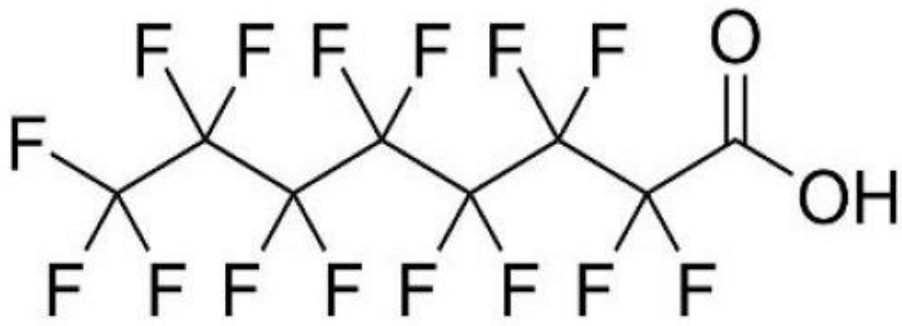
Zone 7 Board of Directors, Special Meeting
September 4, 2024

CALIFORNIA
Water Boards

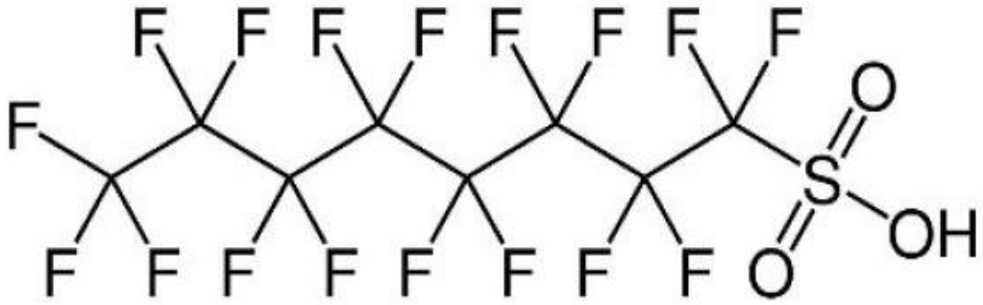
Eileen White, P.E., Executive Officer

# Per- and Polyfluoroalkyl Substances (PFAS)

- >14,000 known compounds
- PFOA and PFOS are common and well-studied



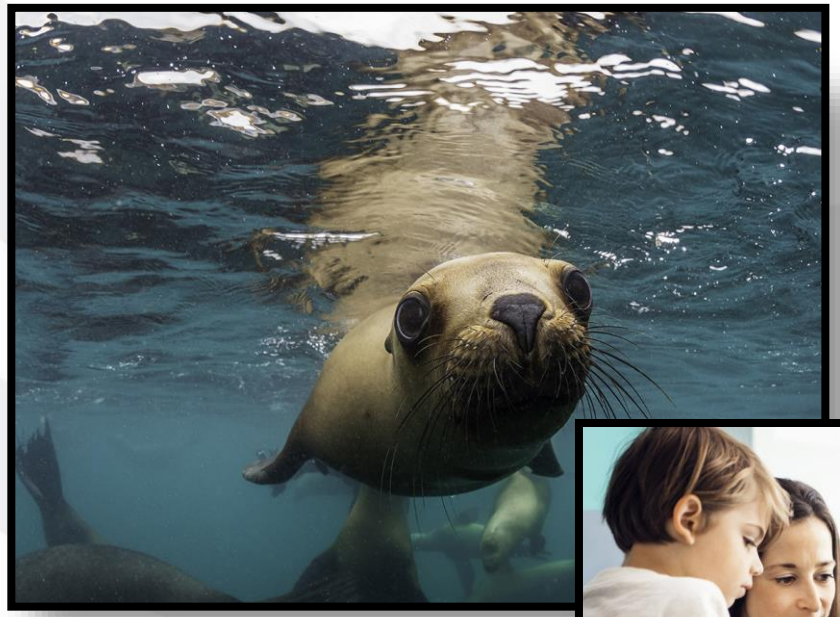

**PFOA: Perfluorooctanoic acid**




**PFOS: Perfluorooctane sulfonic acid**

# Why Do We Care?

- Do not degrade in environment
- Widely distributed
- Toxic to humans and animals



# PFAS Timeline

1930s

Teflon discovered

1940s

Defense Research

1950s

Consumer products

1960s

Aqueous Film Forming Foam (AFFF)

Image modified from Regenesis and AECOM, Rosa Gwinn

1970s

Product enhancement expands

1980s

European Union (EU) discharge restrictions

2000s

Global distribution
Detection in biota

current


Public scrutiny
Evolving regulations
Complex chemistry

Image modified from Regenesis and AECOM, Rosa Gwinn

# Federal Regulations

1. Drinking water maximum contaminant levels

2. Designation as CERCLA hazardous substance

Image Credit: btlaw.com

# PFAS Uses


Image Credit: Australia Department of Defence

# PFAS in the Environment

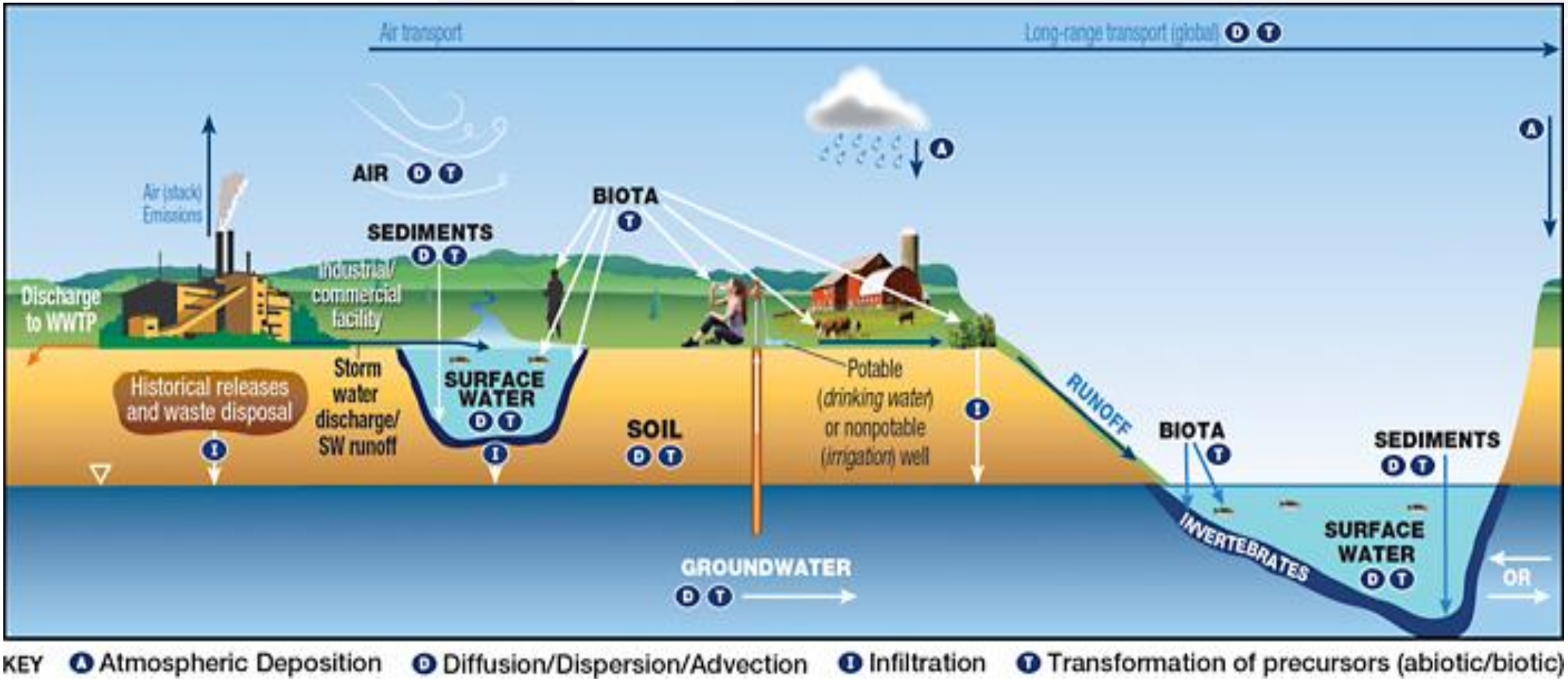
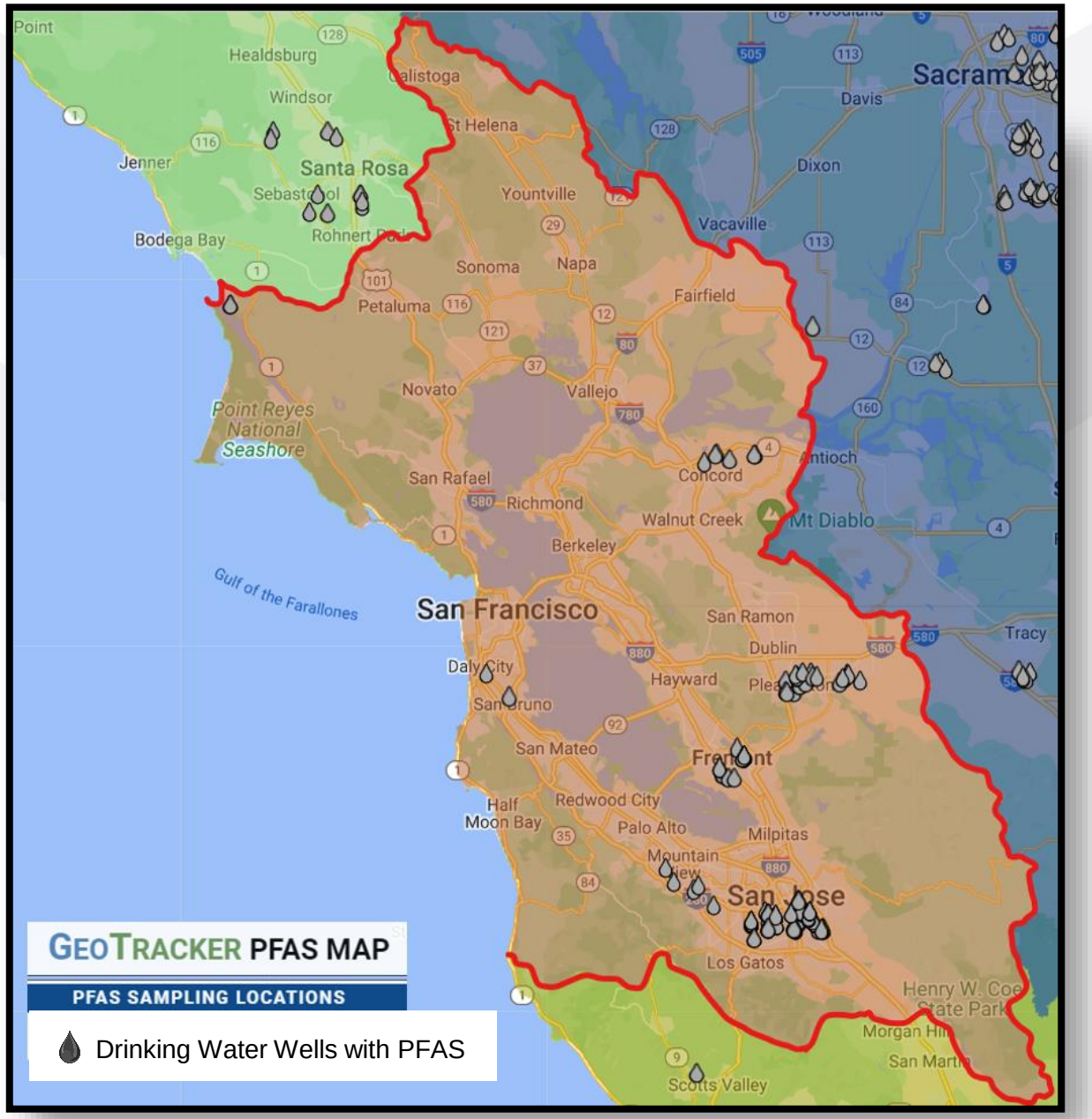



Image Credit: Interstate Technology and Regulatory Council (ITRC)

