WEST YOST
Water. Engineered.

Development of a Puente Basin Groundwater Management Plan

Review of Draft Technical Memorandum 1 (TM-1) Description of the Puente Basin Groundwater Management Plan Area and Basin Setting

September 6, 2023

PUENTE BASIN WATER AGENCY established 1971

Agenda

- Introductions
- Review of Draft *TM-1 Description of the Puente Basin Groundwater Management Plan Area and Basin Setting*
- Basin Management Implications and Goals for Basin Management
- Next Steps

TM-1 Table of Contents

1.0 Introduction

2.0 GMP Area

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- 2.2 Existing Management Programs
- 2.3 Wells in the Puente Basin
- 2.4 Groundwater Monitoring
- 2.5 Land Use, Water Use, Flows, and Disposal
- 2.6 Sources of Water Supply

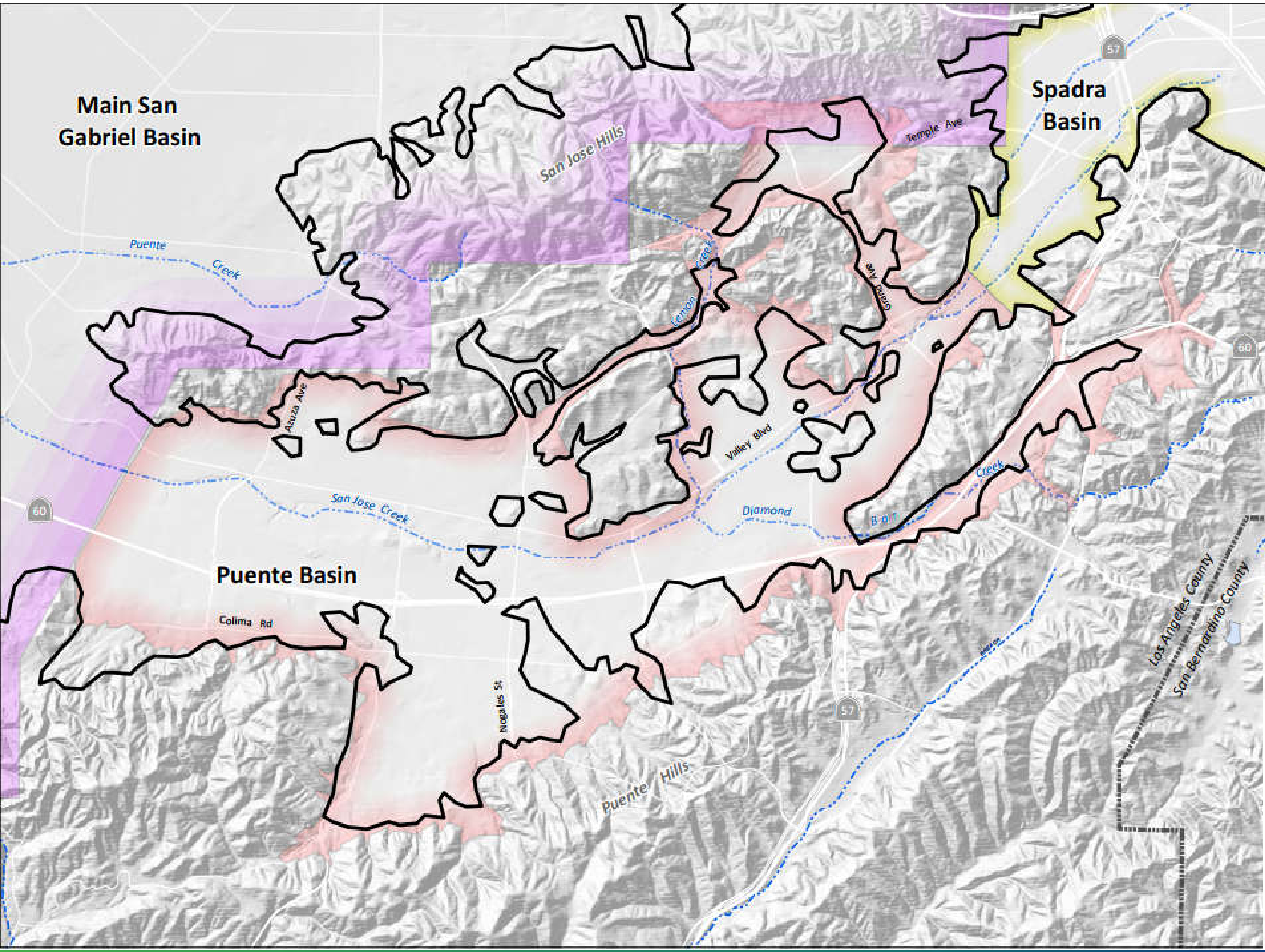
3.0 Basin Setting

- 3.1 Surface water Hydrology and Precipitation
- 3.2 Hydrogeologic Conceptual Model
- 3.3 Groundwater Quality
- 3.4 Ground Levels
- 3.5 Groundwater Dependent Ecosystems
- 3.6 Data Gaps

4.0 Basin Management Implications

TM-1
Section 2.0 GMP Area

Location



DWR Bulletin 118 California Groundwater Basin Boundaries

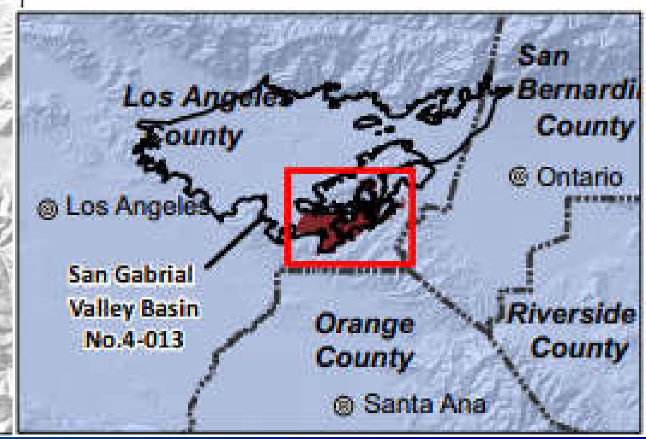
San Gabriel Valley Basin No. 4-013

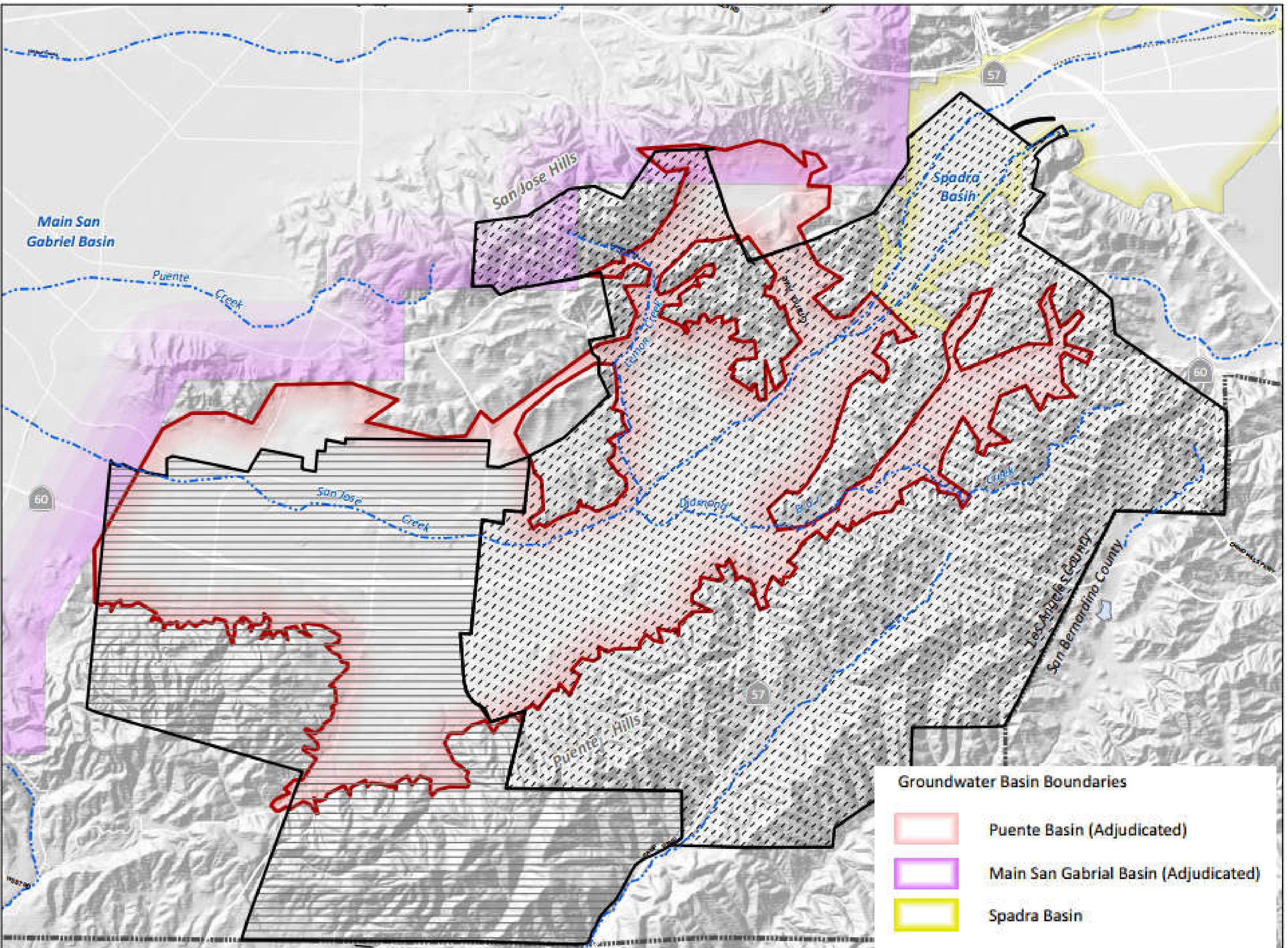
Groundwater Basin Boundaries

Puente Basin (Adjudicated)

Main San Gabrial Basin (Adjudicated)

Spadra Basin





Puente Basin Water Agency (PBWA)

Water Purveyor Boundaries in Puente Basin

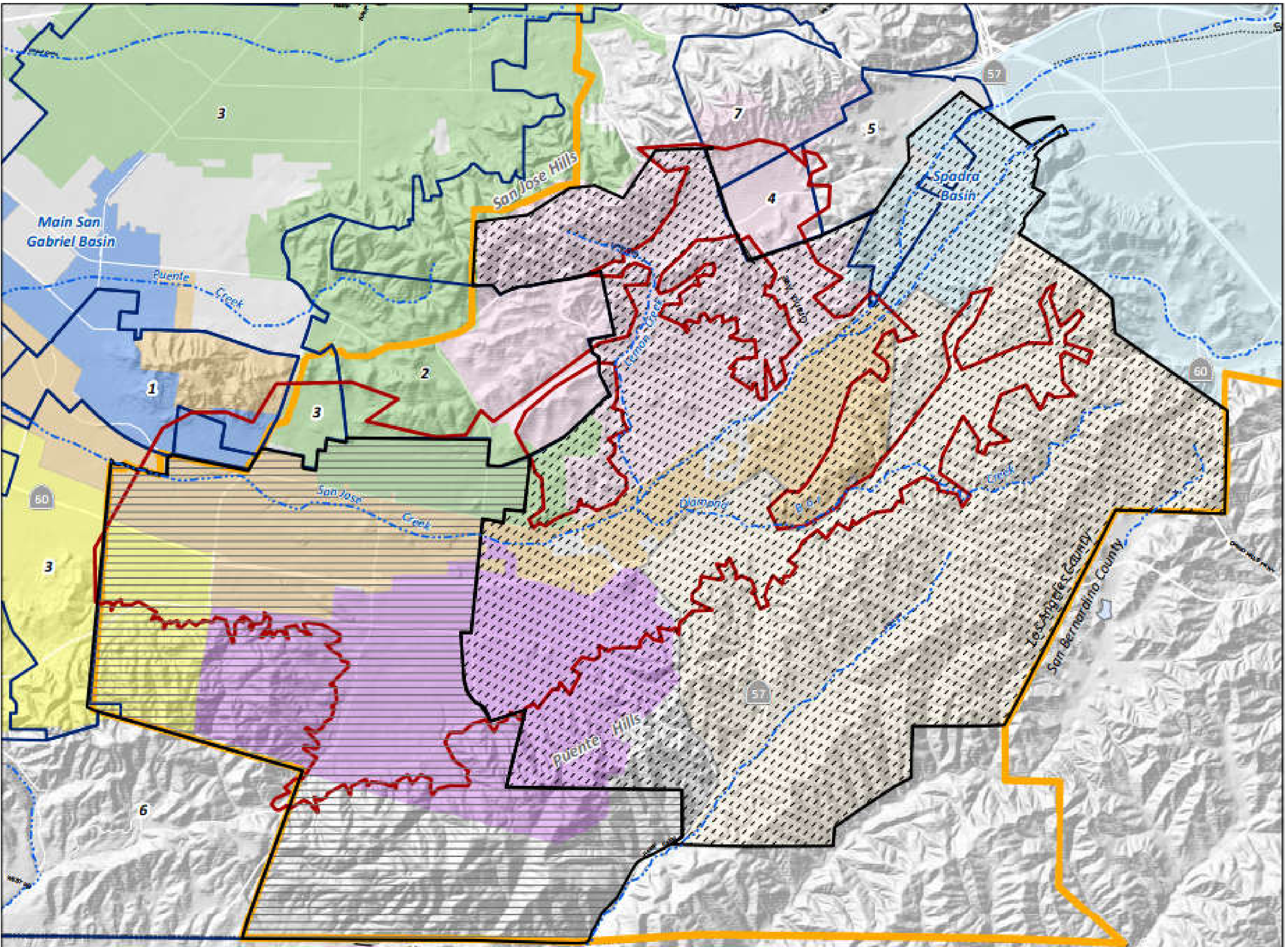
- Rowland Water District (RWD)
- Walnut Valley Water District (WVWD)