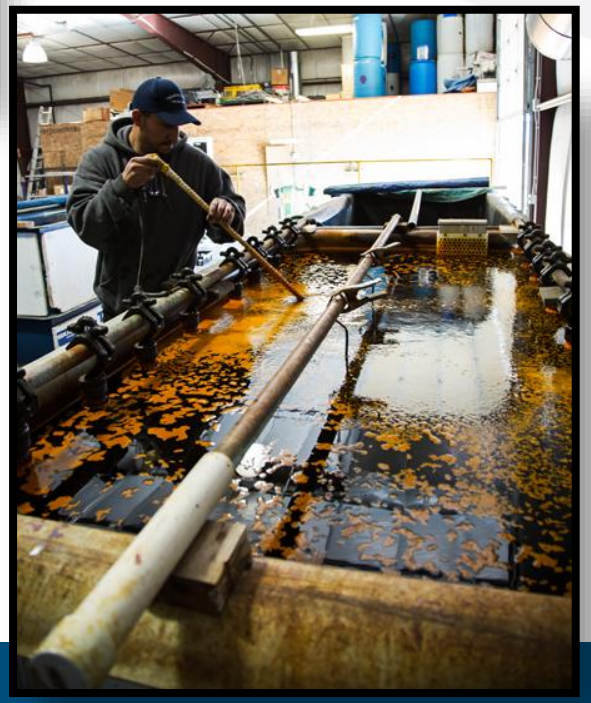
# Focus on Drinking Water Supply Wells

1. Identify PFAS-impacted drinking water wells

2. Look for source sites nearby

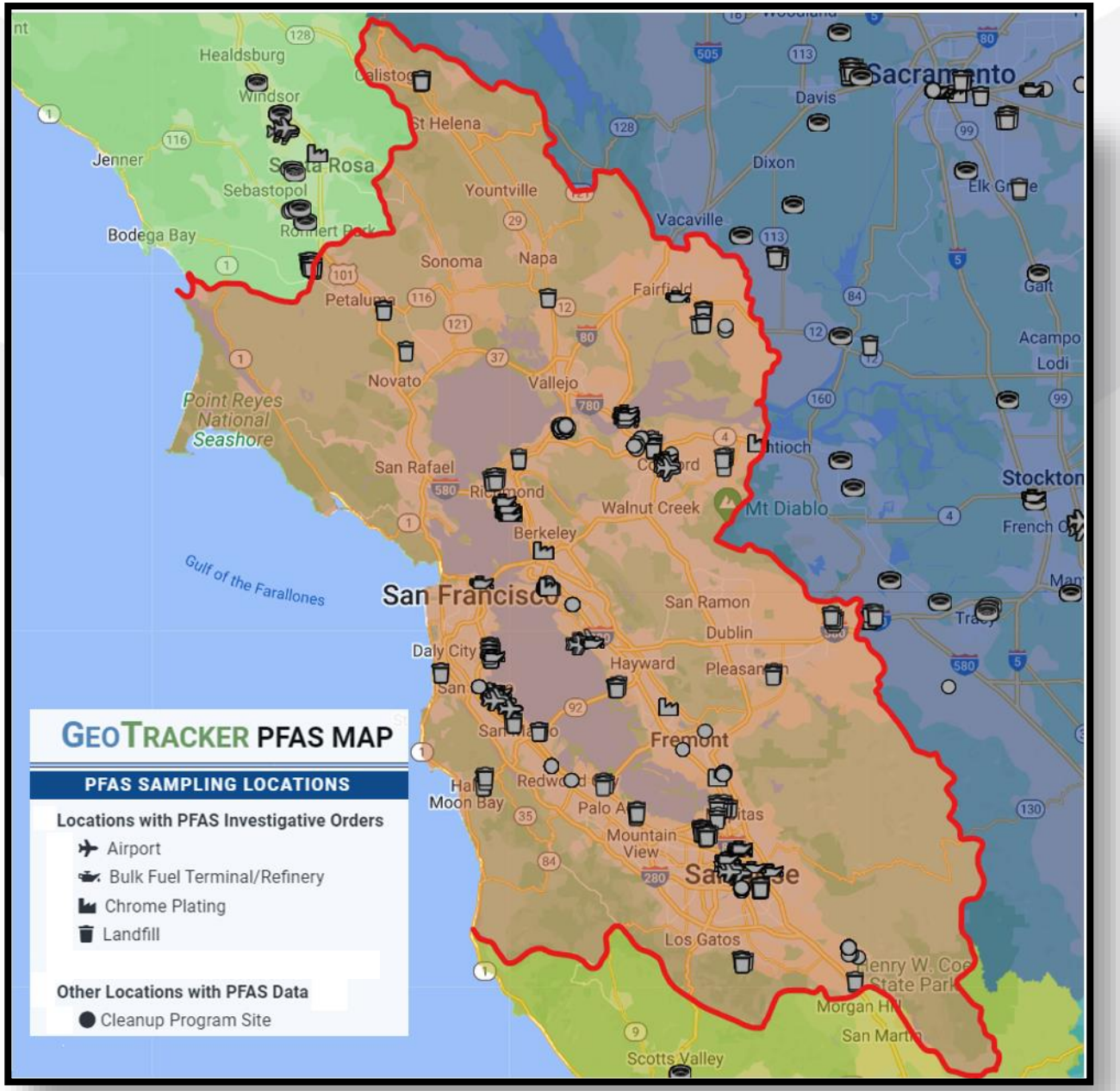


# Regional Cleanup Program Investigations


# Managing Potential PFAS Source Sites

1. Identify source sites
2. Collect data
3. Prioritize sites based on
   - high concentrations
   - near receptors
4. Clean up sources and plumes reaching receptors



# Livermore Valley Investigations


# Water Board Misson

***"To preserve, enhance, and restore the quality of the San Francisco Bay Region's water resources for the protection of the environment, public health and all beneficial uses."***

More information on PFAS is available at the Regional Water Board's PFAS website:
https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/PFAS.html

# Water Board and Zone 7 Partnership

Image: Zone 7 Board of Directors cutting the ribbon on the PFAS Treatment Facility at Stoneridge Well on September 13, 2023

# Thank you

Zone 7 Board of Directors, Special Meeting
September 4, 2024

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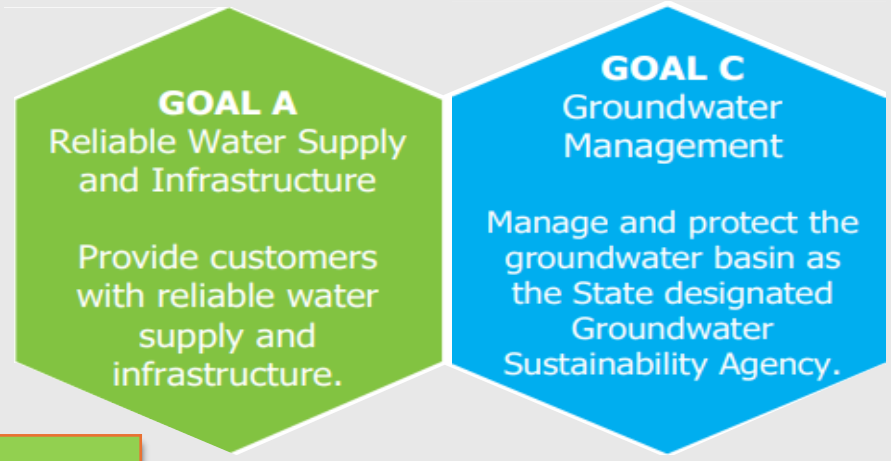
Eileen White, P.E., Executive Officer

# PFAS Management Update

## Special Zone 7 Board Meeting

September 4, 2024

# Supporting Zone 7 Water Agency's Strategic Goals and Initiatives




**Initiative 1**

Establish a diversified water supply plan

**Initiative 7**

Manage the GSA and implement the groundwater management plan

**Initiative 2**

Evaluate and develop appropriate new water supply and reliability opportunities

**Initiative 8**

Study and refine knowledge of the groundwater basin

ZONE 7 WATER AGENCY

# Today's Topics of Discussion

- How did we get here?
- Why does Zone 7 manage PFAS?
- What is Zone 7's PFAS Management Strategy?
- What has Zone 7 accomplished to date?
- What are the key takeaways and planned next steps?

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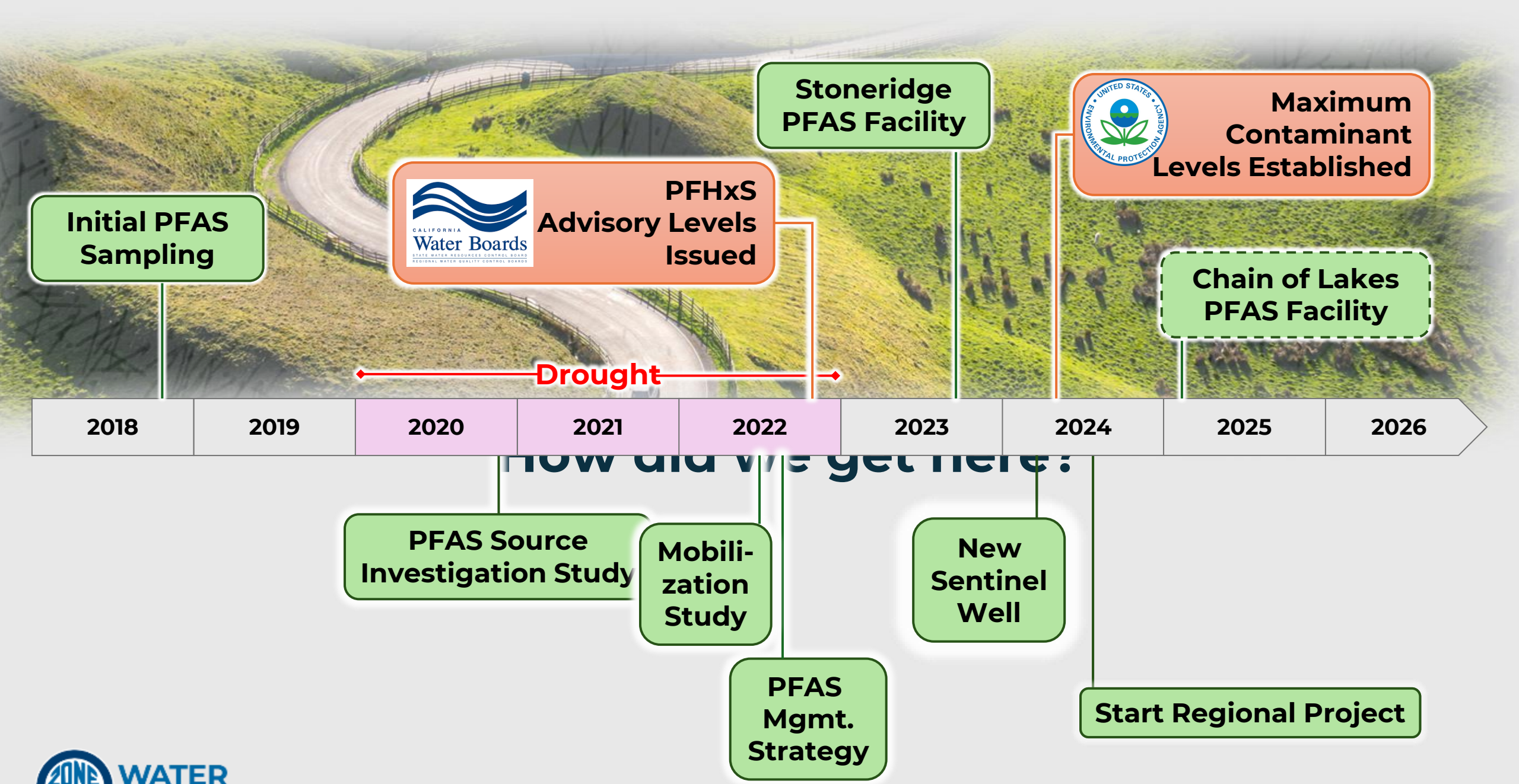
Initial PFAS Sampling
PFHxS Advisory Levels Issued
Stoneridge PFAS Facility
Maximum Contaminant Levels Established
Chain of Lakes PFAS Facility
Drought
2018
2019
2020
2021
2022
2023
2024
2025
2026
How did we get here?
PFAS Source Investigation Study
Mobili-zation Study
PFAS Mgmt. Strategy
New Sentinel Well
Start Regional Project

# US Environmental Protection Agency's Regulatory Actions

- **On April 10, 2024**, EPA announced the final **National Primary Drinking Water Regulation** (NPDWR) for six PFAS. With this regulation, EPA established legally enforceable Maximum Contaminant Levels (MCLs) and a Hazard Index.
- **By 2027**, monitor for these PFAS and have three years to complete initial monitoring, followed by ongoing compliance monitoring.
- **In 2027**, provide the public with information on the levels of these PFAS in their drinking water.
- **By 2029**, implement solutions that reduce these PFAS if monitoring shows that drinking water levels exceed these MCLs.
- **Beginning in 2029,** take action to reduce levels of these PFAS and provide notification to the public of the violation.

# 2024 Final PFAS Maximum Contaminant Levels

| Compound | Final MCLG | Final MCL (enforceable levels) |
|---|---|---|
| PFOA | Zero | 4.0 parts per trillion (ppt) (also expressed as ng/L) |
| PFOS | Zero | 4.0 ppt |
| PFHxS | 10 ppt | 10 ppt |
| PFNA | 10 ppt | 10 ppt |
| HFPO-DA (commonly known as GenX Chemicals) | 10 ppt | 10 ppt |
| Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS | 1 (unitless)<br>Hazard Index | 1 (unitless)<br>Hazard Index |

$$\text{Hazard Index (1 unitless)} = \left(\frac{[\text{HFPO} - \text{DA}_{\text{ppt}}]}{[10\ \text{ppt}]}\right) + \left(\frac{[\text{PFBS}_{\text{ppt}}]}{[2000\ \text{ppt}]}\right) + \left(\frac{[\text{PFNA}_{\text{ppt}}]}{[10\ \text{ppt}]}\right) + \left(\frac{[\text{PFHxS}_{\text{ppt}}]}{[10\ \text{ppt}]}\right)$$

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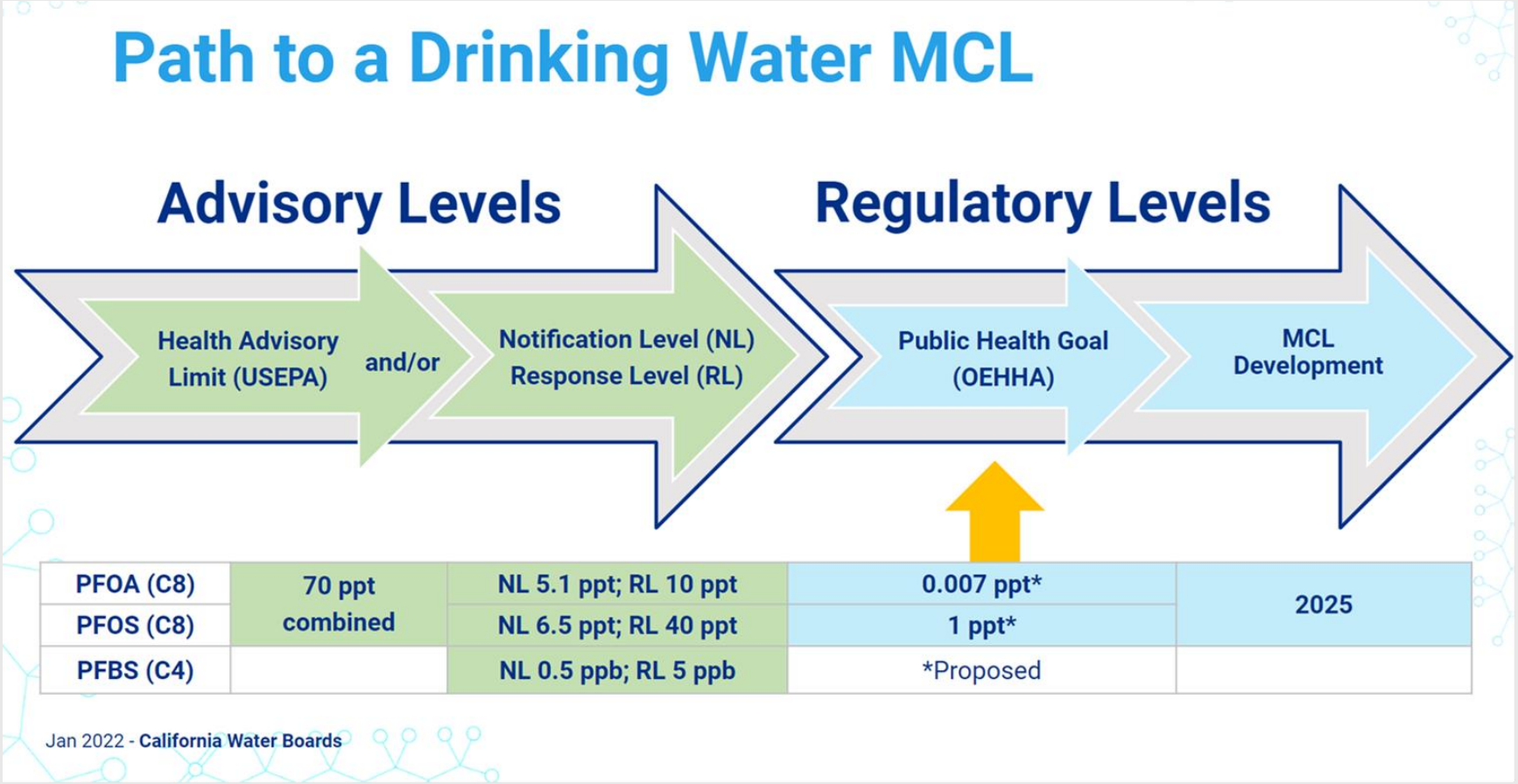
# California's Regulatory Actions

- On April 5, 2024, the California Office of Environmental Health Hazard Assessment (OEHHA) adopted public health goals of 0.007 ppt for PFOA and 1.0 ppt for PFOS.
- The public health goals are objectives, but not enforceable standards.
- The State Water Resources Control Board is working on a statewide standard.




| | | | | |
|---|---|---|---|---|
| PFOA (C8) | 70 ppt combined | NL 5.1 ppt; RL 10 ppt | 0.007 ppt* | 2025 |
| PFOS (C8) | | NL 6.5 ppt; RL 40 ppt | 1 ppt* | |
| PFBS (C4) | | NL 0.5 ppb; RL 5 ppb | *Proposed | |

Jan 2022 - California Water Boards

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# Why does Zone 7 manage PFAS?