1971: PBWA formed as JPA between WVWD and RWD

1972: PBWA entered into Puente Narrows Agreement

1986: Puente Basin Judgement

5 Principal Parties to the Judgment: WVWD, RWD, City of Industry, Successor Industry Agency, and Royal Vista



Water Purveyors and Cities

Water Purveyor Boundaries in Puente Basin

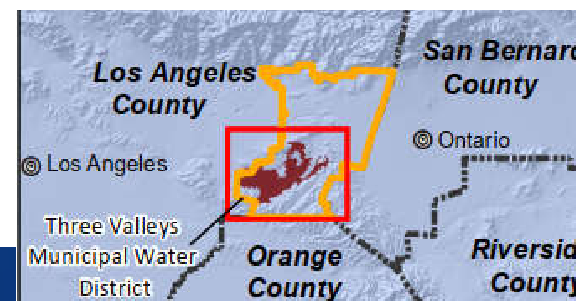
- Rowland Water District
- Walnut Valley Water District
- Other Water Purveyors with Boundaries Along the Fringes *Labled in the map by the following numbers

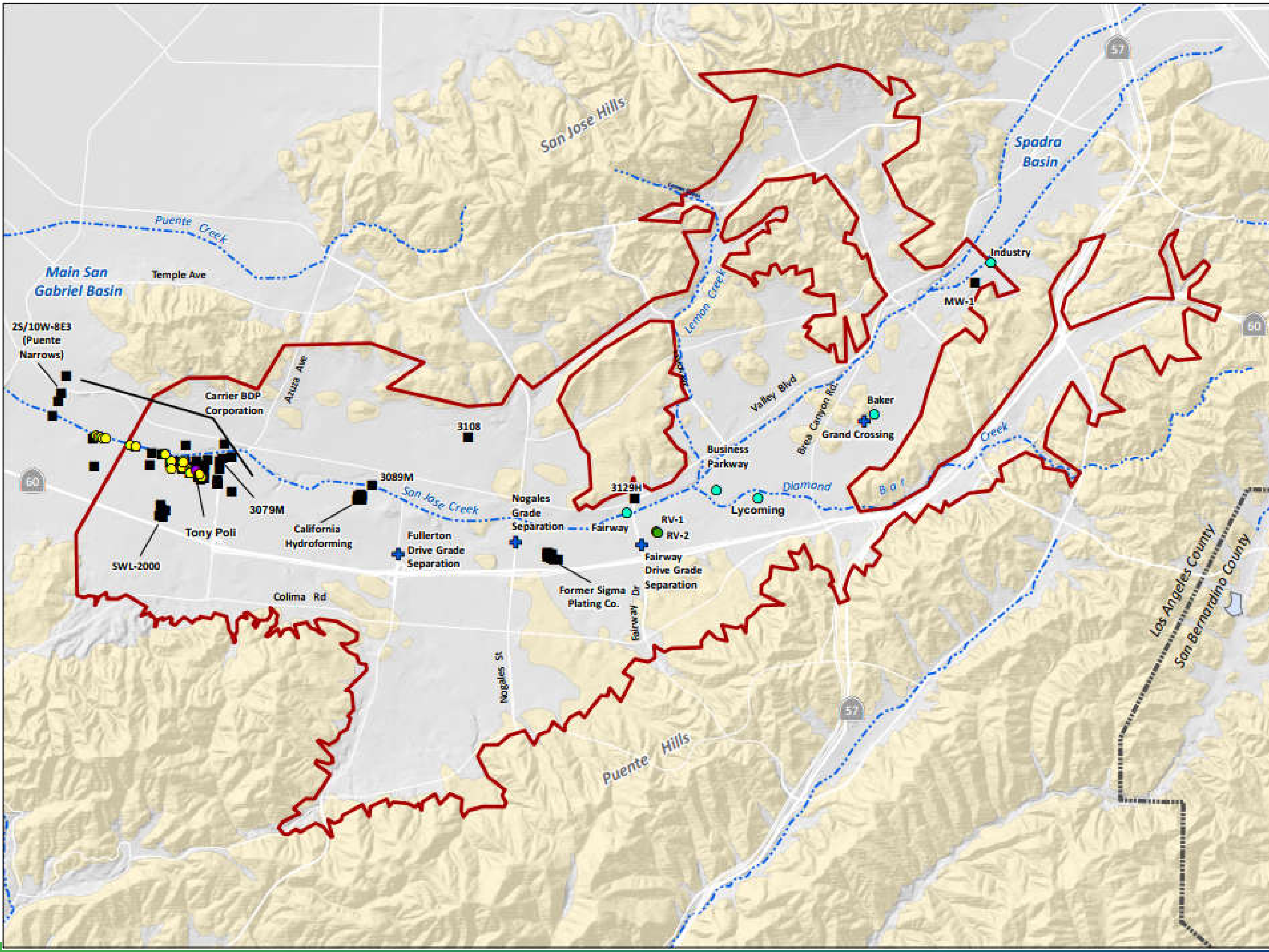
1.) La Puente Valley County Water District
2.) City of West Covina Water Department
3.) Suburban Water Systems
4.) Mt San Antonio College
5.) Cal Poly Pomona
6.) La Habra Heights Water Company
7.) Southern California Water Systems - San Dimas

- Three Valleys Municipal Water District

City and Unicporated Community Boundaries

- Diamond Bar
- Walnut
- Industry
- West Covina
- Pomona
- Hacienda Heights
- Rowland Heights
- La Puente





Wells

25 Pumping Wells

Pumping Well (Symbolized by Well Owner)

- Walnut Valley Water District **(4)**
- Rowland Water District **(1)**
- Leased by Royal Vista Golf Course **(2)**
- Carrier BDP Corporation for Site Cleanup **(18)**

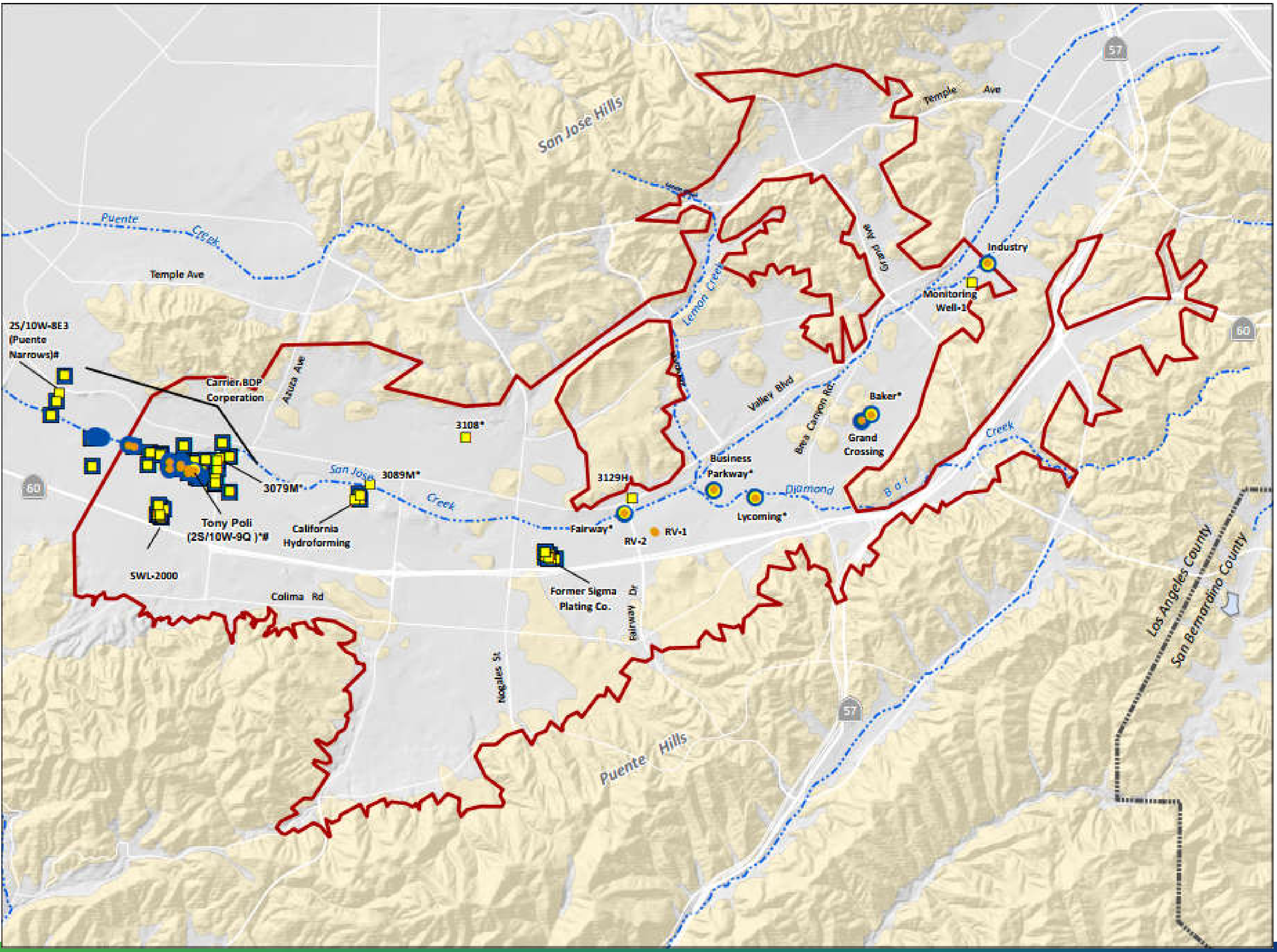
4 Wet Wells (shallow groundwater)

- Shallow Groundwater Wet Well and Pump Station

76 Monitoring Wells

- Monitoring Wells Labeled by Well Name or Well Group

Groundwater Monitoring



Well Type (symbolized by shape)

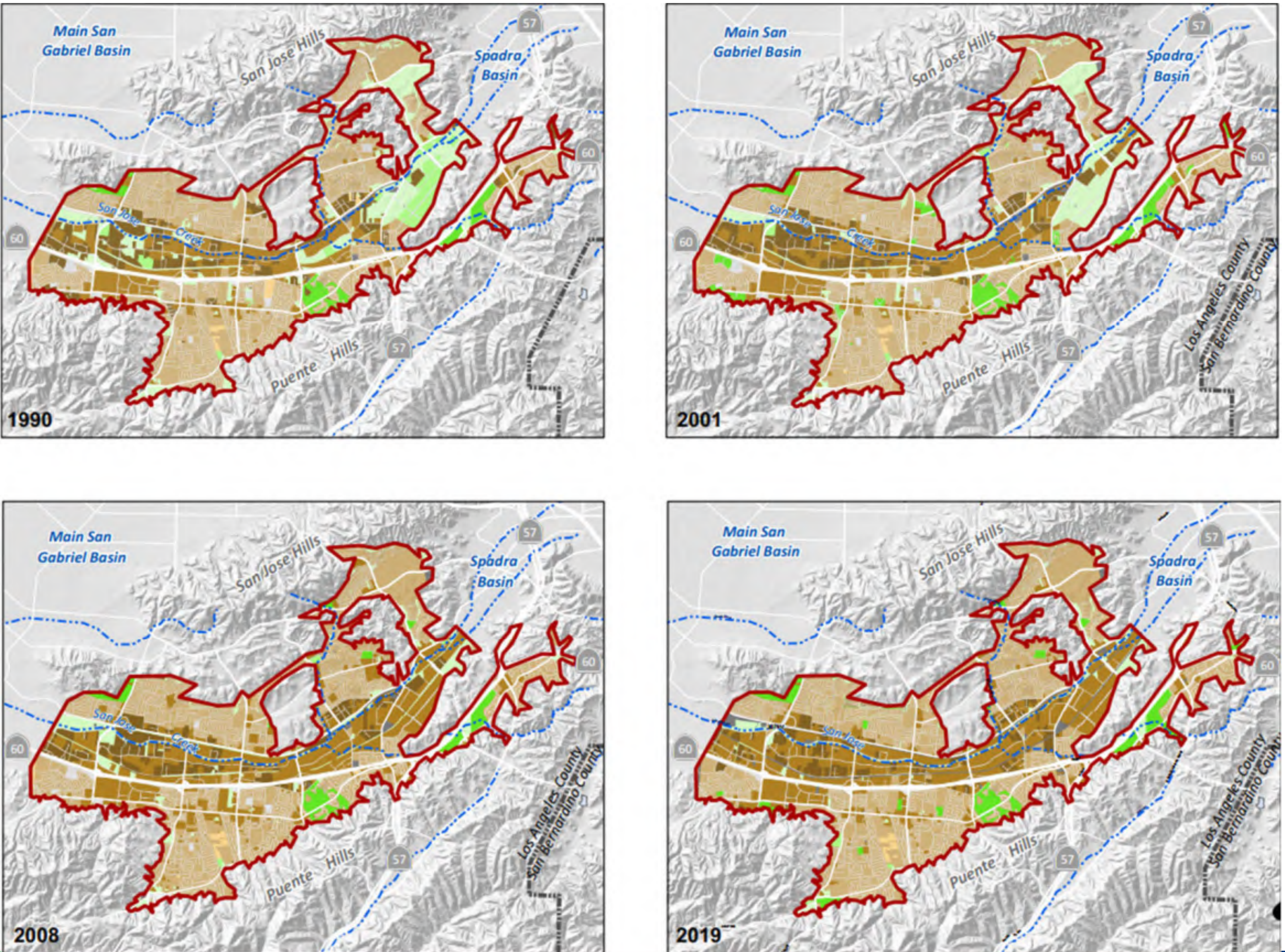
- Monitoring Well
- Production Well

Data Type (symbolized by color)