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# Policy Requirements and Regulatory Compliance Needs

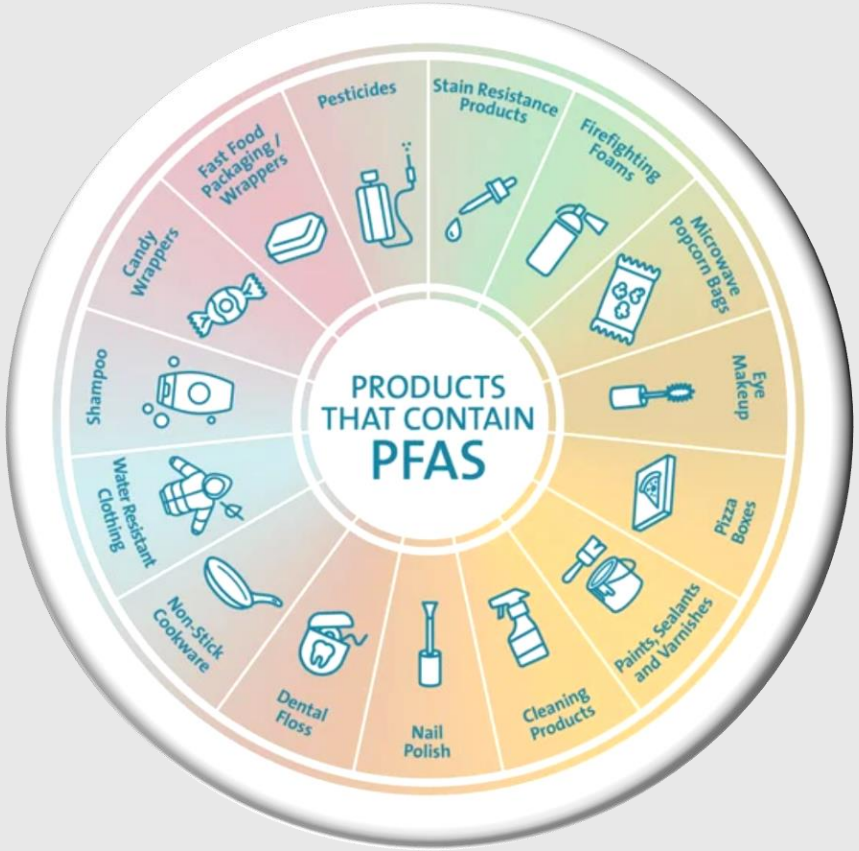
- To implement Zone 7's Water Supply Reliability Policy
- To implement Zone 7's Water Quality Policy
- To meet Domestic Water Supply Permits requirements
- To comply with the National Primary Drinking Water Regulation (NPDWR) also known as Maximum Contaminant Levels (MCLs)*
- To meet California Drinking Water Standards**


* Zone 7 is complying with the MCLs ahead of 2029 due date

** yet to be promulgated

# Zone 7's PFAS Management Objectives

1. To support the mission of delivering safe, reliable, efficient, and sustainable water
2. To manage local groundwater supply to remain resilient to multiyear droughts
3. To meet or exceed State and Federal Drinking Water Quality standards
4. To sustainably manage the groundwater basin in compliance with the Sustainable Groundwater Management Act



# What is Zone 7's PFAS Management Strategy?

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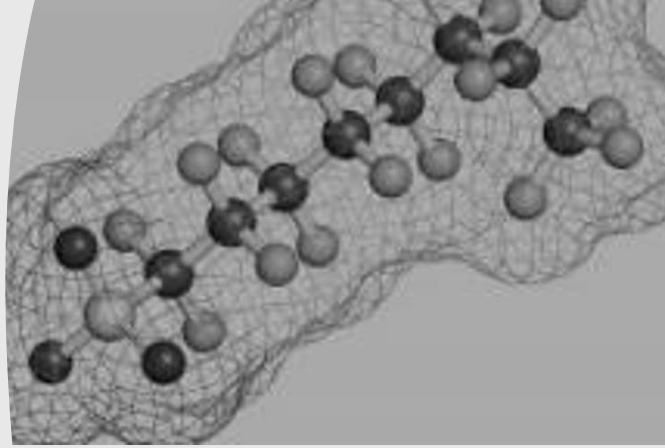
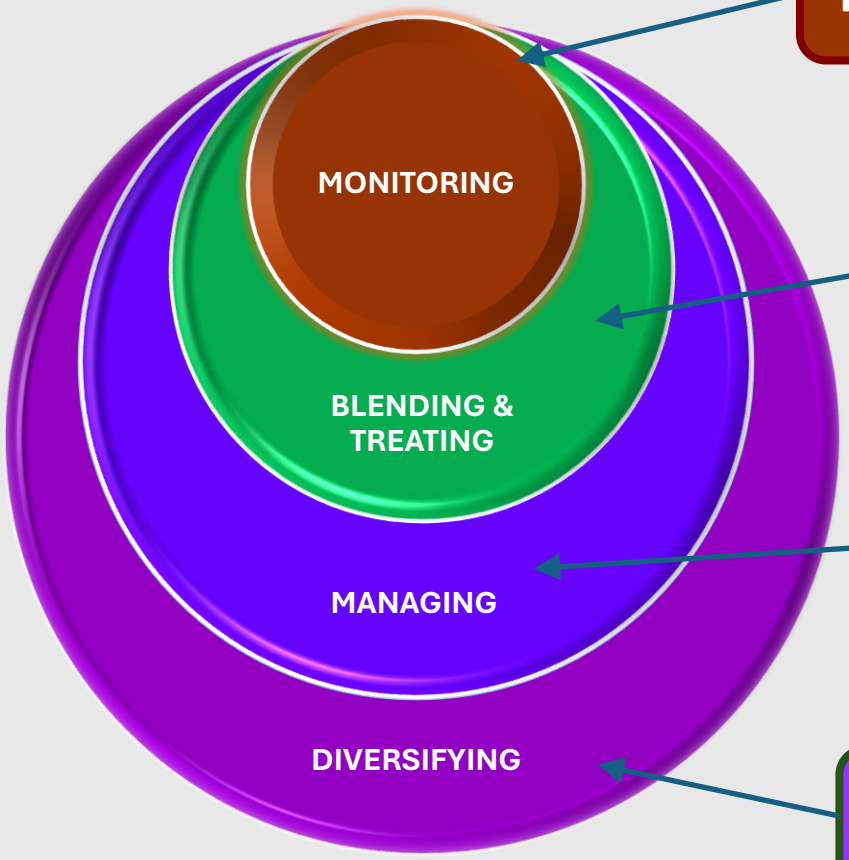
# Near-Term Strategy (~~Present~~ August 2022 – 2023)

- **Monitoring**
  - Monitoring PFAS
  - Tracking regulations ar… …development
- **Blending**
  - Blending Cha… …ll fields to meet the WQ standards
  - Hopyard does … …eatment currently
  - Stoneridge wil… …with the upcoming PFHxS Respon…
- **Supply Driven Op…**
  - Operating Moc… …ard, COL, and Stoneridge
- **Planning**
  - Pre-planning for impacts of potential MCLs

Implemented



# Zone 7's Long-term PFAS Management Strategy* (Post 2023)




**MONITORING** to track and manage groundwater quality

**BLENDING & TREATING** to meet water quality standards

**MANAGING GROUNDWATER QUALITY** to prevent further degradation

**DIVERSIFYING GROUNDWATER SOURCES** to become more resilient

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* This strategy is internally developed by Zone 7 in 2022.

# What has Zone 7 accomplished so far?


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# MONITORING COMPONENT

# Monitoring

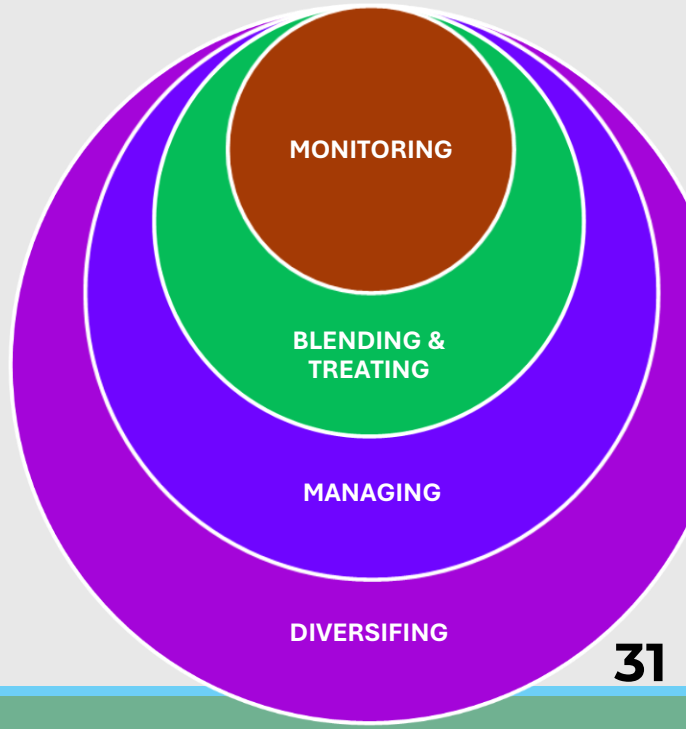
## To track and manage groundwater quality

Completed Actions:

- Expanded PFAS monitoring network from 67 wells in 2021 Water Year to 107 In 2023 Water Year
- Installed a sentinel well in Ken Mercer Park to observe the Bernal subbasin (2023)

Ongoing Actions:

- Implementing the PFAS monitoring program to track the PFAS concentrations
- Sharing data with retailers and regulators to investigate the source(s)
- Making PFAS data and information available to the public for transparency