- Groundwater Quality
- Groundwater Elevation
- Groundwater Production

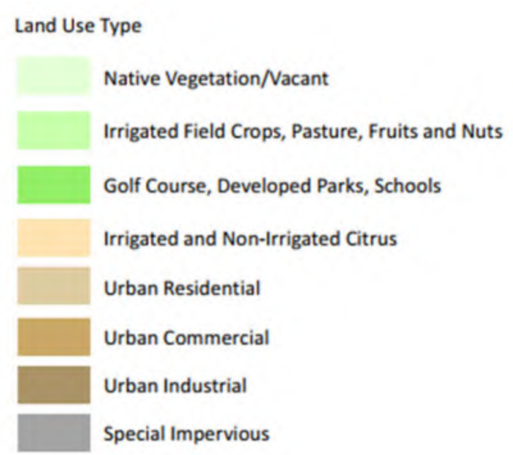
*indicates well in CASGEM program

# indicates well is used for the calculation of Puente Narrows underflow

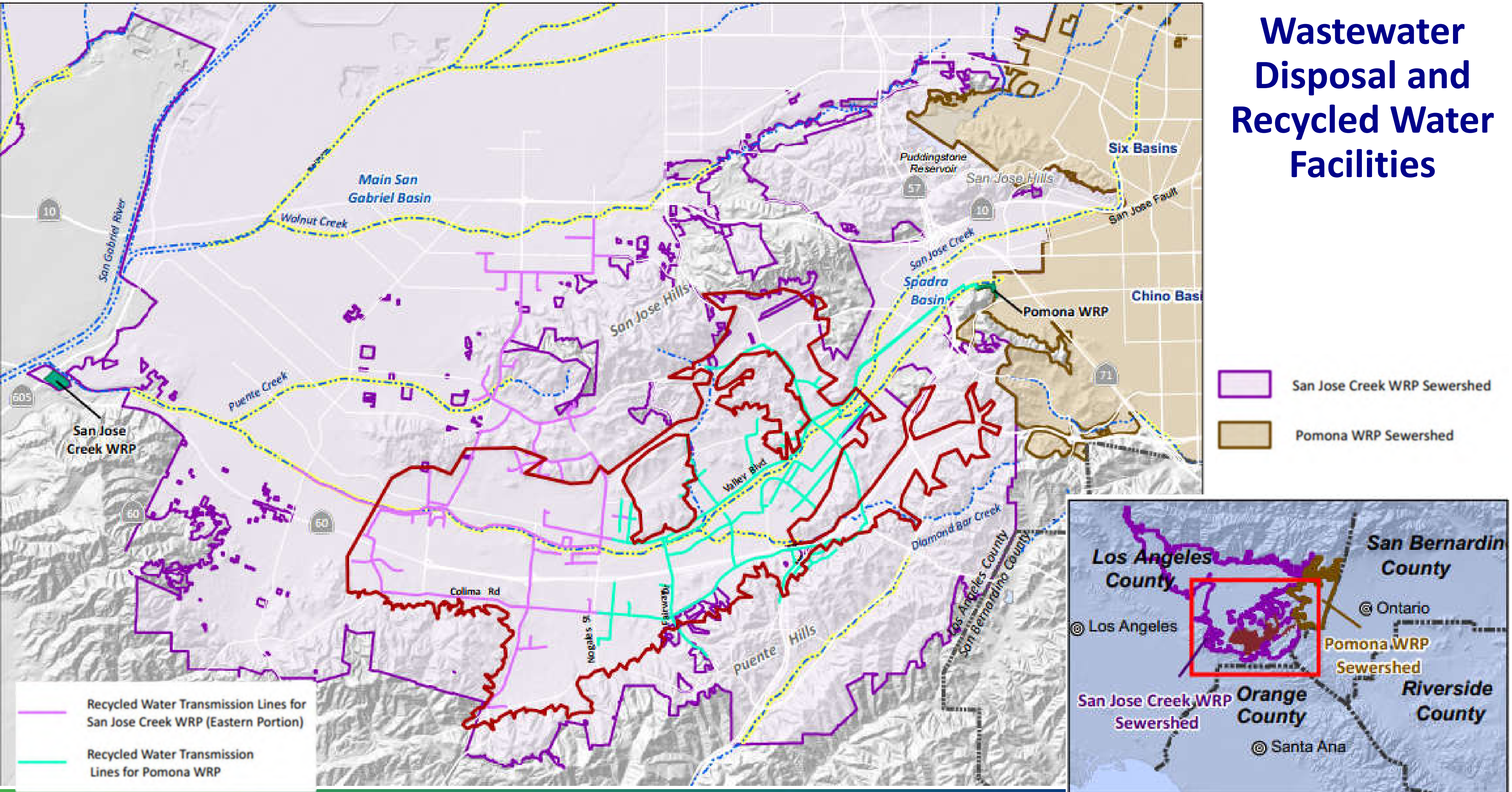


Land Use

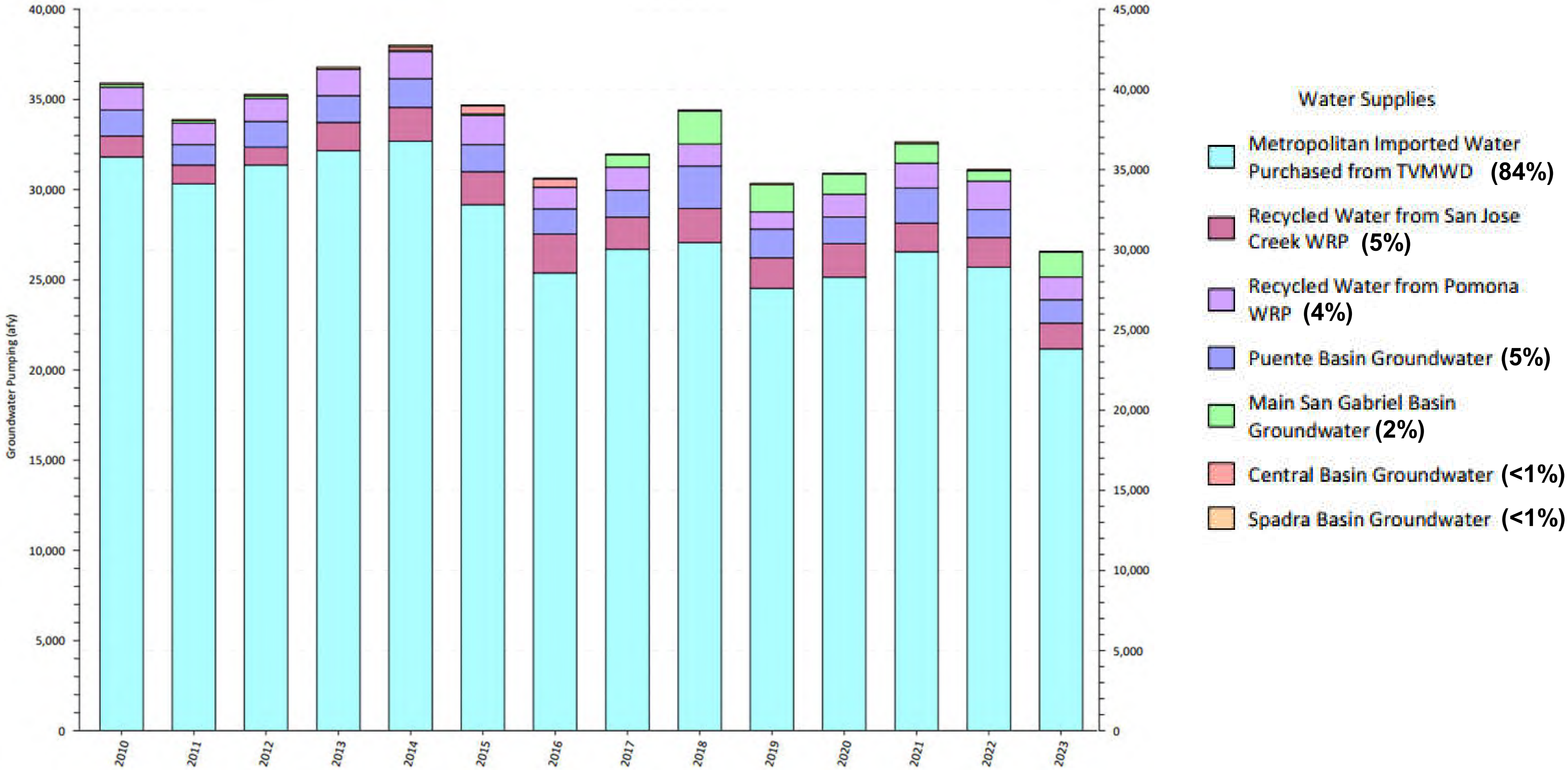
Land use has become more urban over time; decreasing return flows to the basin.



Wastewater Disposal and Recycled Water Facilities

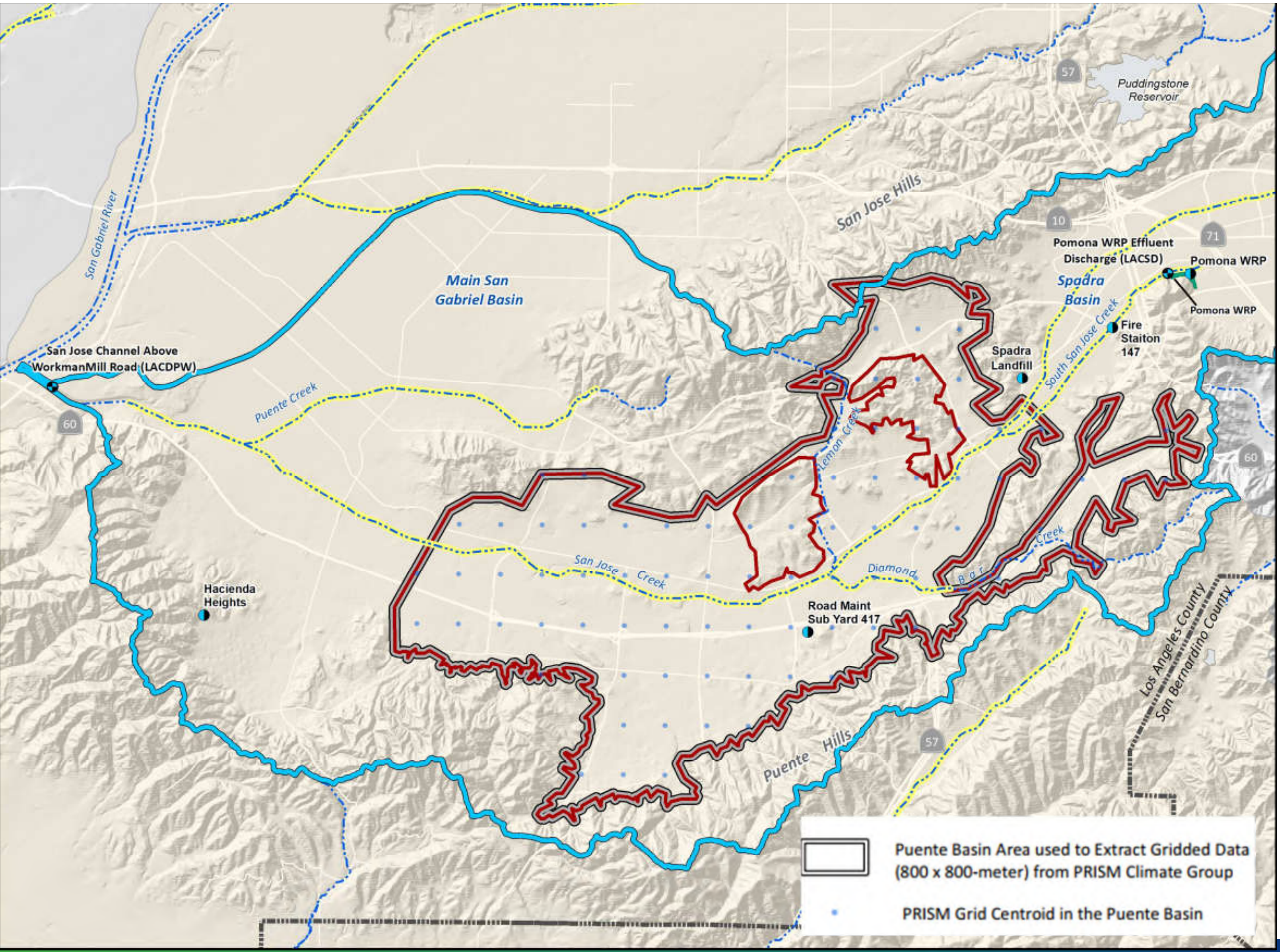


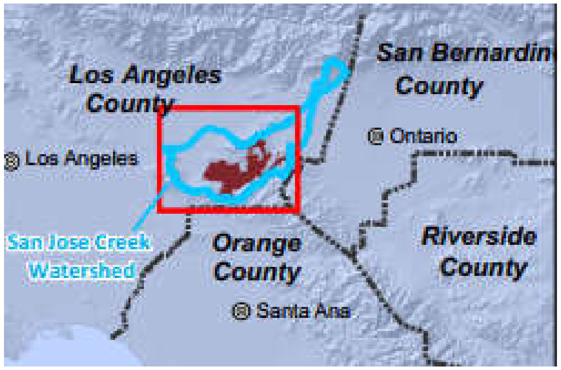
Water Supplies Used by the Principal Parties in the Puente Basin - 2010 to 2023