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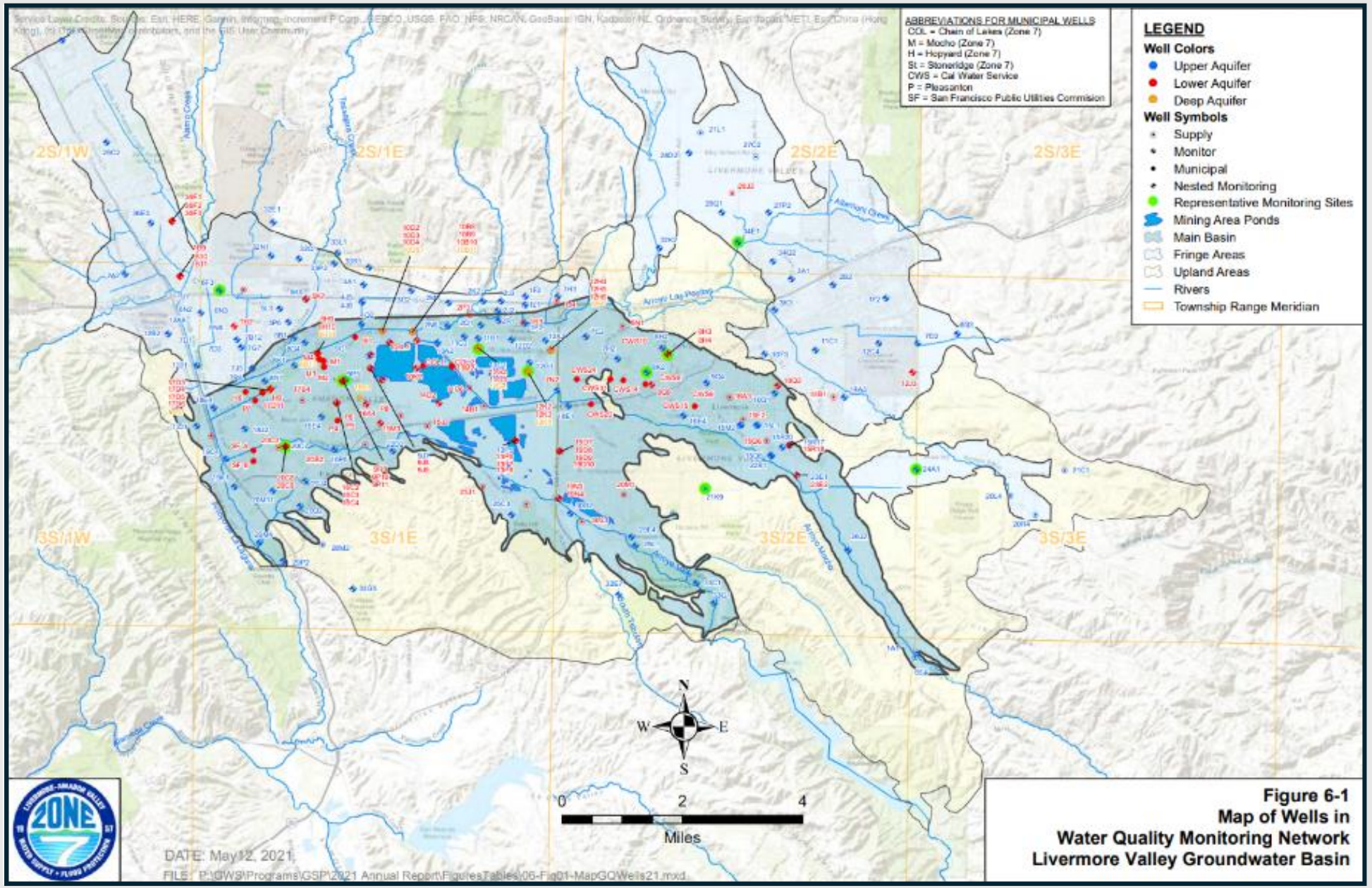
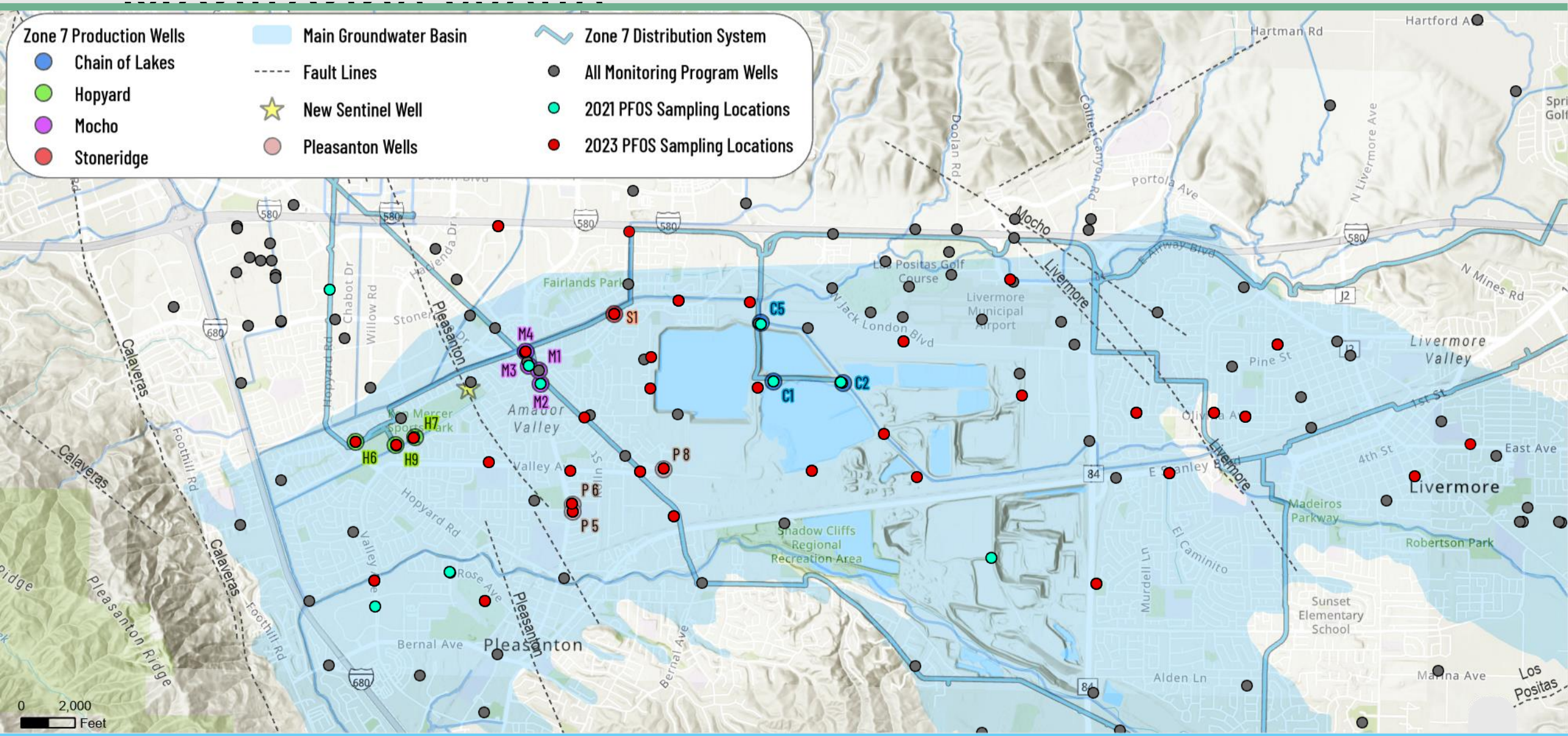
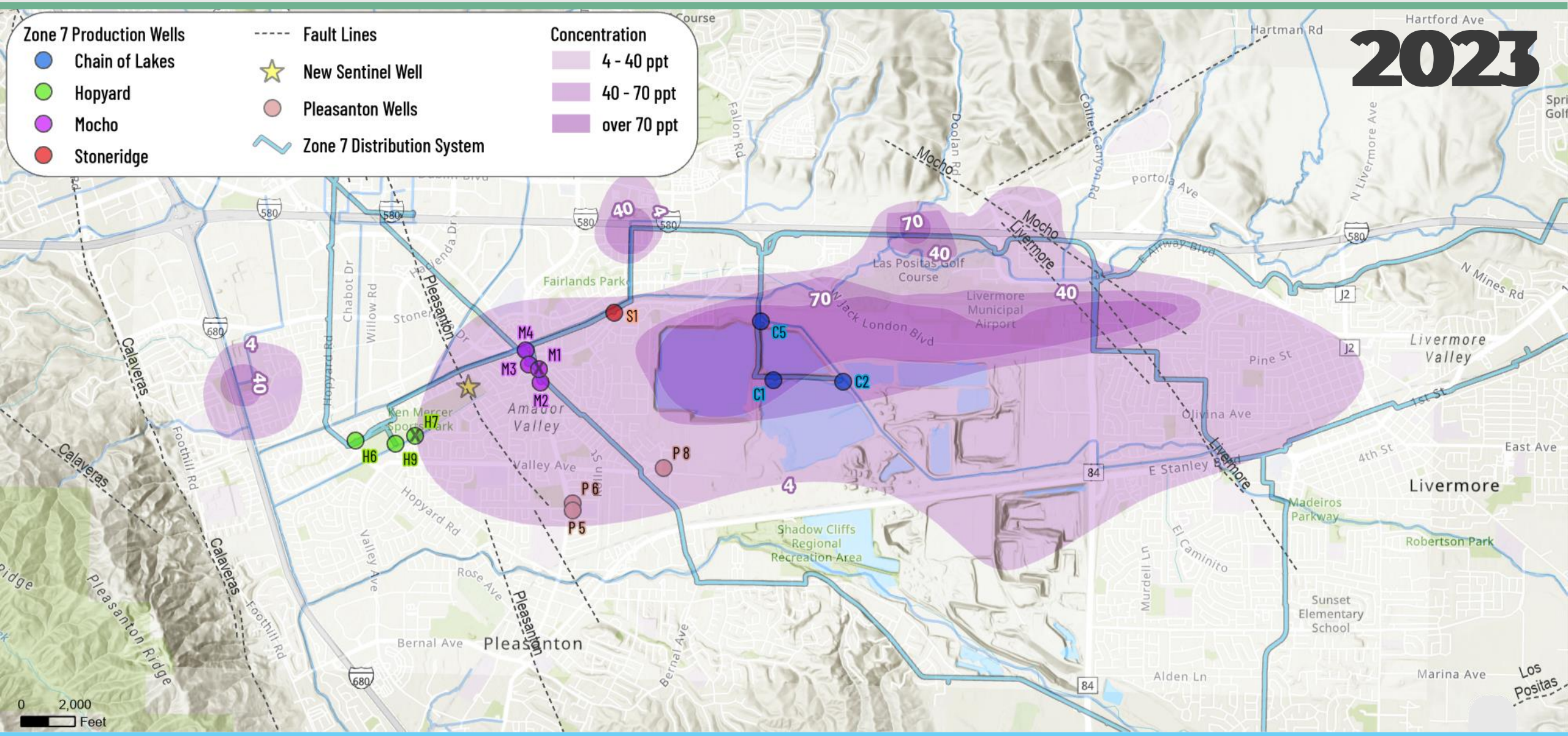
# Water Quality Monitoring



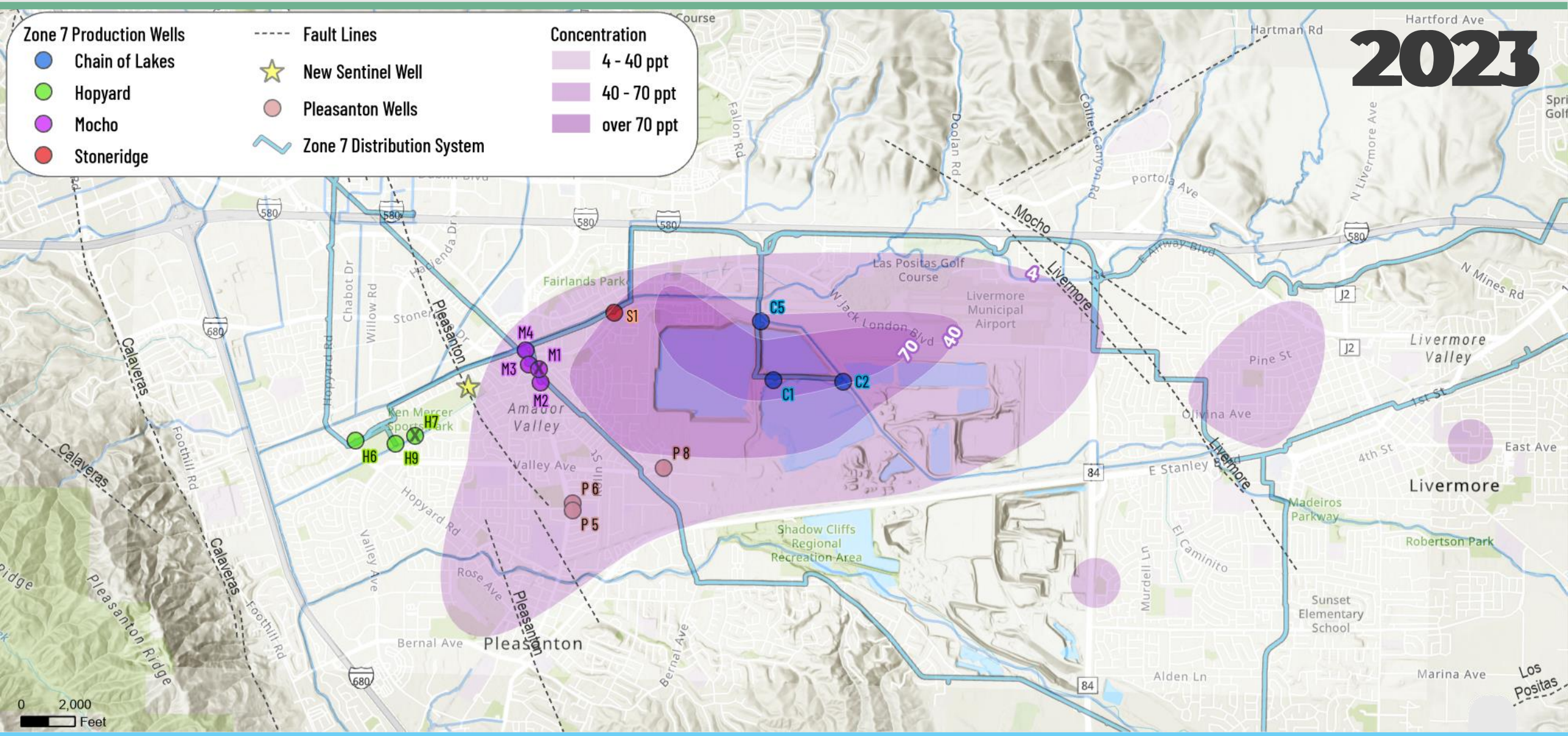
# PFAS Monitoring Well Network



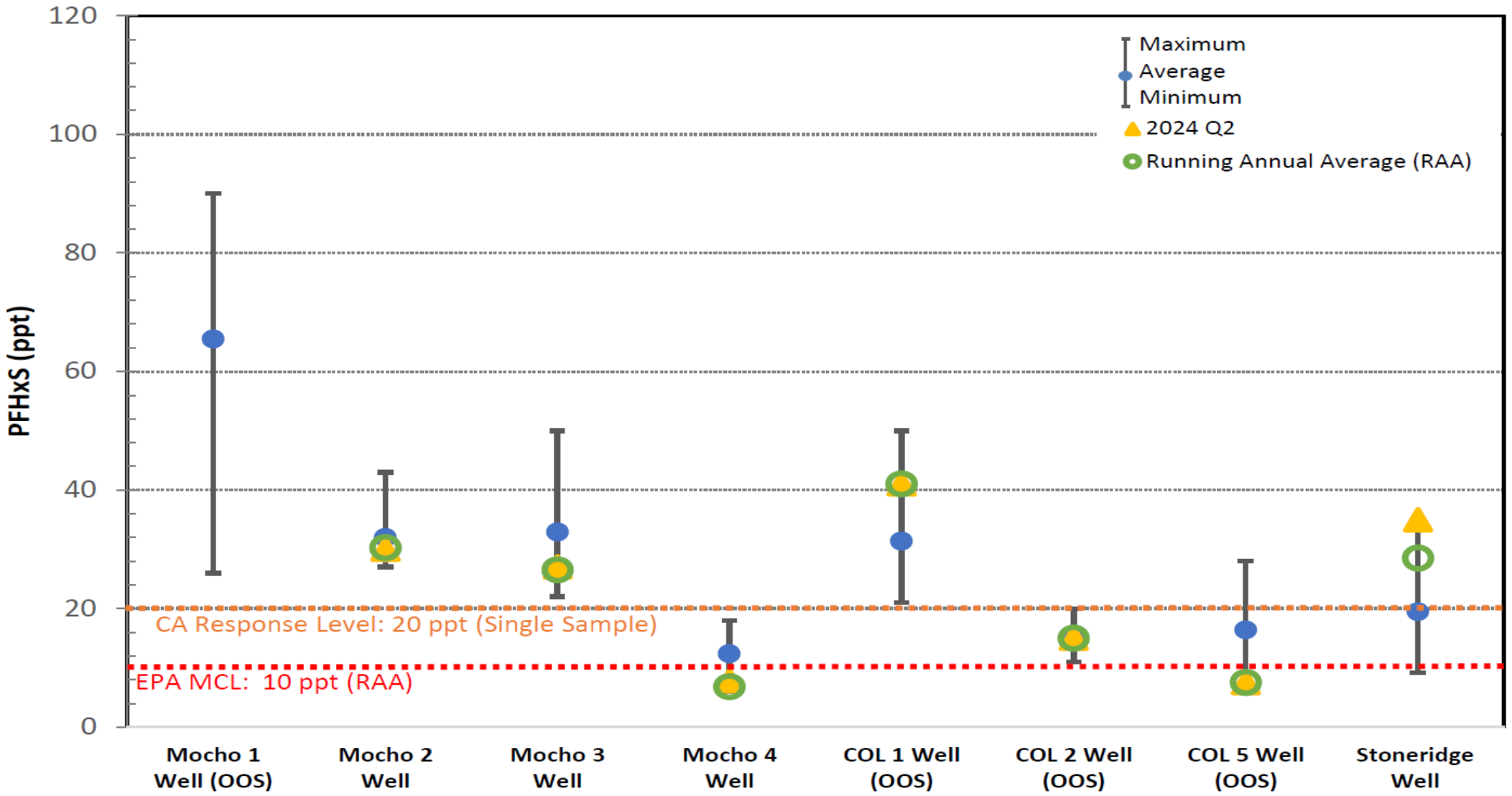
# **Upper** Aquifer PFOS Footprints (2021 and 2023)