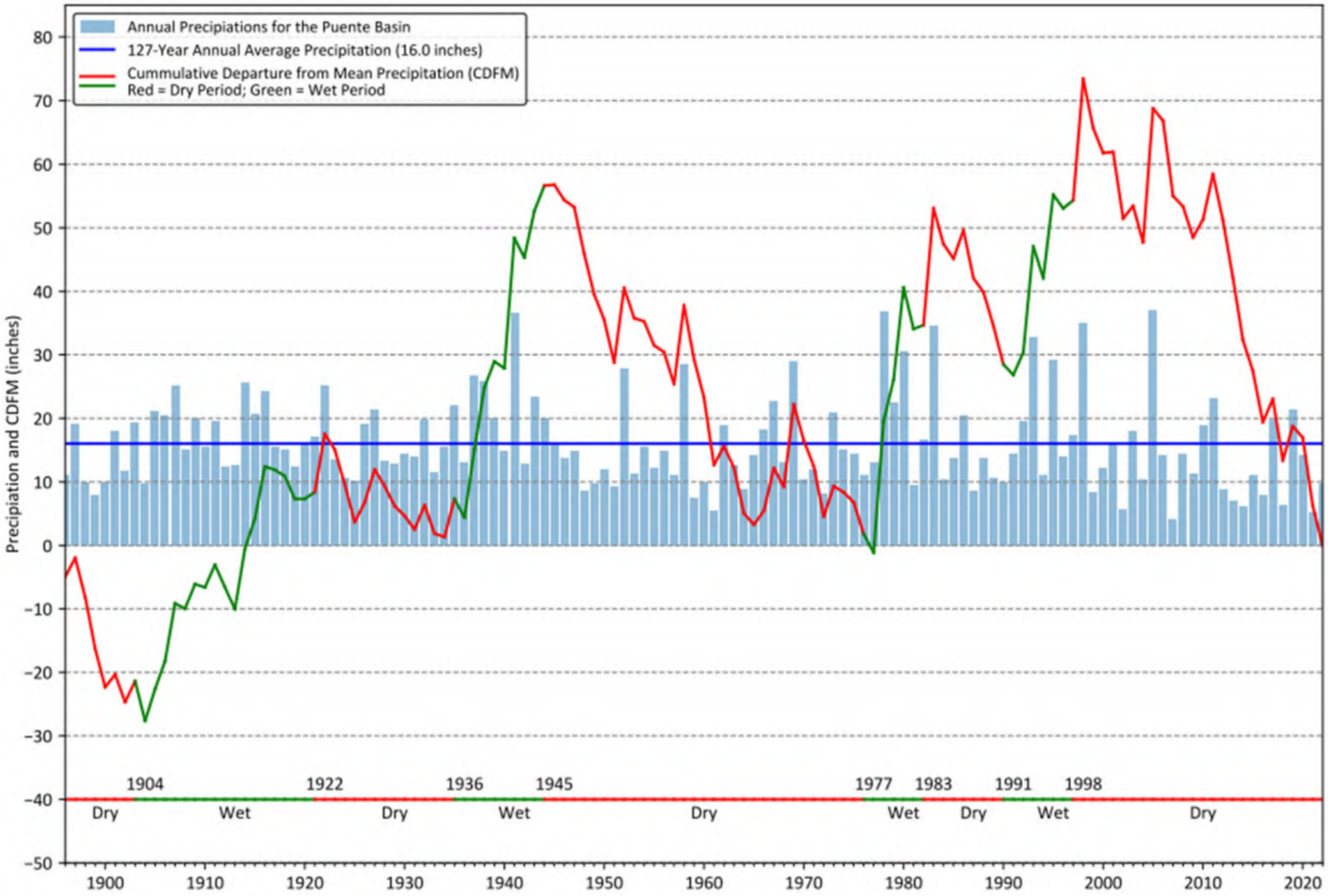
TM-1
Section 3.0 Basin Setting

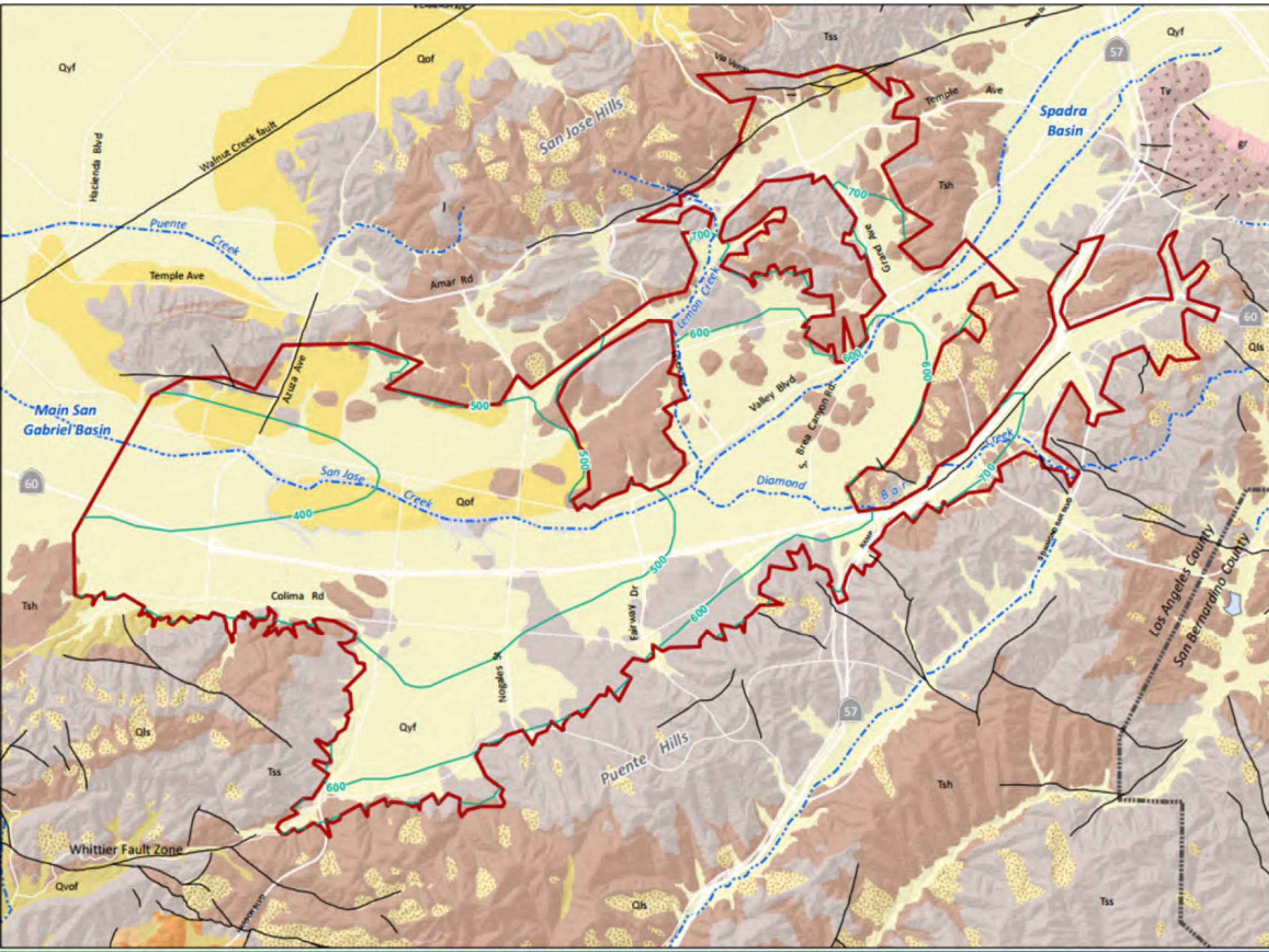
Hydrologic Features





Annual Precipitation and CDFM





Geologic Map

Surface Geology

Unconsolidated Sediments
(Source: CGS Special Report 217)

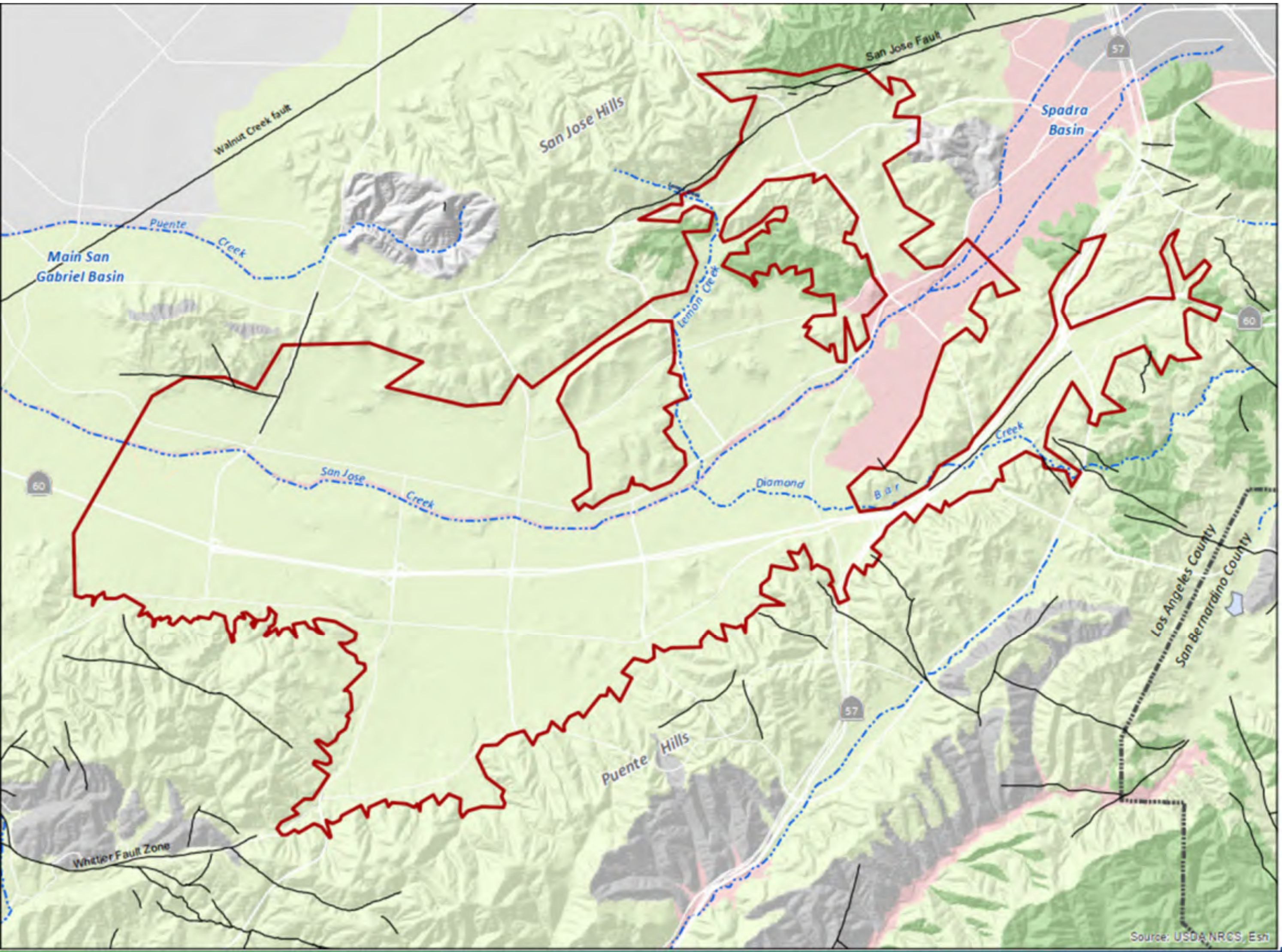
- Qyf — Undifferentiated Quaternary (younger) alluvial deposits
- Qoa, Qof, Qvof — Undifferentiated Quaternary (older) alluvial deposits
- Qls — Landslide Deposits

Consolidated Bedrock Formations
(Source: CGS Special Report 217)

- Tss, Tsh, Tv — Puente Group: Tertiary sedimentary and volcanic rocks
- gr — Basement Complex: Cretaceous and Pre-Cretaceous igneous and metamorphic rocks

Faults

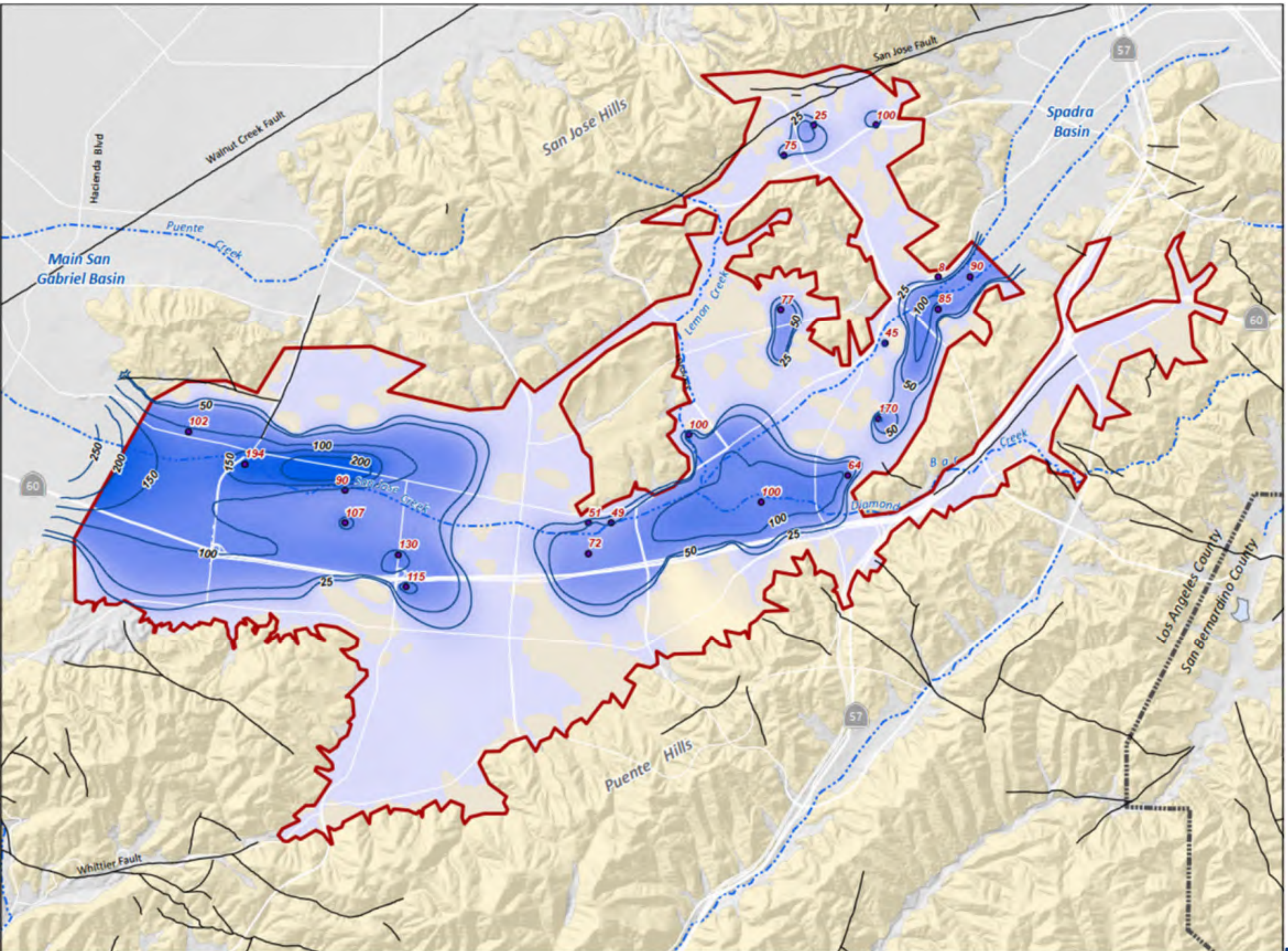
- Location Certain
- Location Approximate
- Location Concealed
- Location Uncertain
- 600 — Topographic Elevation Contour (ft-amsl)



Hydrologic Soil Types

A	Low runoff potential. Soils having high infiltration rates even when thoroughly wetted and consisting chiefly of deep, well to excessively drained sands or gravels. These soils have a high rate of water transmission.
B	Soils having moderate infiltration rates when thoroughly wtted and consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.
C	Soils having slow infiltration rates when thoroughly wetted and consisting cheifly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture. These soils have a slow rate of water transmission.
D	High runoff potential. Soils having very slow infiltraiton rates when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very slow rate of water transmission.

Depth to Bottom of Aquifer



150 ● Wells drilled to bedrock at the specified depth (ft-bgs)

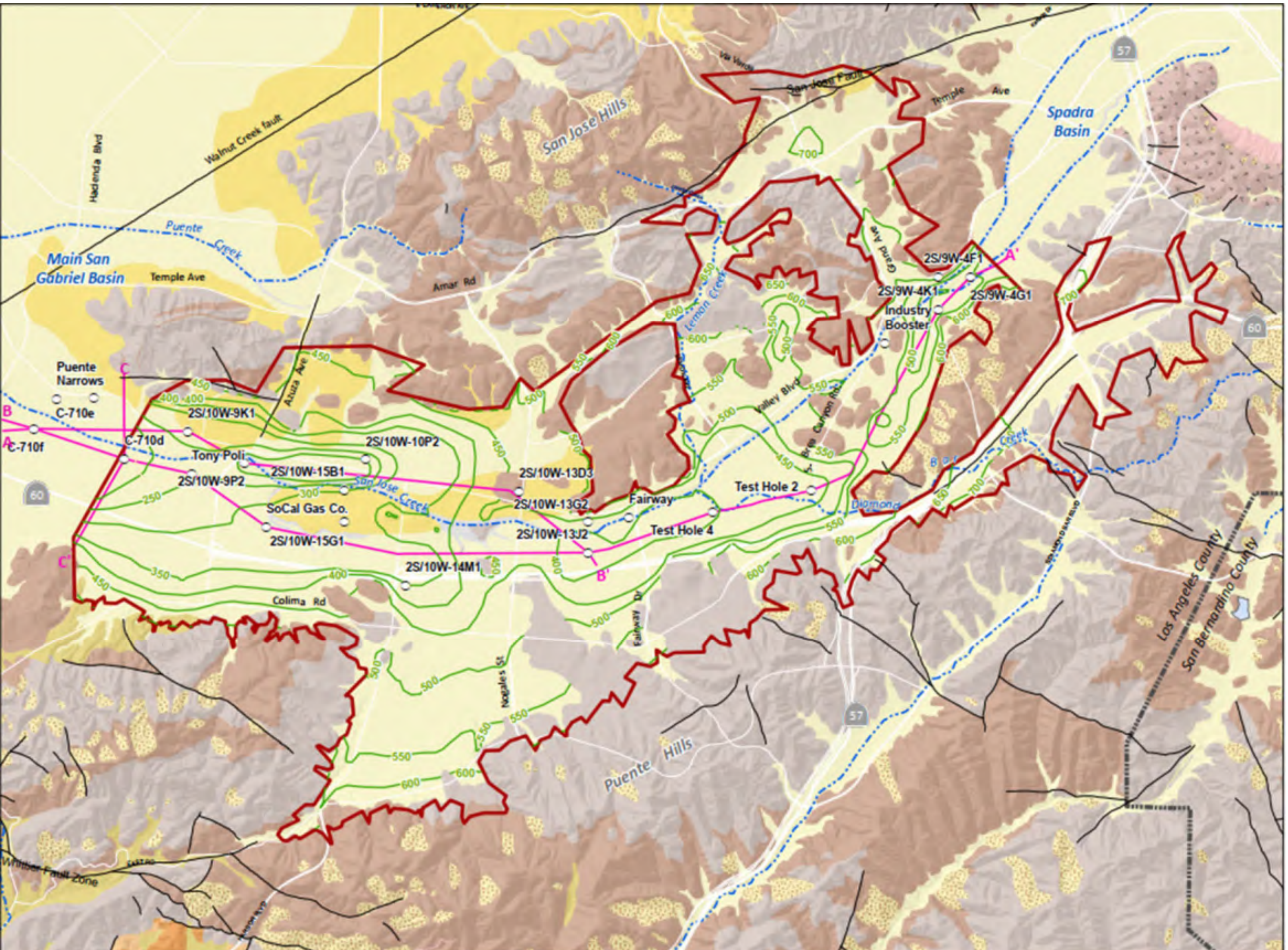
Estimated Depth to Bedrock

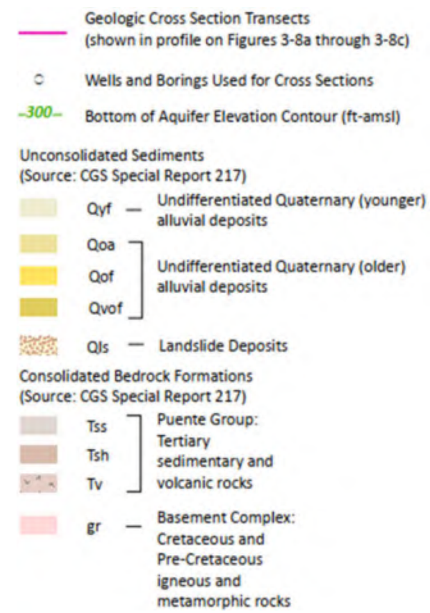
230 ft-bgs

150

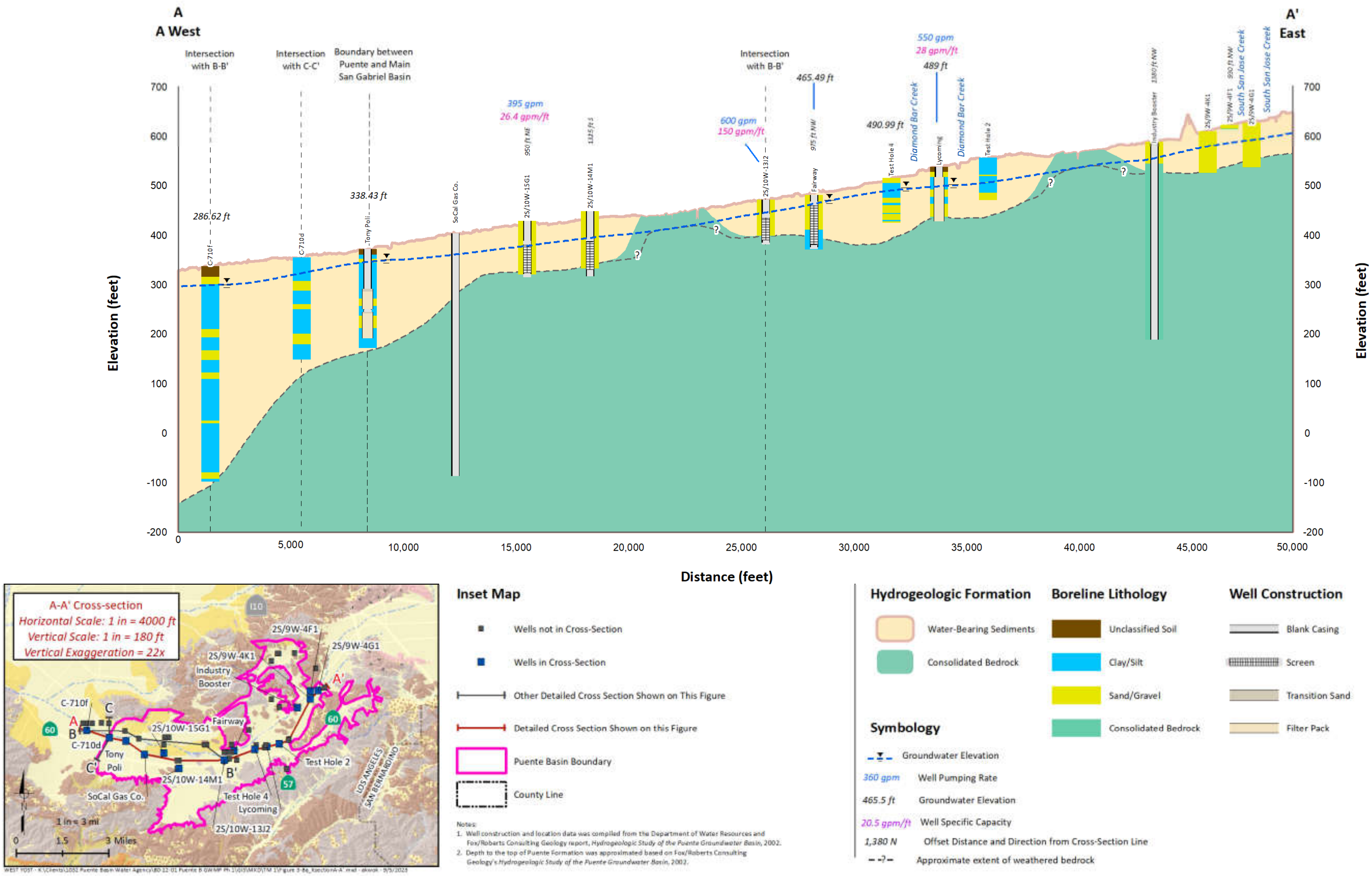
0

Depth to Bottom of Aquifer Elevation



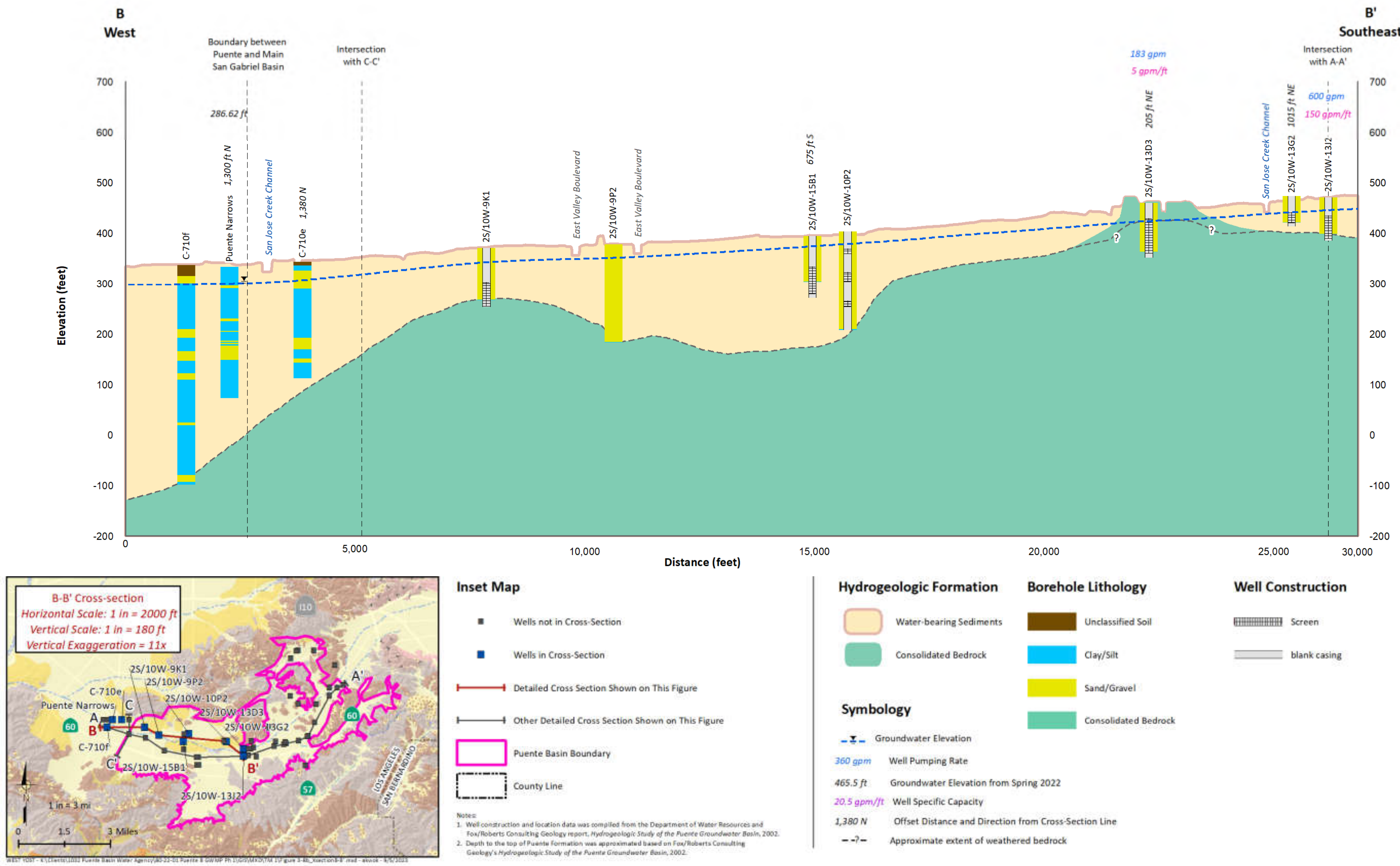


Hydrogeologic Cross-Section A-A’