# **Lower** Aquifer PFOS Footprints (2021 and 2023)



# Source Water PFHxS Monitoring Data (Nov 2018 - Present)

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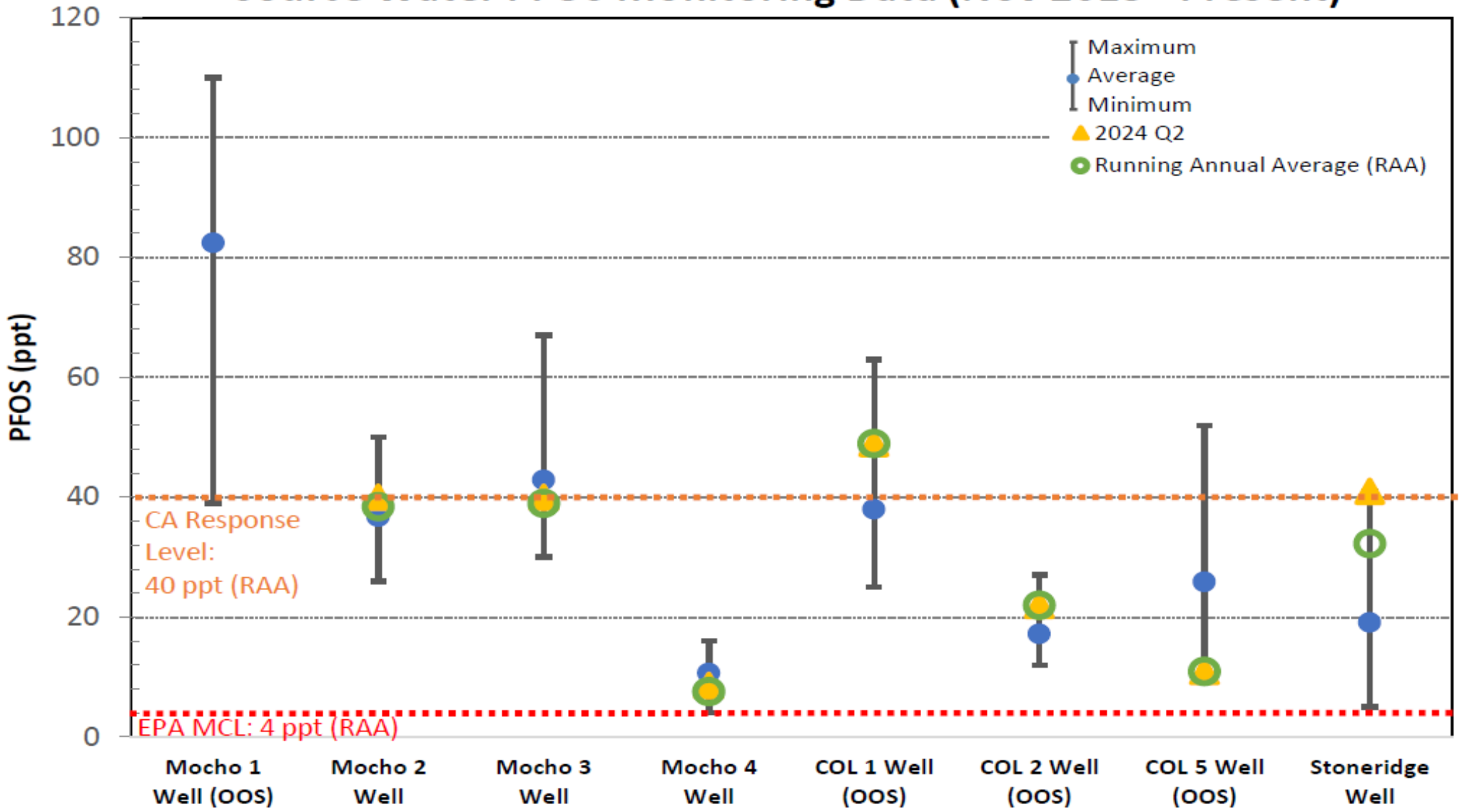
# Source Water PFOS Monitoring Data (Nov 2018 - Present)

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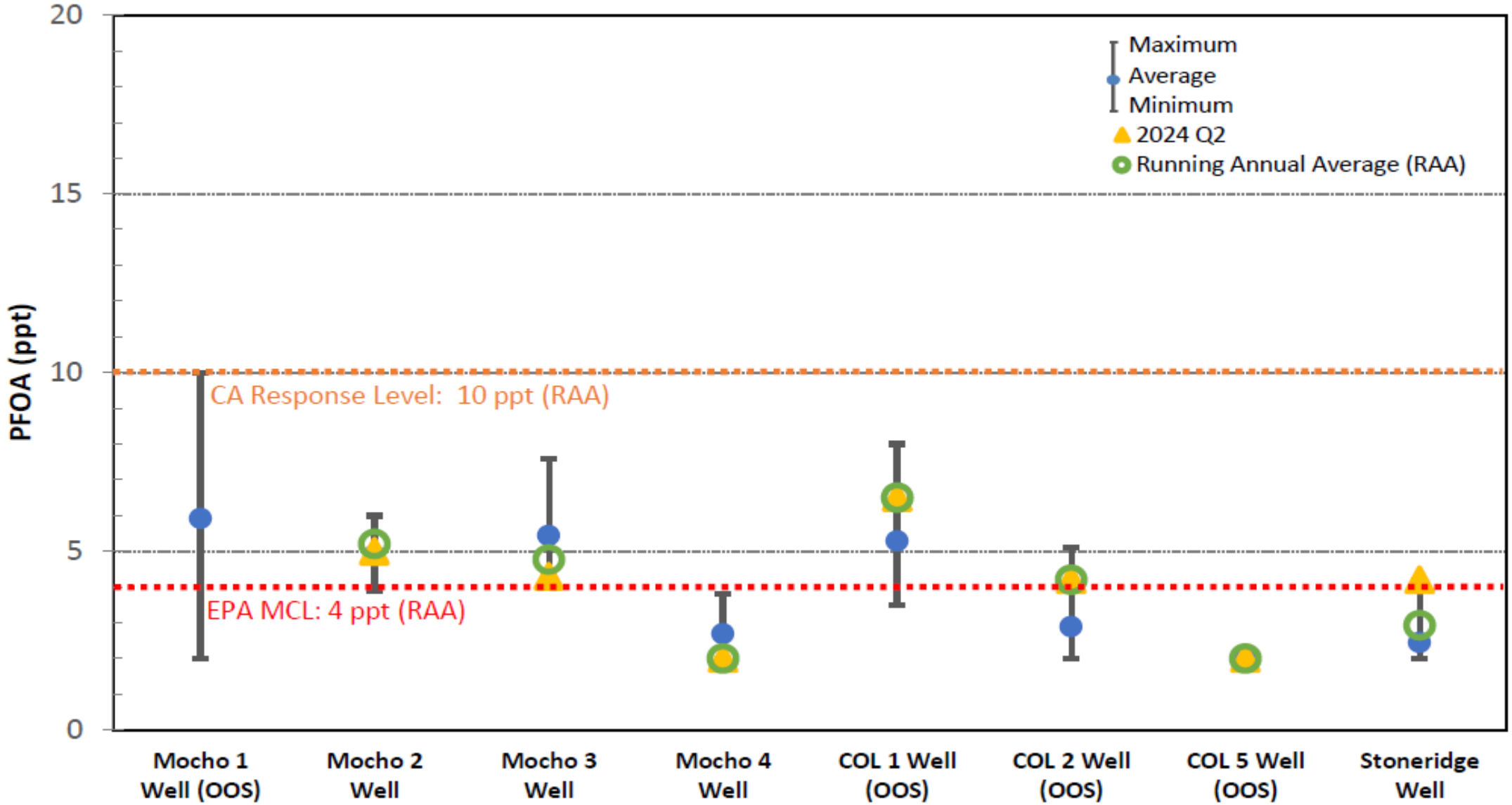
# PFOA Monitoring Data (Nov 2018 - Present)

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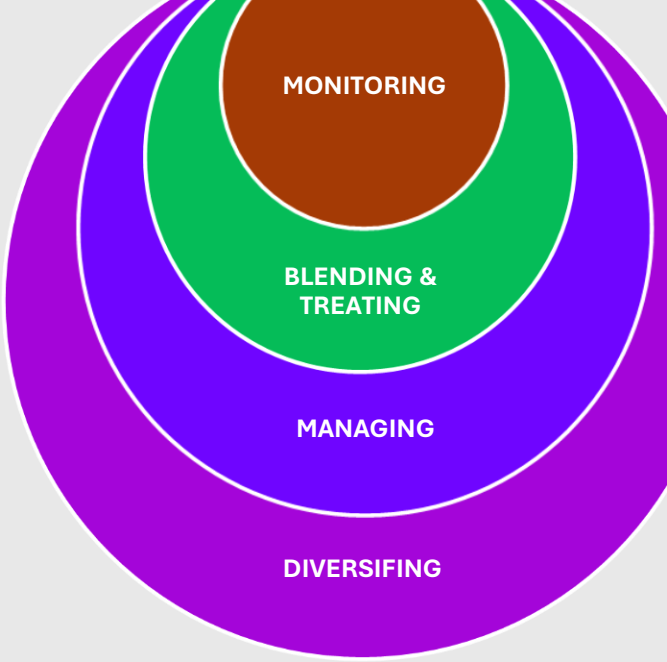
# BLENDING & TREATING  COMPONENT

# Blending and Treating

## To meet current and future water quality standards



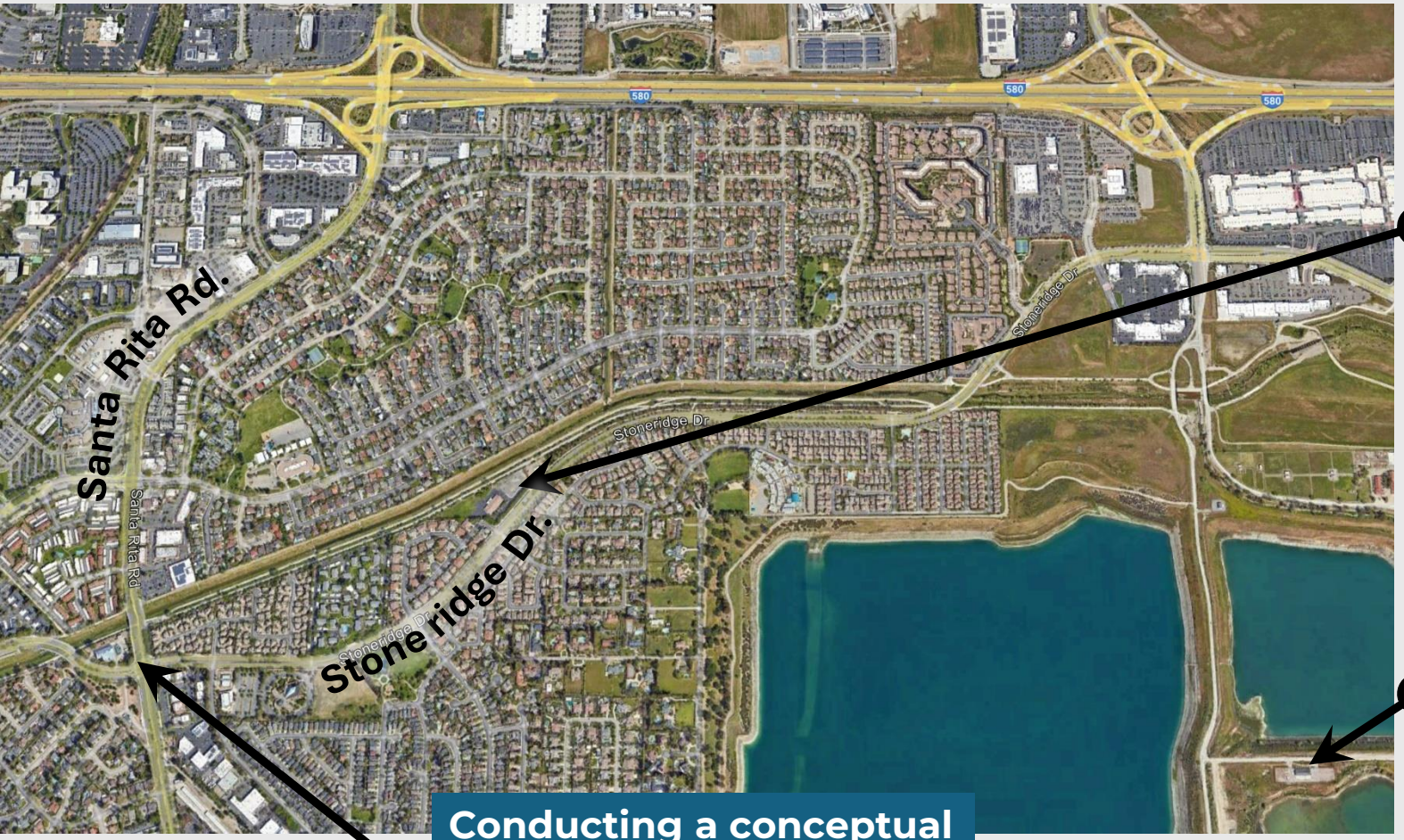

**Completed Actions:**

- Installed Ion Exchange PFAS Treatment at the Stoneridge Well facility
- Increased use of surface water.