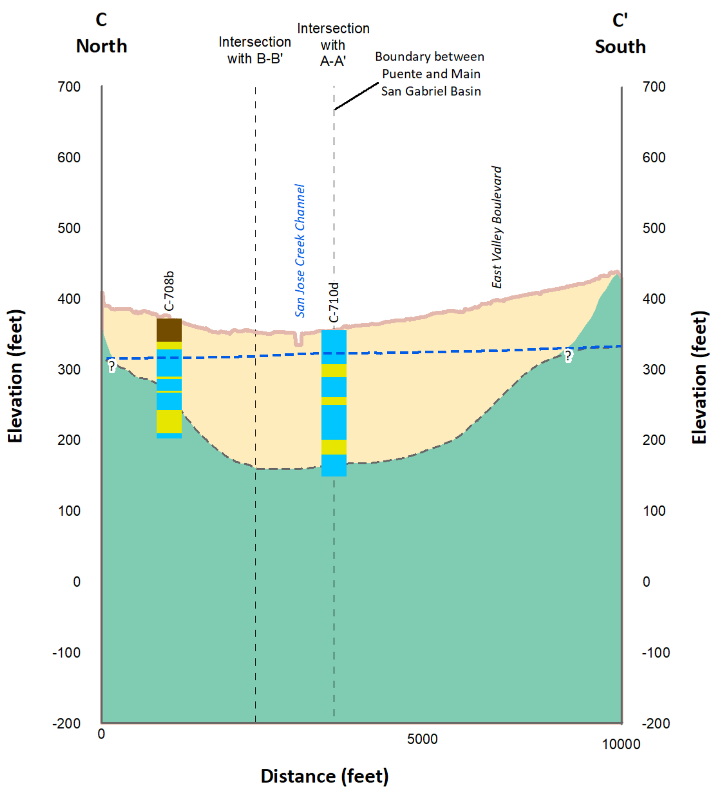


W

Hydrogeologic Cross-Section B-B’



Hydrogeologic Cross-Section C-C’



Hydrogeologic Formation

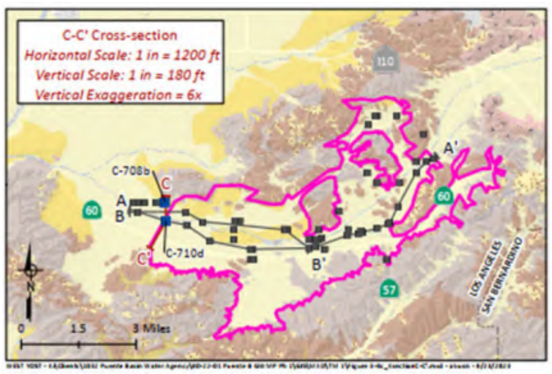
- Water-Bearing Sediments
- Consolidated Bedrock

Borehole Lithology

- Unclassified Soil
- Clay/Silt
- Sand/Gravel

Symbology

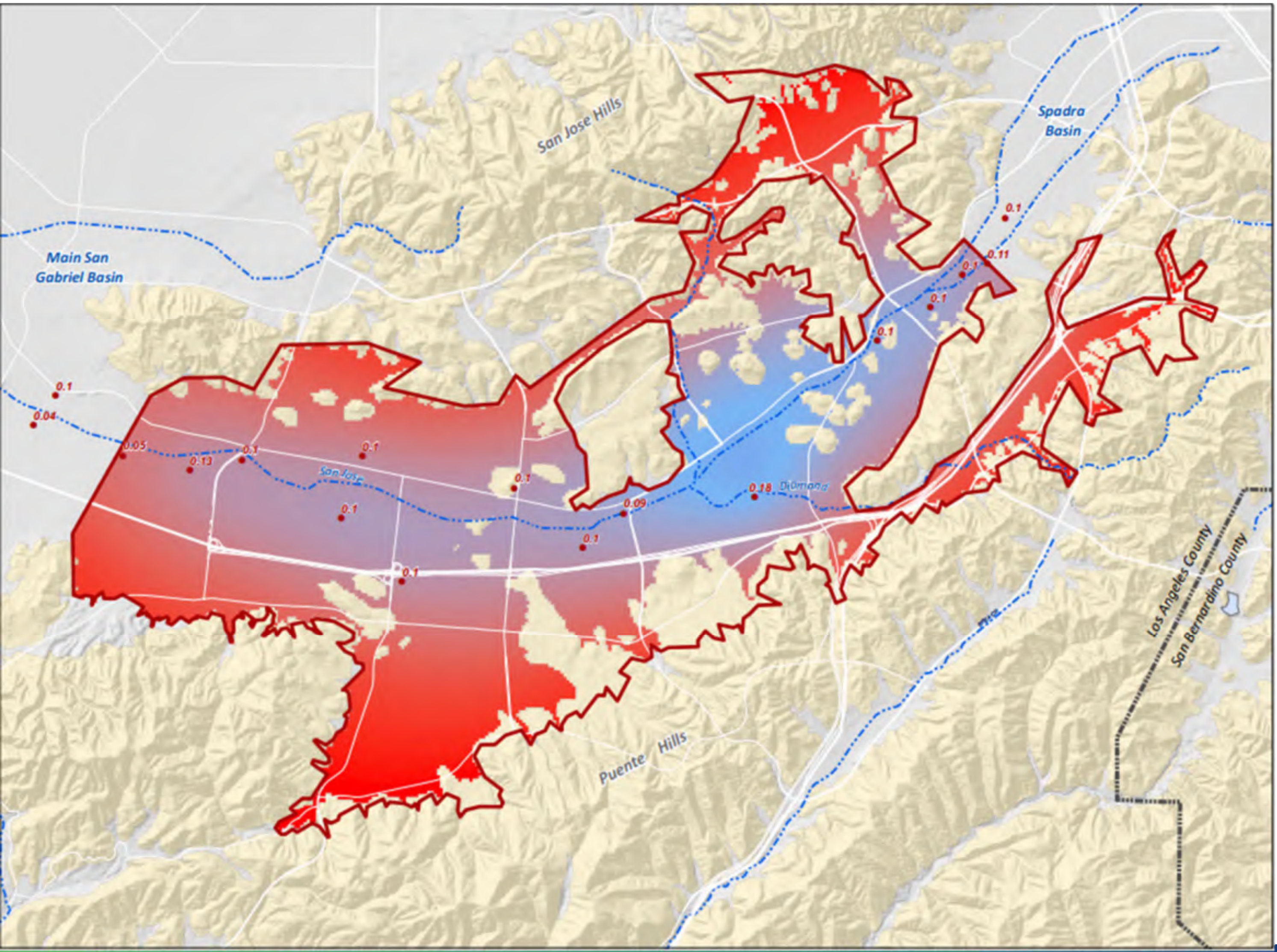
- Groundwater Elevation
- *360 gpm* Well Pumping Rate
- *465.5 ft* Groundwater Elevation from Spring 2022
- *20.5 gpm/ft* Well Specific Capacity
- *1,380 N* Offset Distance and Direction from Cross-Section Line
- --?-- Approximate extent of weathered bedrock

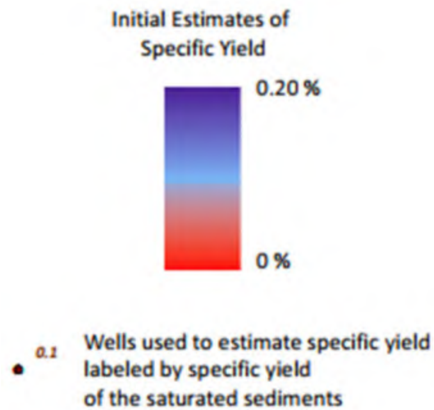


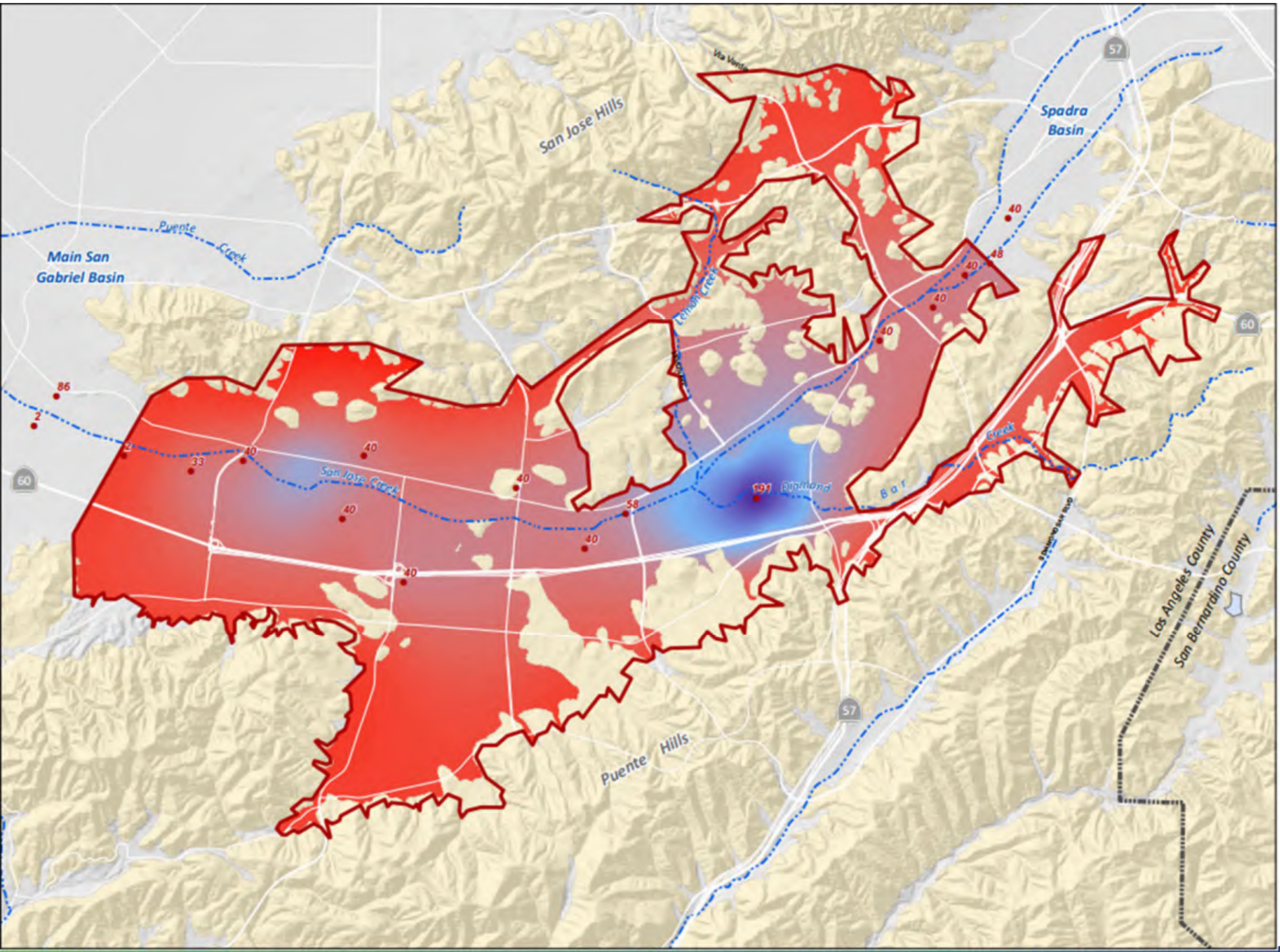
Inset Map

- Wells not in Cross-Section
- Wells in Cross-Section
- Other Cross- Section Not Shown on Figure
- Detailed Cross Section Shown on this Figure
- Puente Basin Boundary
- County Line

Specific Yield







Horizontal Hydraulic Conductivity

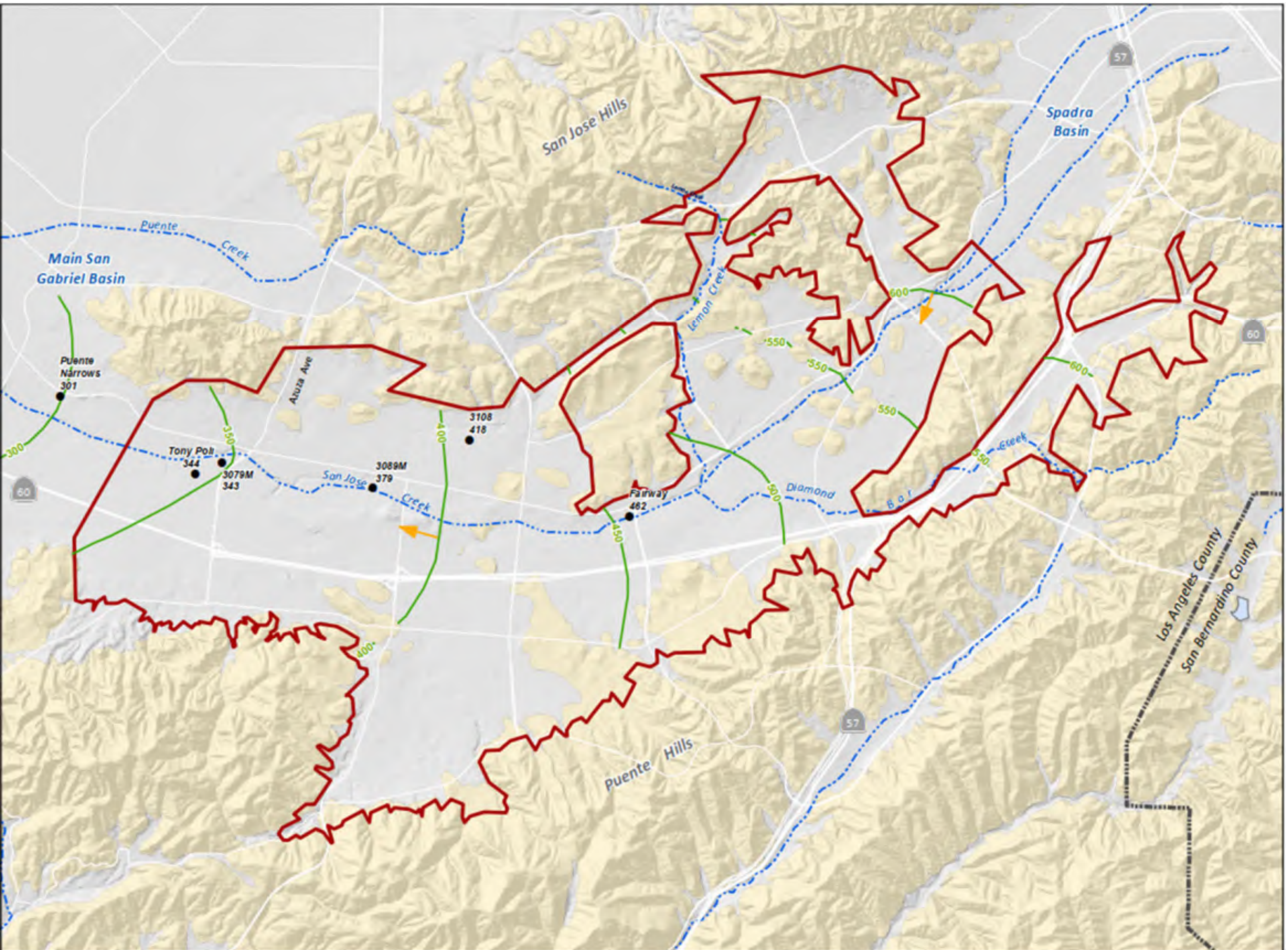
Initial Estimates of Horizontal Hydraulic Conductivity

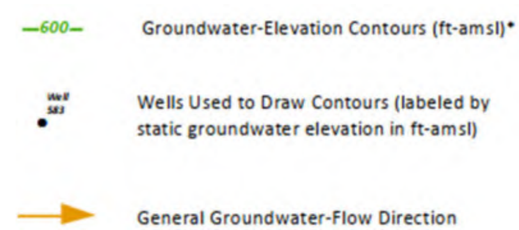
200 ft/day

0 ft/day

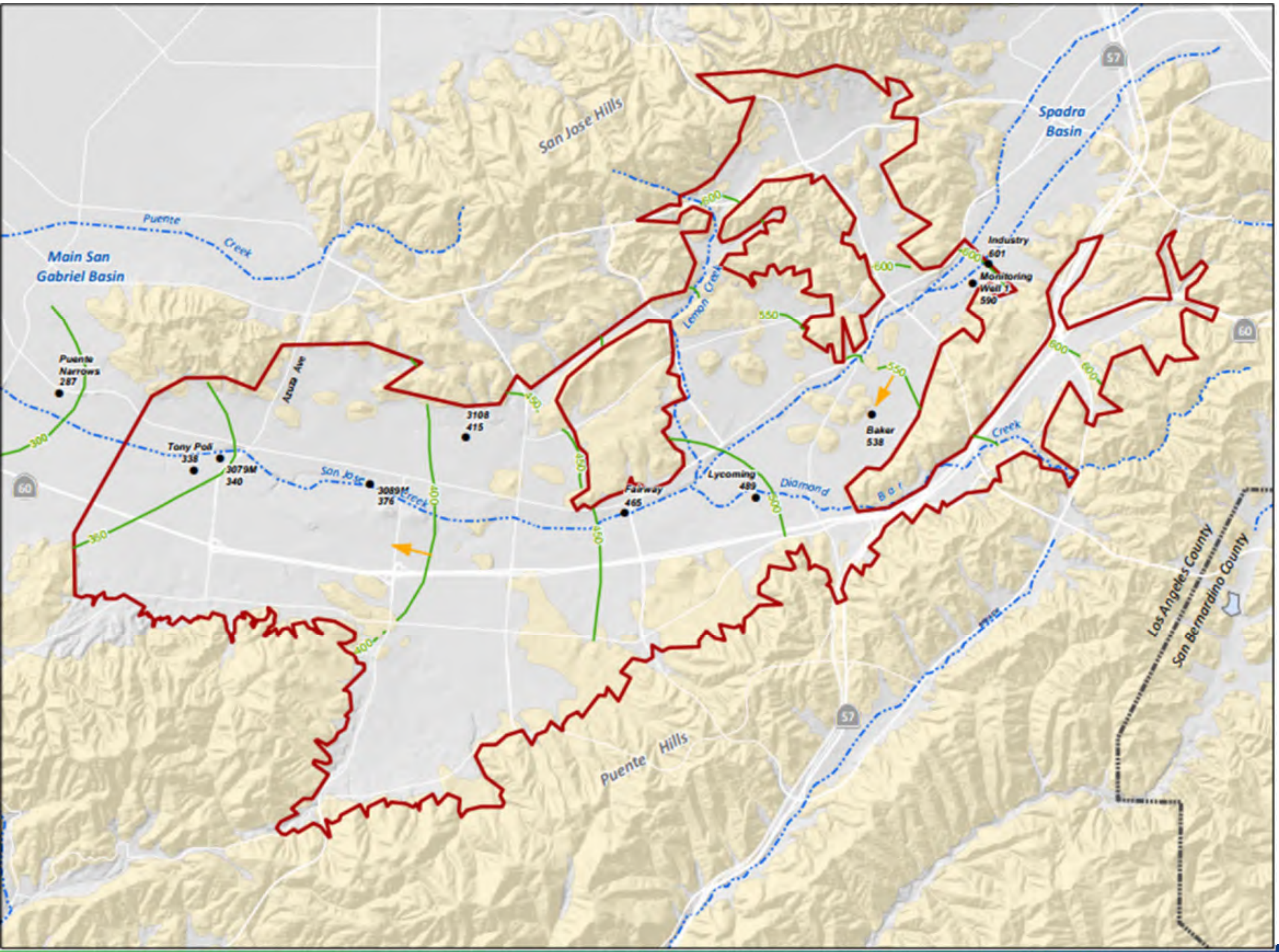
122 Wells used to estimate hydraulic conductivity labeled by horizontal hydraulic conductivity of the saturated sediments

Groundwater Elevation and Flow Directions – Spring 2000

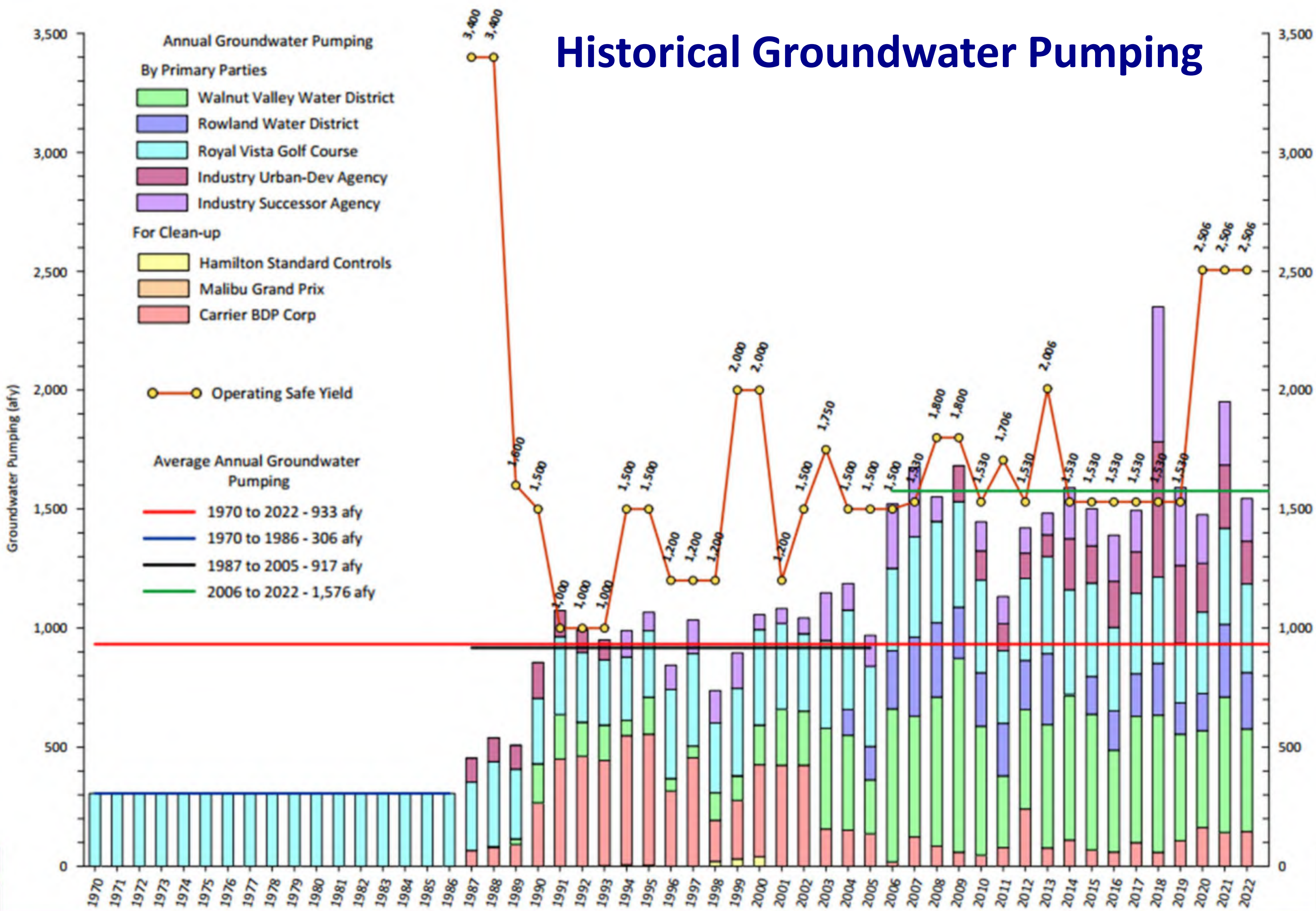




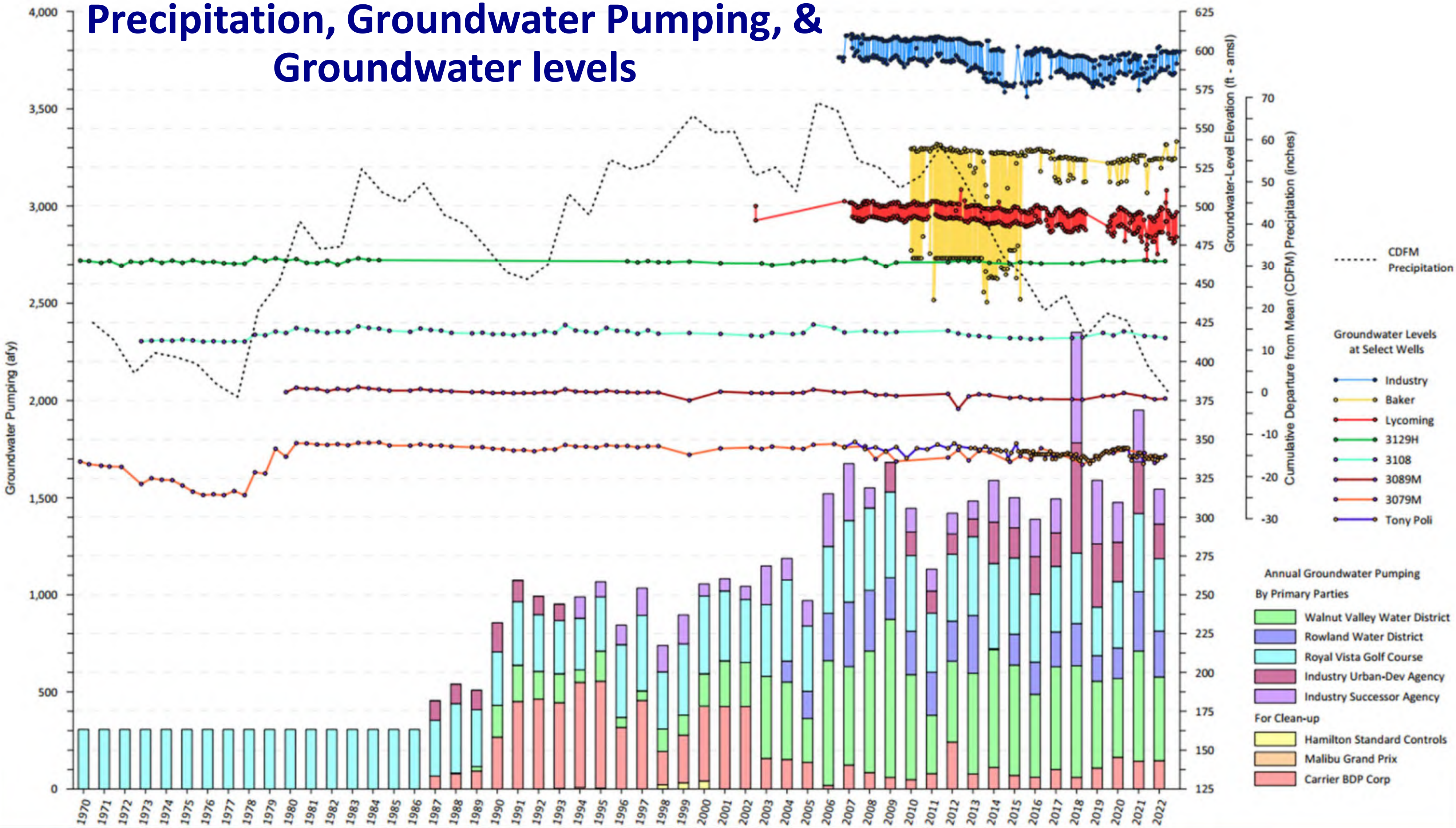
Groundwater Elevation and Flow Directions – Spring 2022