**Ongoing Actions:**

- Meeting primary water quality standards
- Optimizing blending and treating to gain operational efficiency
- Constructing Ion Exchange PFAS Treatment facility at the Chain of Lakes Facility to be commissioned in early 2025
- Reduced the production of our Mocho wellfield by nearly two-thirds
- Started a conceptual design for a Mocho PFAS treatment facility with the goal of having the facility online in coming years

# Managing PFAS Concentrations by Wellhead Treatment

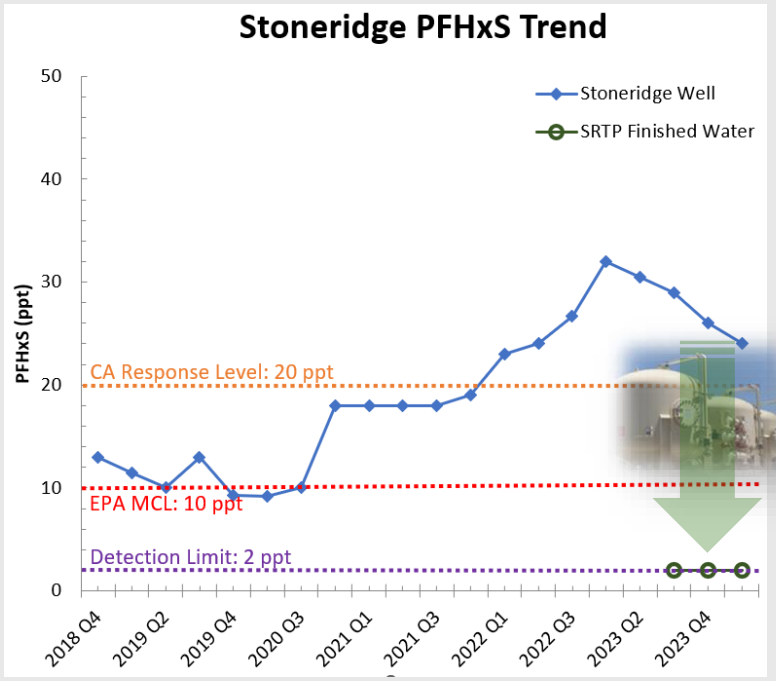


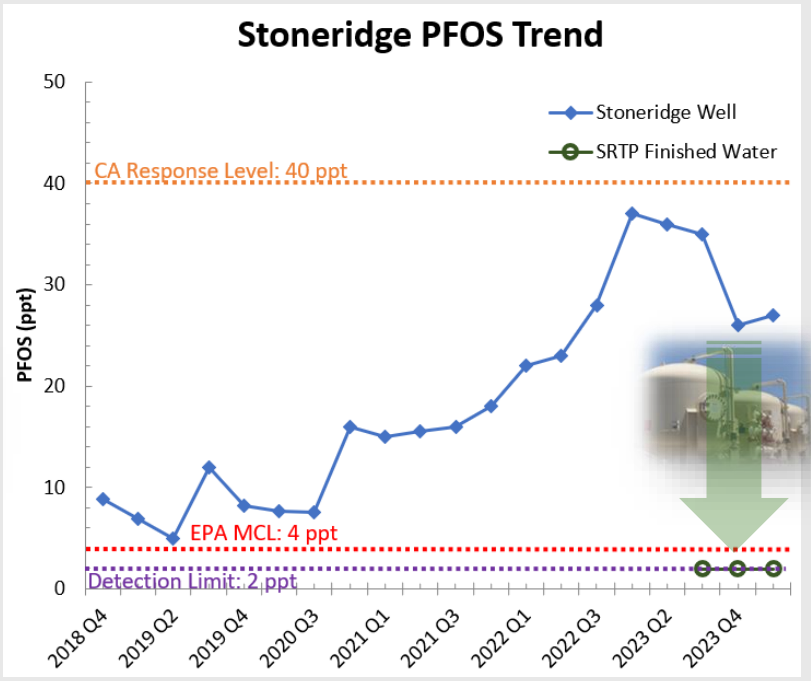

**Stoneridge PFAS Treatment Plant**
Ribbon Cutting Ceremony, Sept. 2023

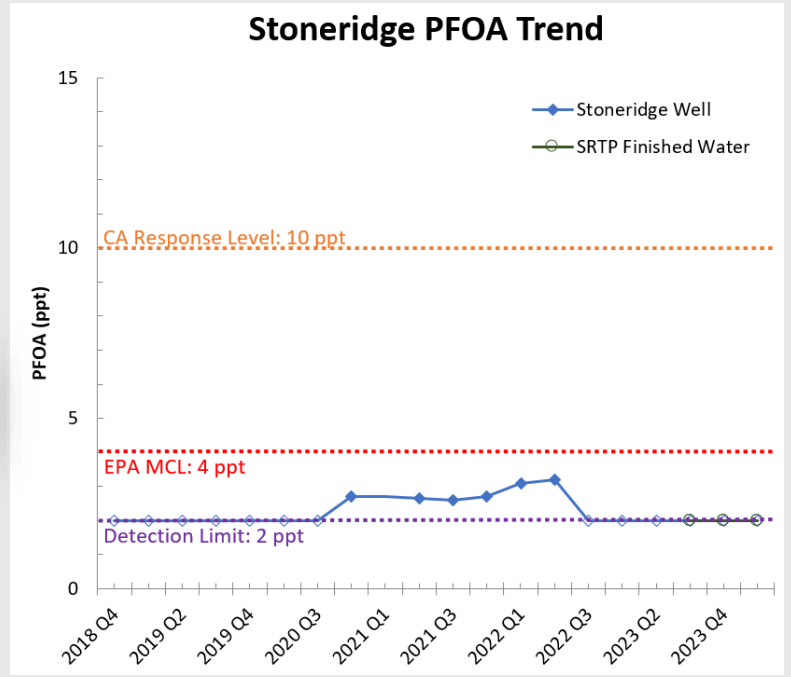
**Chain of Lakes PFAS Treatment Plant**
Constructing Tank Pad, August 2024

**Conducting a conceptual design study to identify optimal treatment configuration**

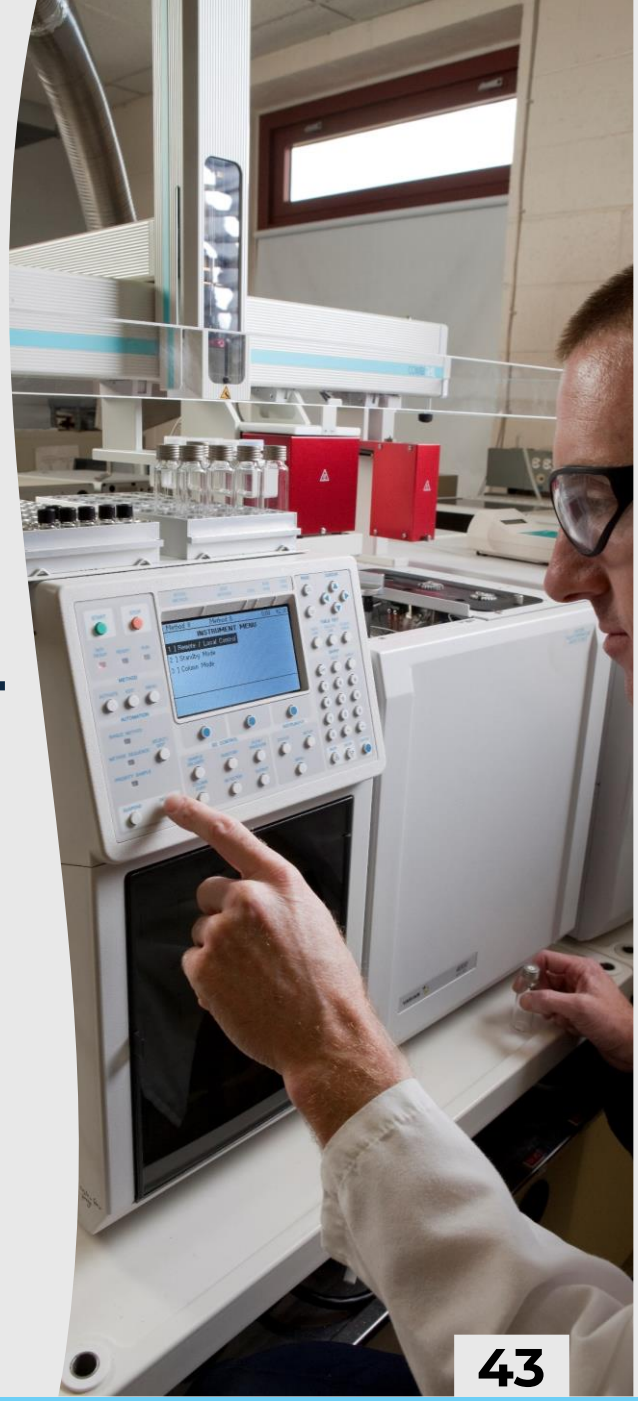
# Effectiveness of Ion Exchange PFAS Treatment at Stoneridge



# MANAGING GROUNDWATER QUALITY  COMPONENT



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# MANAGING GROUNDWATER QUALITY

To extent possible, prevent water quality degradation and potential mobilization

**Completed Actions:**

- Analyzed feasibility of injecting Mocho 1 to dilute and/or impede the concentration (Determined it's no longer feasible)
- Commenced Stoneridge facility operations
- Recharged the basin with imported surface water

**Ongoing Actions:**

- To extent possible, prevent water quality degradation and potential mobilization
- Increase the water quality protection by more stringent well permitting
- When completed, operate Mocho Demineralization facility, Stoneridge and COL PFAS Treatment Facility to pump and treat the concentrations


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# Managing PFAS by Pump and Treat

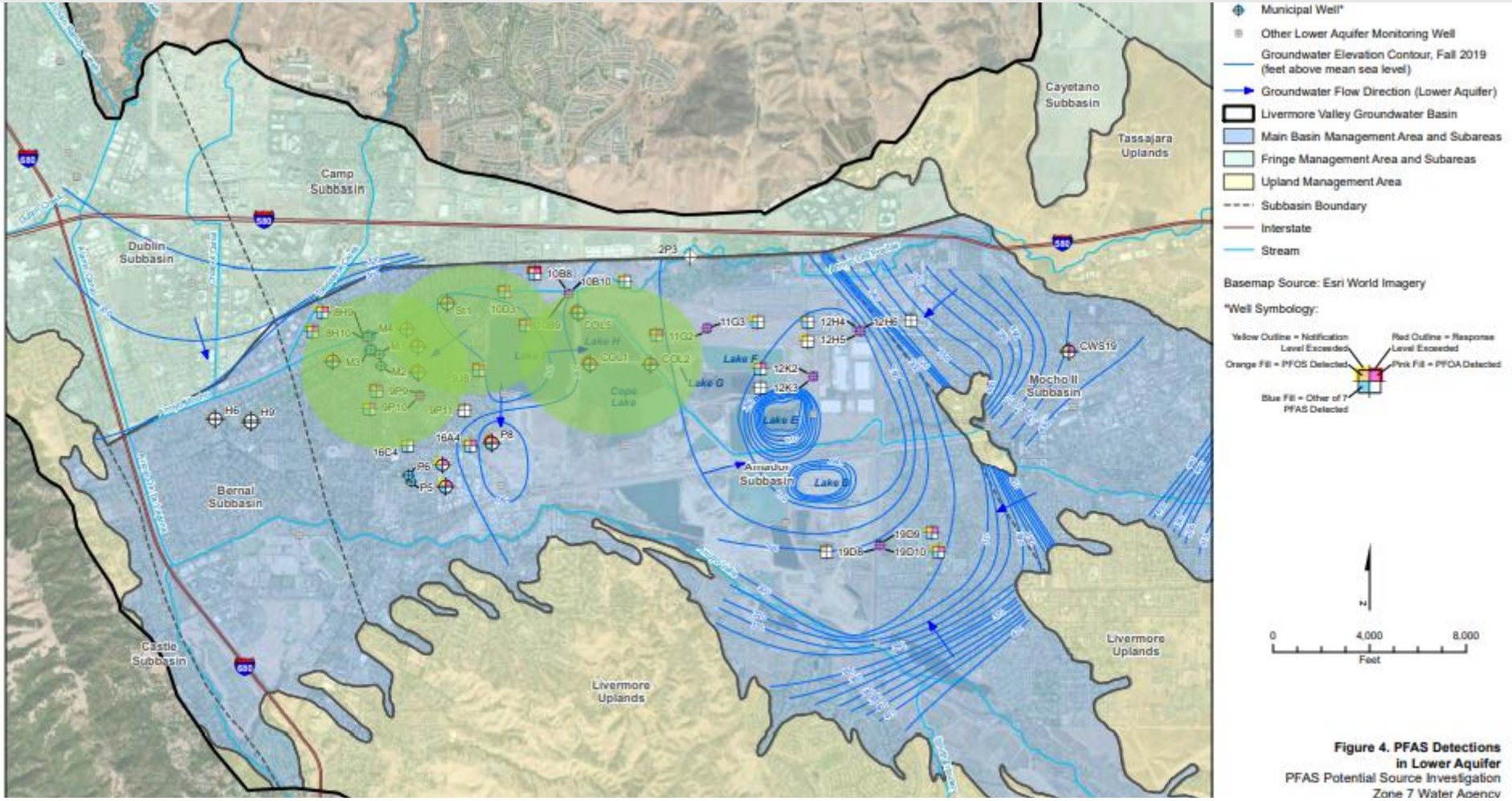
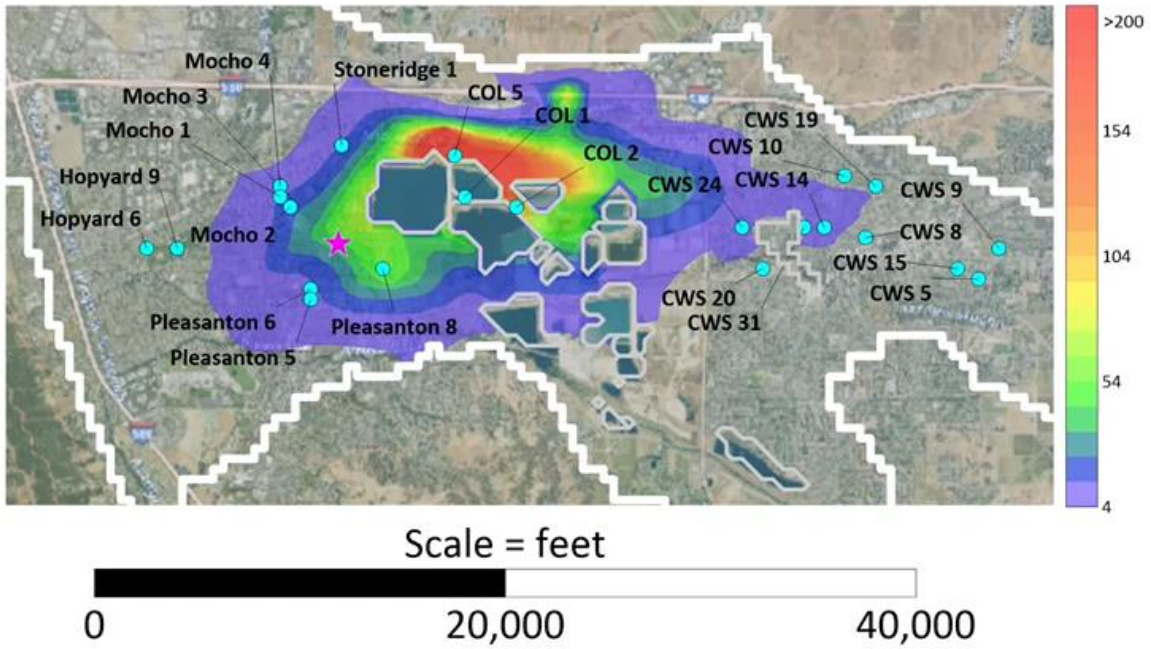



**Figure 4. PFAS Detections in Lower Aquifer**
PFAS Potential Source Investigation
Zone 7 Water Agency

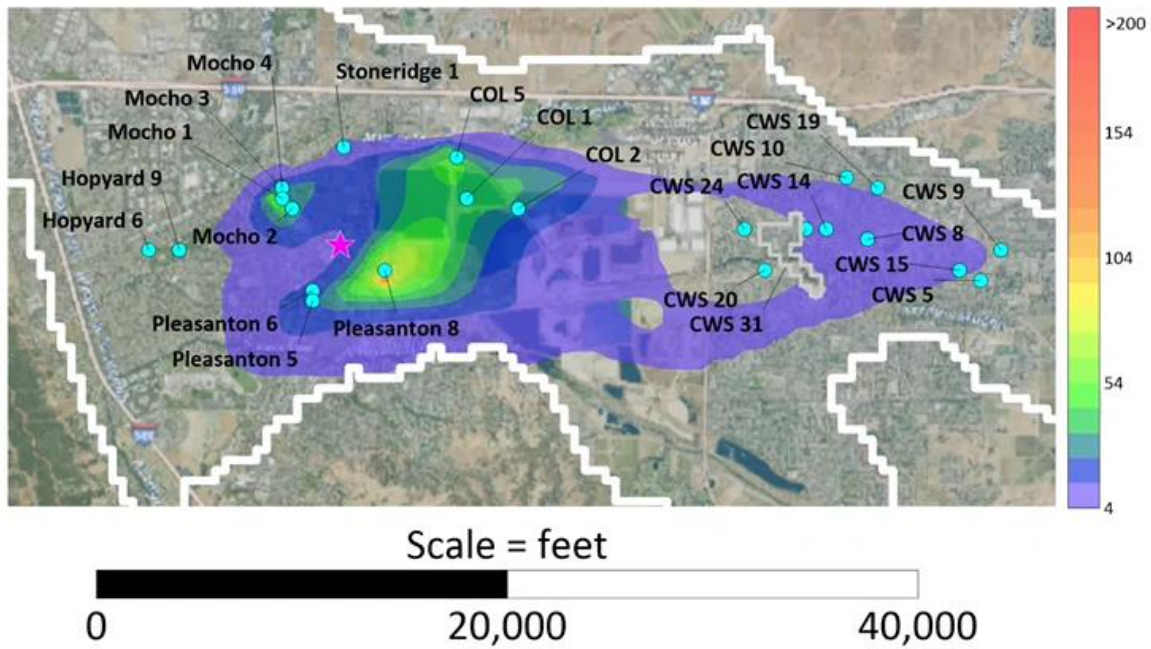
**Note**: Demonstration of the pump & treat concept only but not absolute values.

# Simulations of Pump & Treat of PFAS @ COL 1, 2, 5 and Mocho Well Fields (2022)

Effectiveness of simulated pump & treat in Upper Aquifer




Effectiveness of simulated pump & treat in Lower Aquifer

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# *Local Water Resources*

## DIVERSIFYING ~~GROUNDWATER SOURCES~~ COMPONENT

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# DIVERSIFING ~~GROUNDWATER SOURCES~~

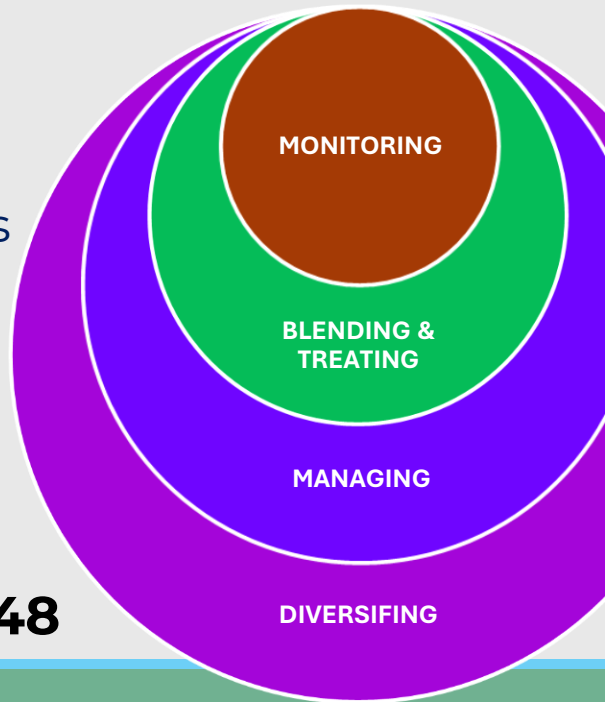
To become more resilient to droughts and emergencies

**Completed Actions:**

- Recharged the groundwater basin to 99% full
- Used SWP and local run-off water to meet 31% and 95% of demand in 2022 and 2023 respectively

**Actions to be taken in coming years:**

- Update the 2003 well master plan (FY24)
- Add new wells to diversify the GW sources and remain sustainable
- Conduct a feasibility study of a local storage and conveyance project in the Chain-of-lakes complex
- Conduct Water Supply Evaluation in coming years to diversify water supplies and respond to changing climate

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# Feast or Famine Local Hydrology

# How about State Water Project (SWP) Delivery?

- The 2023 DCR forecasts substantial reductions in SWP delivery capability and reliability
- The SWP operation is driven by the impacts of [illegible] constraints within the federal and St[illegible] critical species.
- The SWP delivery [illegible] much as [illegible] extr[illegible]

# Zone 7's Water Supply Reliability Policy

- In October 2012, the Zone 7 Board adopted Resolution No. 13-4230, the water supply reliability policy. The policy requires meeting:

**Goal 1:**

- Zone 7 will meet its treated water customers' water supply needs:
  - At least 85% of M&I water demands 99% of the time
  - 100% of M&I water demands 90% of the time

**Goal 2:**

- Provide sufficient treated water production capacity and infrastructure to meet at least 80% of the maximum month M&I contractual demands should any one of Zone 7's major supply, production, or transmission facilities experience an extended unplanned outage of at least one week.

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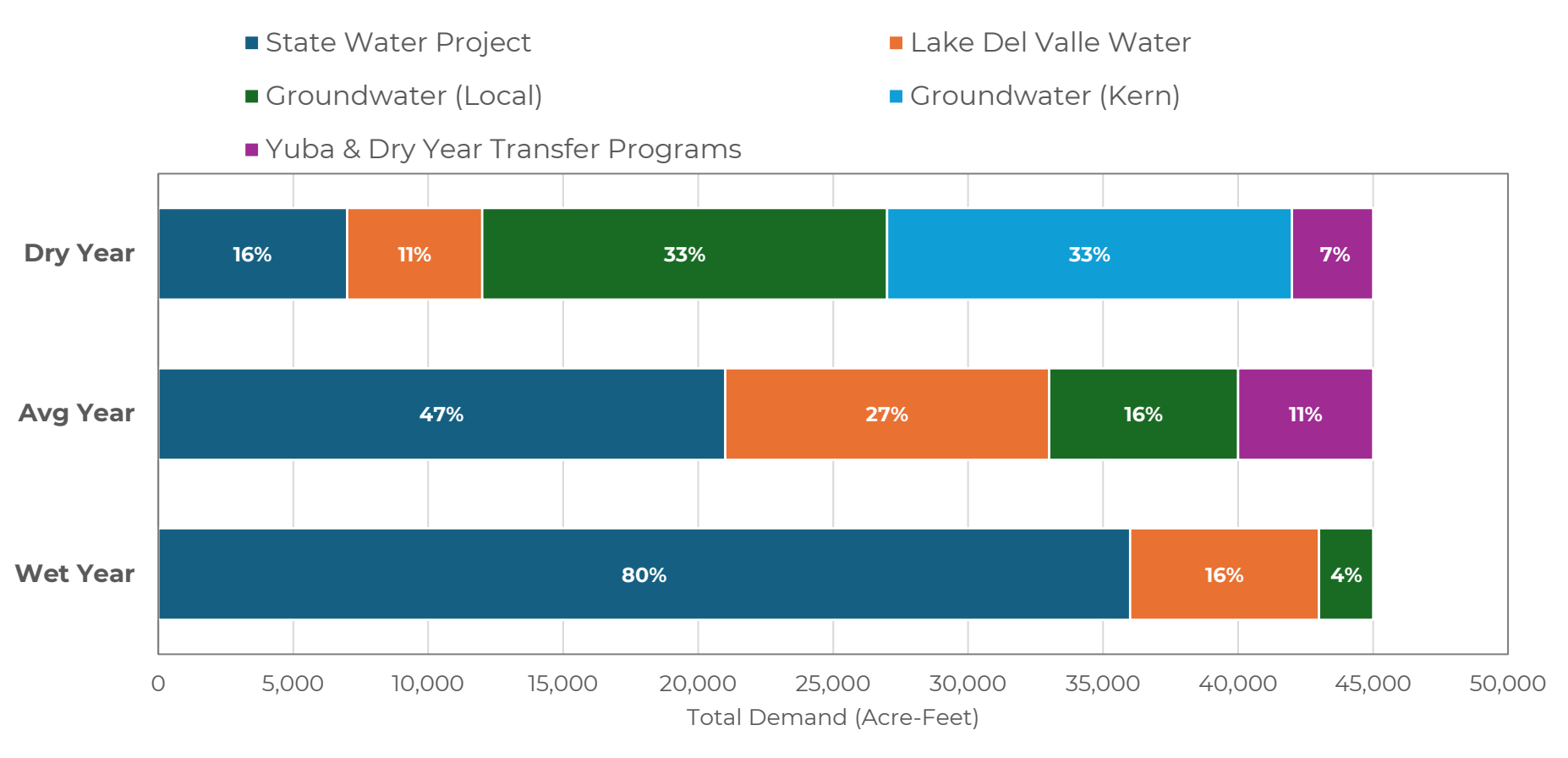
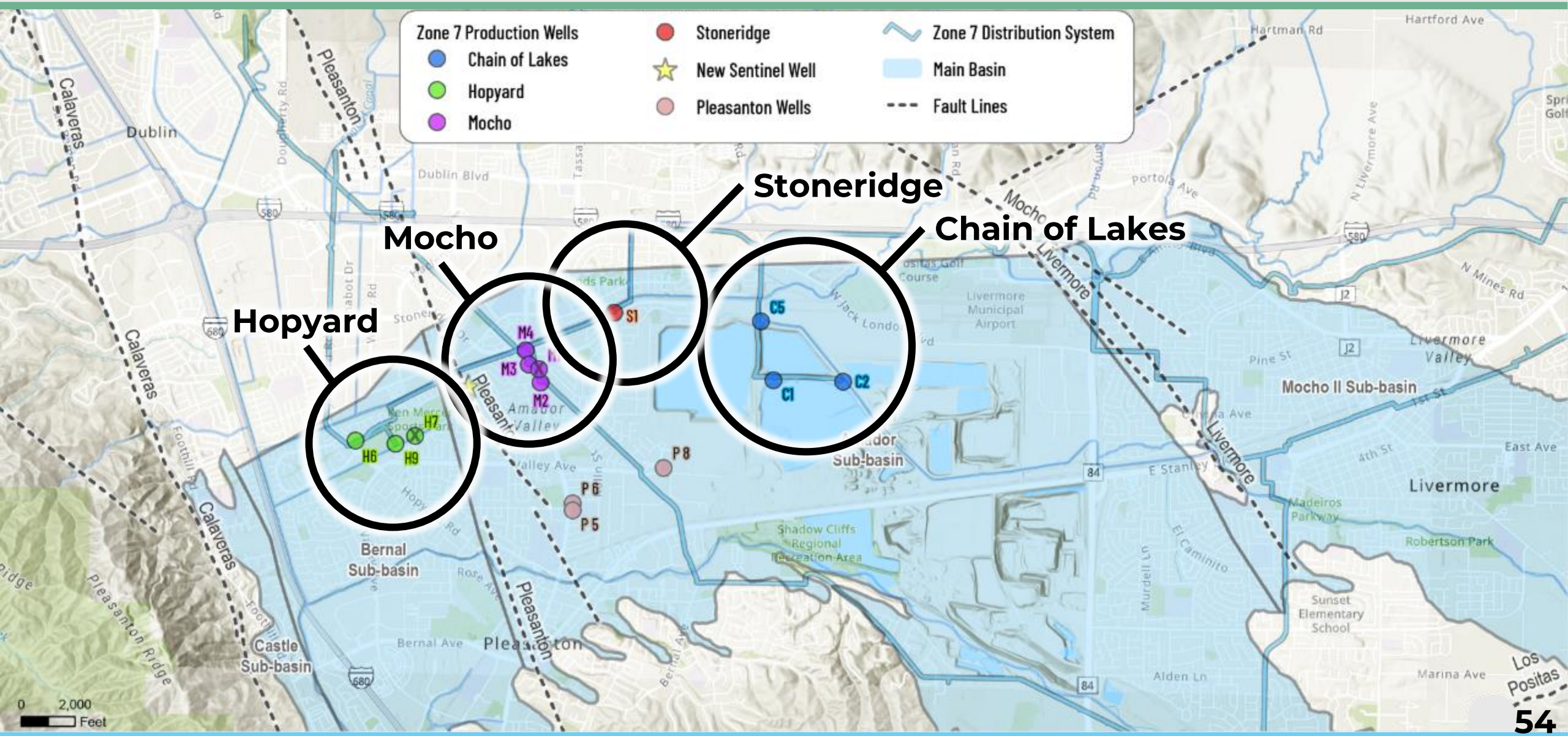
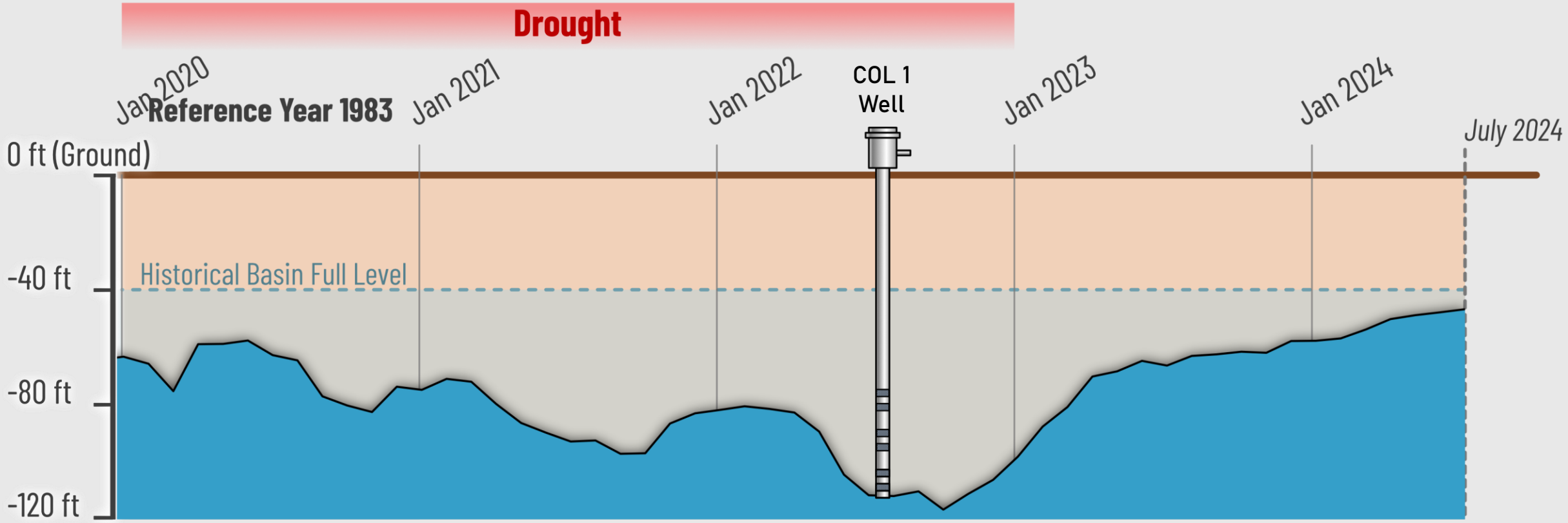
# Sources of Water Supplies



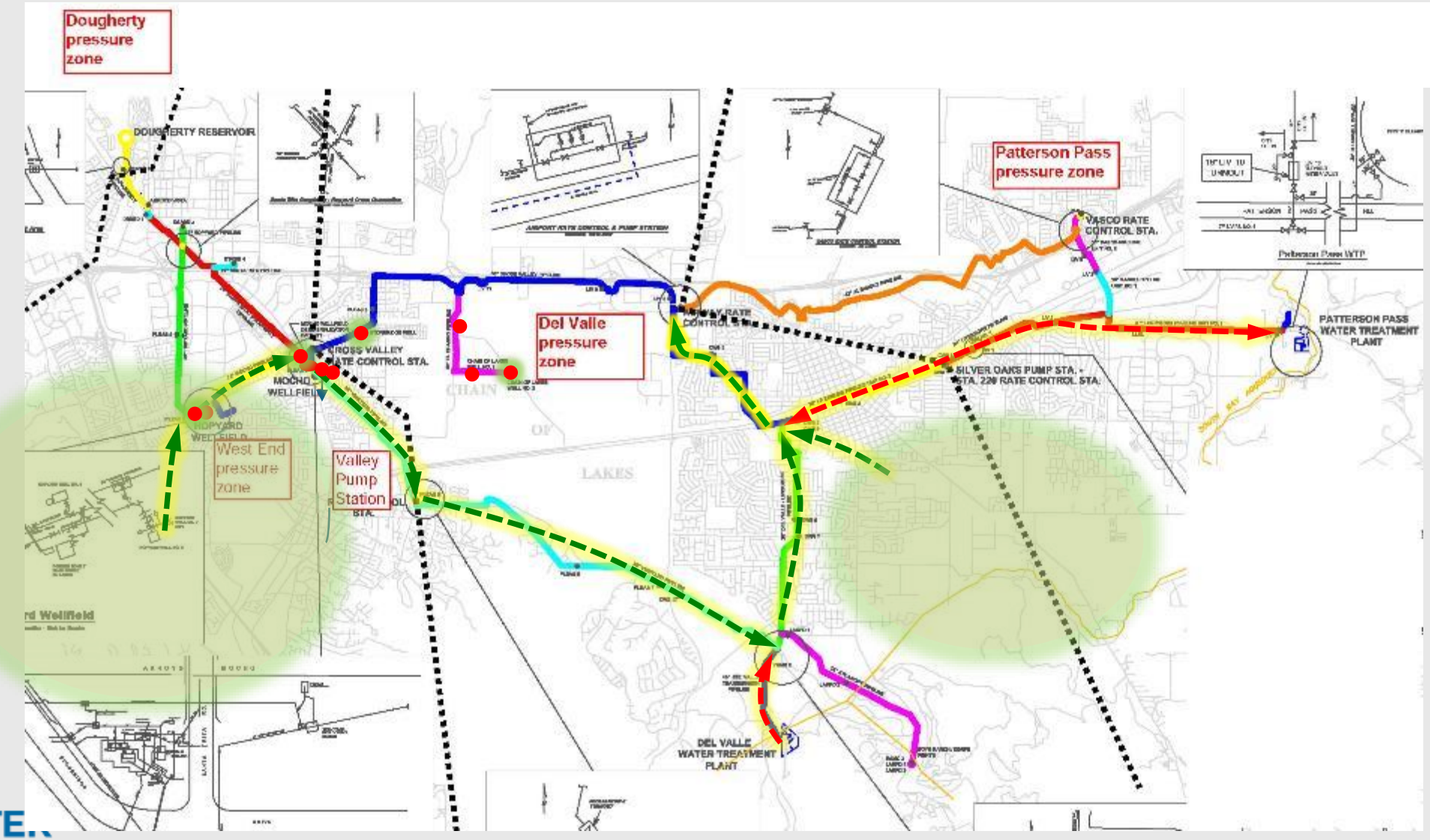
# Overview Zone 7 Well Fields



# Amador West Subbasin – Depth to Groundwater



# Diversifying Groundwater Sources



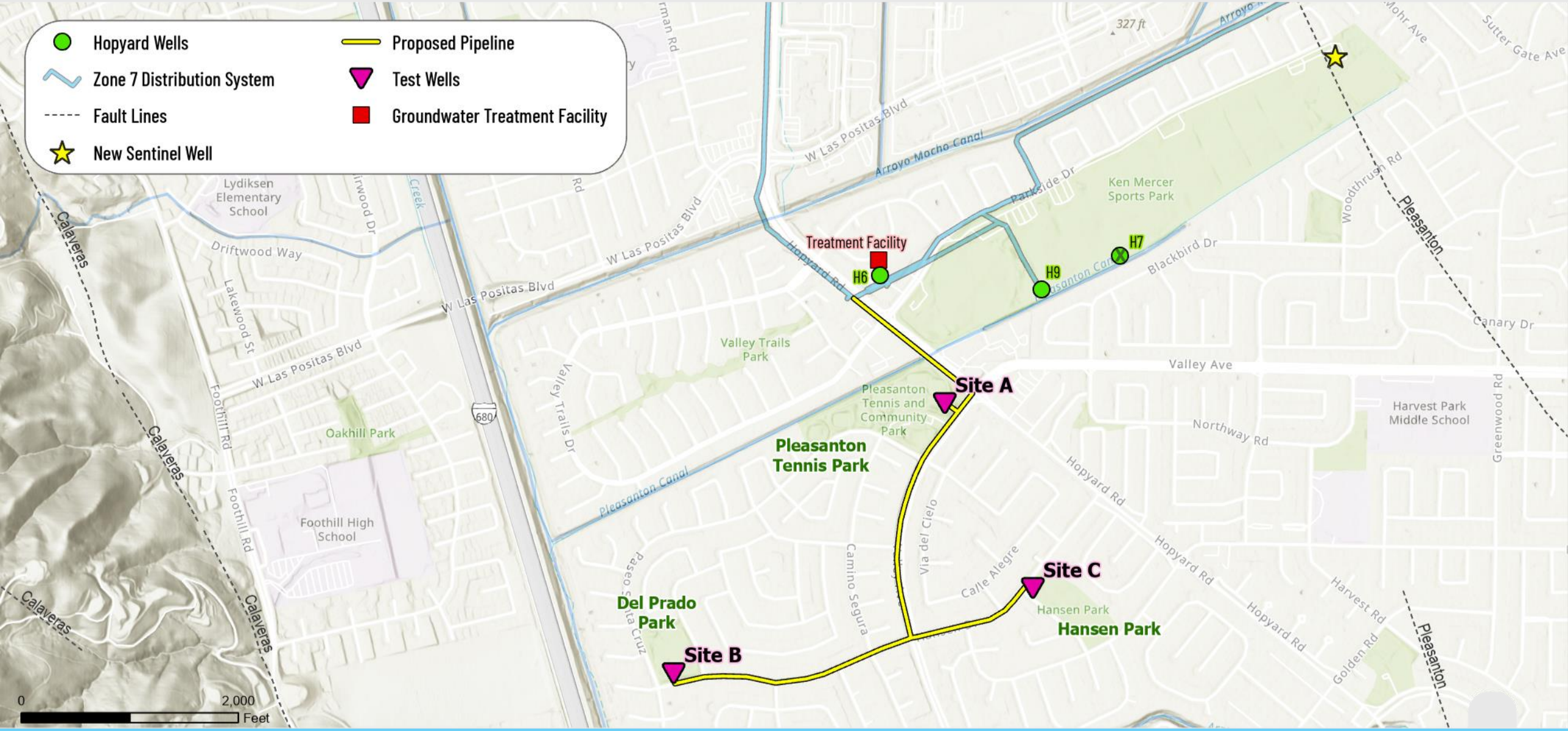
# FEASIBILITY STUDY FOR A REGIONAL PROJECT

# Investigating Feasibility of the Regional Project

1. **Analyze** native water quality, potential yields, and treatment needs
2. Conduct **well site screening** -- using updated groundwater model, pilot borings, water chemistry analysis, and yield analysis
3. Conduct **fatal flaw analysis** including groundwater sustainability
4. Assess **infrastructure** needs, schedule and costs
5. Conduct **basis of design** analysis to evaluate centralized treatment concept at Hopyard 6
6. Based on potential yields, estimate each party's **proportional cost share**
7. Evaluate cost savings for Pleasanton and Zone 7 from **economy of scale**
8. Provide the City Council and the Zone 7 Board necessary information to **decide** whether to jointly develop a regional project

ZONE 7 WATER AGENCY

# Test Well Locations



# What are the next steps?

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# Key Takeaways

1. PFAS is ubiquitous in the environment and generally everywhere
2. PFAS most likely comes from multiple legacy sources and ongoing domestic discharges
3. Complete elimination of source(s) is almost impossible until PFAS is totally removed from consumer products
4. Increased monitoring could reveal previously unknown PFAS concentrations, and footprint
5. Groundwater recharge and pumping & treating can change PFAS concentrations
6. Wet year hydrology can influence PFAS concentrations
7. Ongoing monitoring, pump & treat operations, and modeling are helpful to study and manage PFAS better, but need to prepare for eventual well head treatment for PFAS and other emerging contaminants
8. Public outreach efforts to inform the public of factual information is essential
9. Meeting the drinking water MCLs is at the point of compliance of the distribution system but not in the basin or not at the wells

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# Planned Next Steps

1. Continue monitoring
2. Continue coordinating with the San Francisco Regional Water Quality Control Board to investigate potential source(s)
3. Share information with the State Board's Division of Drinking Water
4. Complete upgrading the GW model (FY24) and analyze PFAS concentrations
5. Complete construction of the COL PFAS treatment facility (FY24)
6. Proceed with the Regional Project feasibility study to diversify the groundwater supply sources (FY25)
7. Develop a basin wide water quality management plan (FY25)
8. Update the Well Masterplan (FY26)
9. Identify optimal PFAS treatment configuration for Mocho well field
10. Pump and treat the PFAS concentration with Stoneridge, COL and Mocho demineralization facility
11. Plan water supply operations to manage water supply needs
12. Continue developing the Chain-of-Lakes conveyance system concept


ZONE 7 WATER AGENCY

FY – Fiscal Year

# Zone 7's actions are guided by and aligned with Mission, Vision, & Values

## MISSION

We deliver safe, reliable, efficiency and sustainable water and flood protection services.

## VISION

We provide excellent water and flood protection services to enhance the quality of life, economic vitality, and environmental health of the communities we serve.

## VALUES

- **Transparency** – We operate in an open and transparent fashion.
- **Customer Service** – We are prompt, respectful and courteous in all of our interactions.
- **Collaboration** – We embrace collaboration to enhance our services.
- **Environmental Sensitivity** – We deliver our services in an environmentally sensitive manner.
- **Fiscal Responsibility** – We operate in a productive, cost effective and efficient manner.
- **Innovation** – We encourage innovation, creativity, and ingenuity.
- **Integrity** – We maintain the highest ethical standards and value open and honest communications.
- **Leadership** – We maintain a diverse team of highly skilled professional devoted to honest and accountable stewardship of resources.
- **Proactivity** – We proactively address issues and embrace continuous improvement.
- **Safety** – We are committed to public and employee safety.

ZONE 7 WATER AGENCY


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