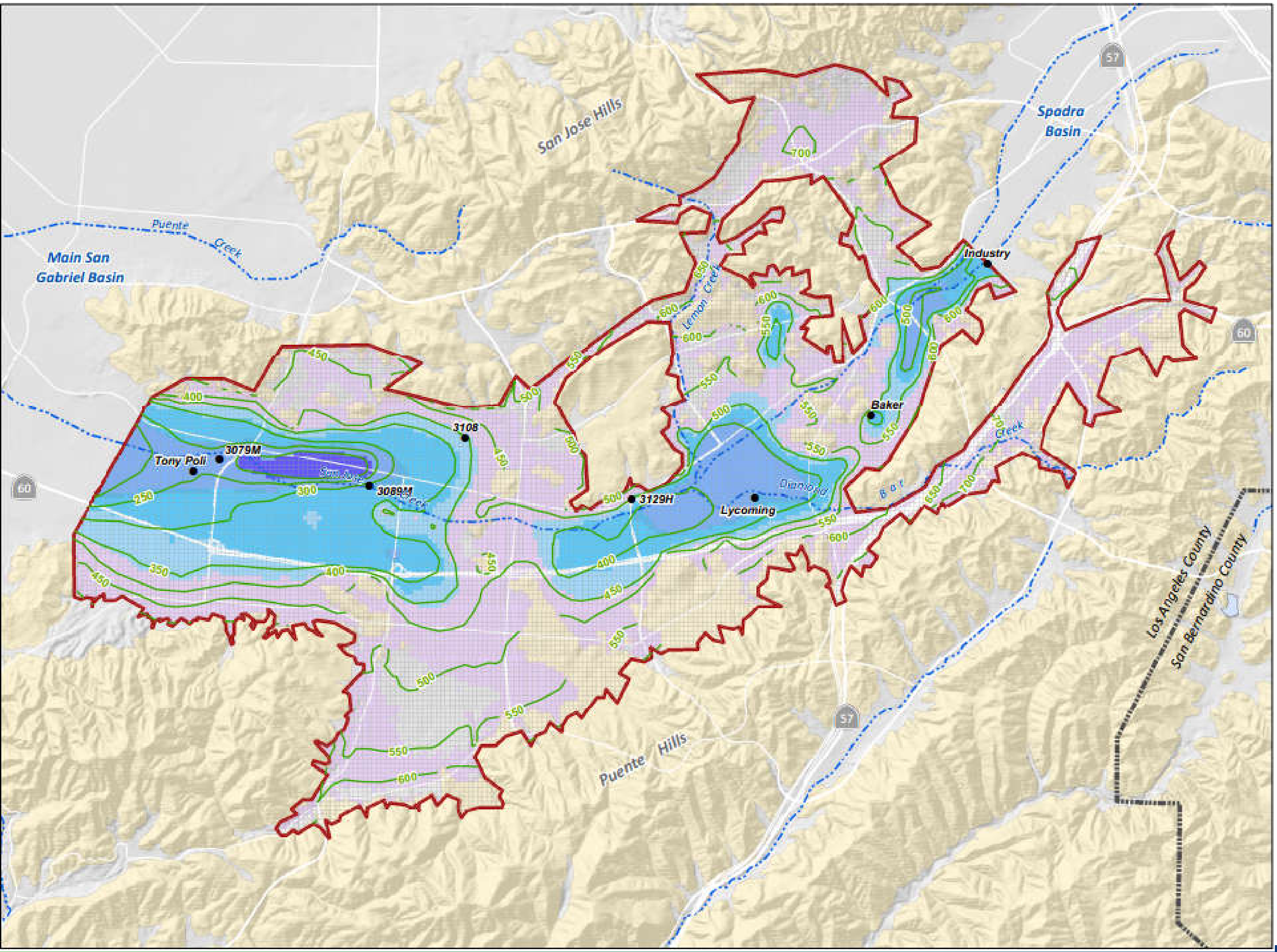


Historical Groundwater Pumping



Precipitation, Groundwater Pumping, & Groundwater levels





Groundwater in Storage - 2000

Groundwater in Storage in Each 60 x 60-meter Grid (af)

- 0 - 2.5
- 2.5 - 5.0
- 5.0 - 7.5
- 7.5 - 10
- 10 - 15
- Unsaturated

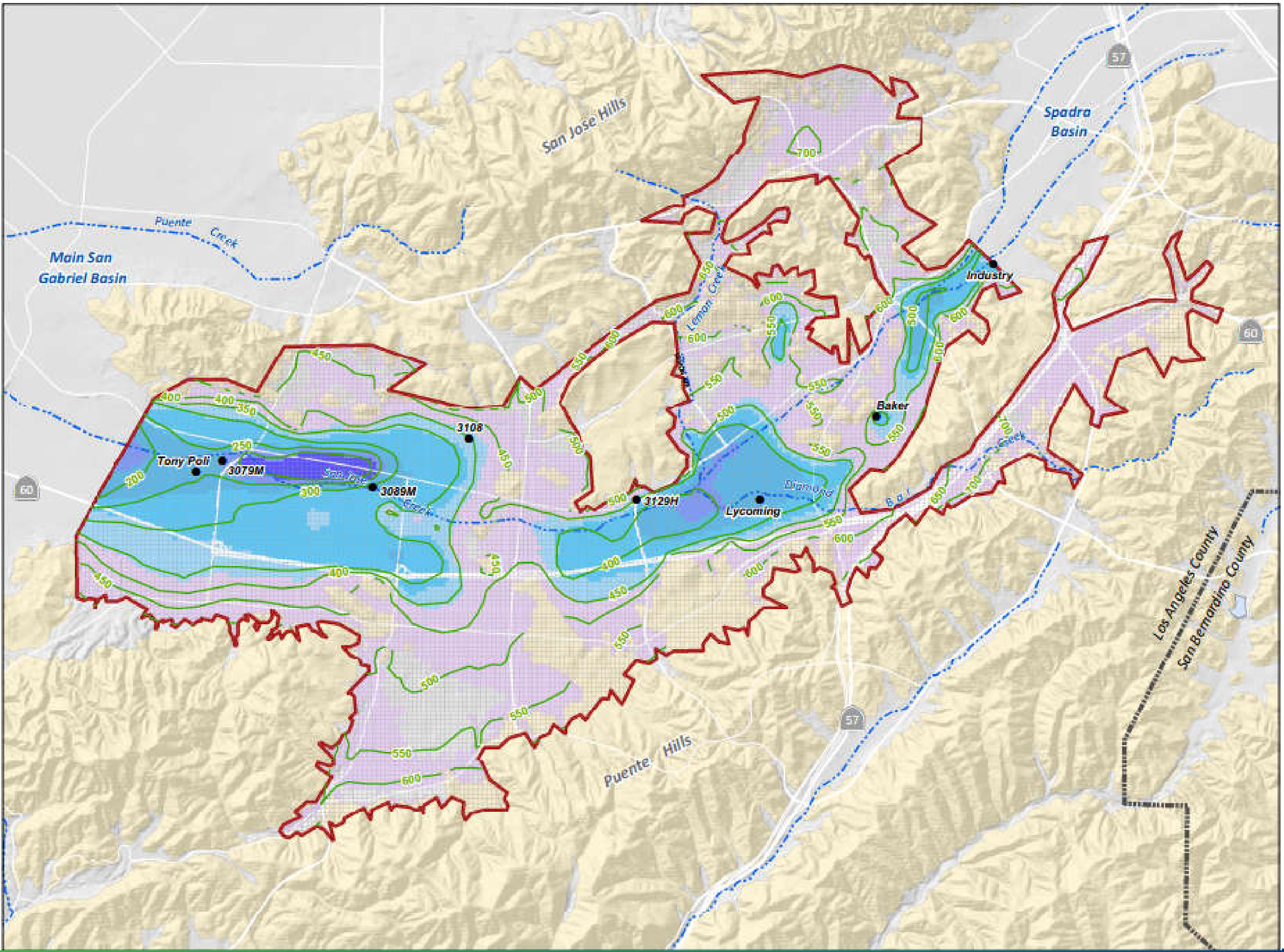
–300– Bottom of Aquifer Elevation Contour (ft-amsl)

60 x 60-meter Grid

Wells with Water Level Time-Series in Figure 3-13

Estimated Storage = 18,071 af

Groundwater in Storage - 2022



Groundwater in Storage in Each 60 x 60-meter Grid (af)

- 0 - 2.5
- 2.5 - 5.0
- 5.0 - 7.5
- 7.5 - 10
- 10 - 15
- Unsaturated

-300- Bottom of Aquifer Elevation Contour (ft-amsl)

60 x 60-meter Grid

Wells with Water Level Time-Series in Figure 3-13

Estimated Storage = 17,551 af

Estimated Developed Yield

The developed yield can be estimated using the following formula:

Developed Yield = $(O_p - I_{ar} + \Delta S)/\Delta t$

Where:

- Δt is the period over which the developed yield is being estimated
- O_p is the total groundwater pumped from the basin during Δt
- I_{ar} is the total supplemental water recharged to the basin during Δt
- ΔS is the change in groundwater storage within the basin during Δt

Developed Yield = (33,286 af – 0 af - 520 af)/23 years <u>= 1,425 afy</u>

Underflow and Accounting of Accumulated Credits

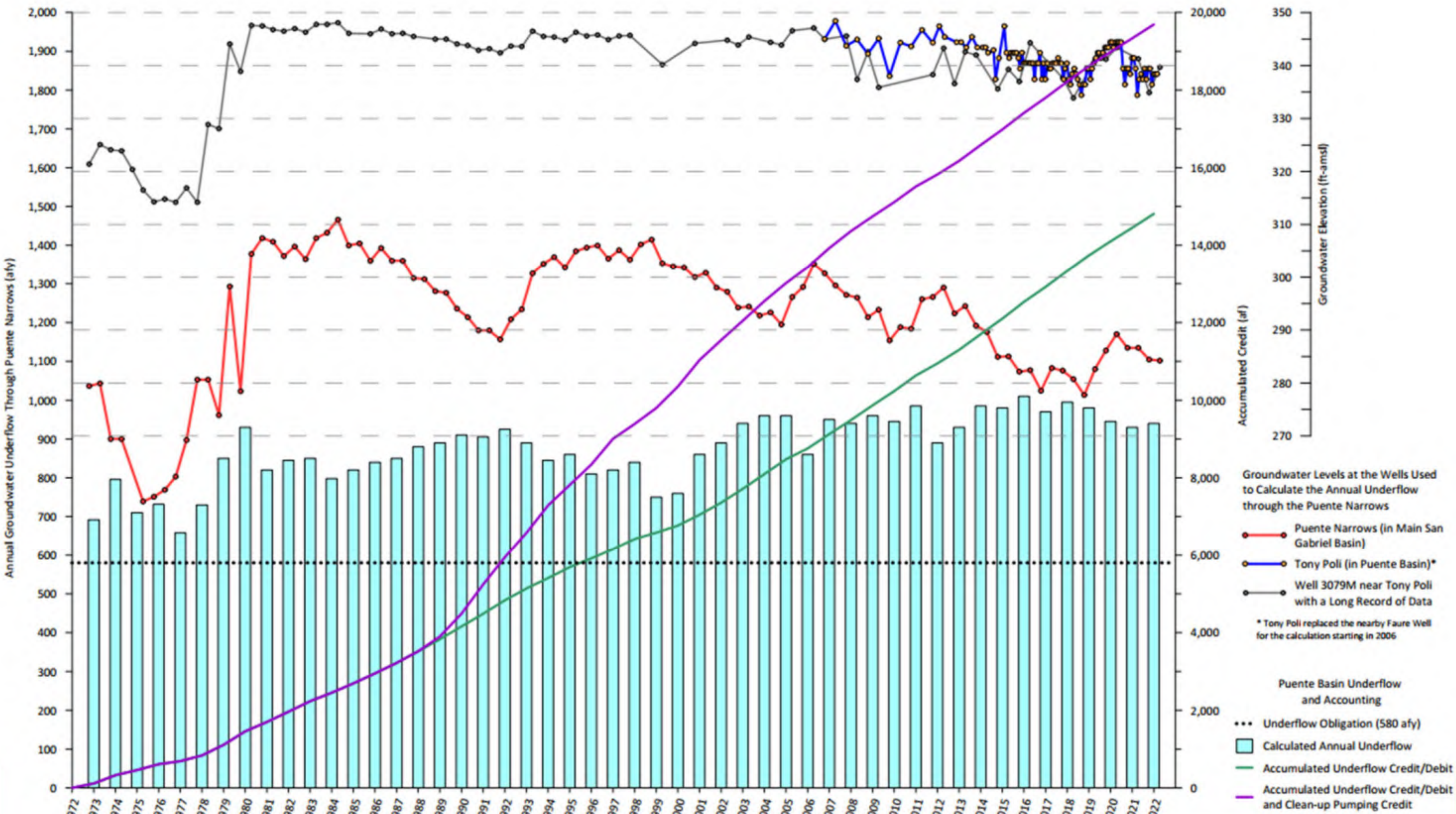


Table 3-5. Exceedances of Groundwater Quality Standards in the Puente Basin 1987 - 2022

Analyte	Standard	Number of Wells Sampled	Number of Wells with Exceedances	Number of Samples with Exceedances	Percent of Wells Sampled with Exceedances
Contaminant with Primary MCL [a]					
1,1-Dichloroethane	6 µg/L	90	1	3	1%
1,1-Dichloroethene (1,1-DCE)	6 µg/L	90	3	191	3%
Benzene	1 µg/L	88	15	32	17%
Chromium	50 µg/L	11	2	8	18%
Chromium (VI)	10 µg/L	10	7	40	70%
cis-1,2-Dichloroethene (cis-1,2-DCE)	6 µg/L	88	29	762	33%
Ethylbenzene	0.3 µg/L	88	9	43	10%
Methyl Tert-Butyl Ether (MTBE)	13 µg/L	81	1	26	1%
Nickel	0.1 µg/L	11	7	30	64%
Nitrate-Nitrogen	10 µg/L	11	3	19	27%
Nitrite-Nitrogen	1 µg/L	11	1	1	9%
Tetrachloroethylene (PCE)	5 µg/L	90	88	1632	98%
Toluene	0.15 µg/L	88	9	65	10%
trans-1,2-Dichloroethene (trans-1,2-DCE)	10 µg/L	87	2	2	2%
Trichloroethylene (TCE)	5 µg/L	90	47	1072	52%
Vinyl Chloride	0.5 µg/L	88	16	119	18%
Xylene	10 mg/L	20	9	65	45%
Contaminant with Secondary MCL					
Chloride	500 mg/L	11	3	21	27%
Methyl Tert-Butyl Ether (MTBE)	5 µg/L	81	1	26	1%
Sulfate	250 mg/L	11	10	21	91%
TDS	500 mg/L	16	16	441	100%
Contaminant with California NL					
1,4-Dioxane	1 µg/L	1	1	2	100%
Boron	1 µg/L	11	1	1	9%
PFOA (Perfluorooctanoic acid)	4 µg/L [b]	3	3	1	100%
PFOS (Perfluorooctanesulfonic acid)	4 µg/L [b]	3	3	1	100%
PFHxS (Perfluorohexanesulfonic acid)	3 µg/L	3	3	1	100%
Naphthalene	17 µg/L	87	10	12	11%
Tert-Butyl Alcohol	120 µg/L	77	2	8	3%

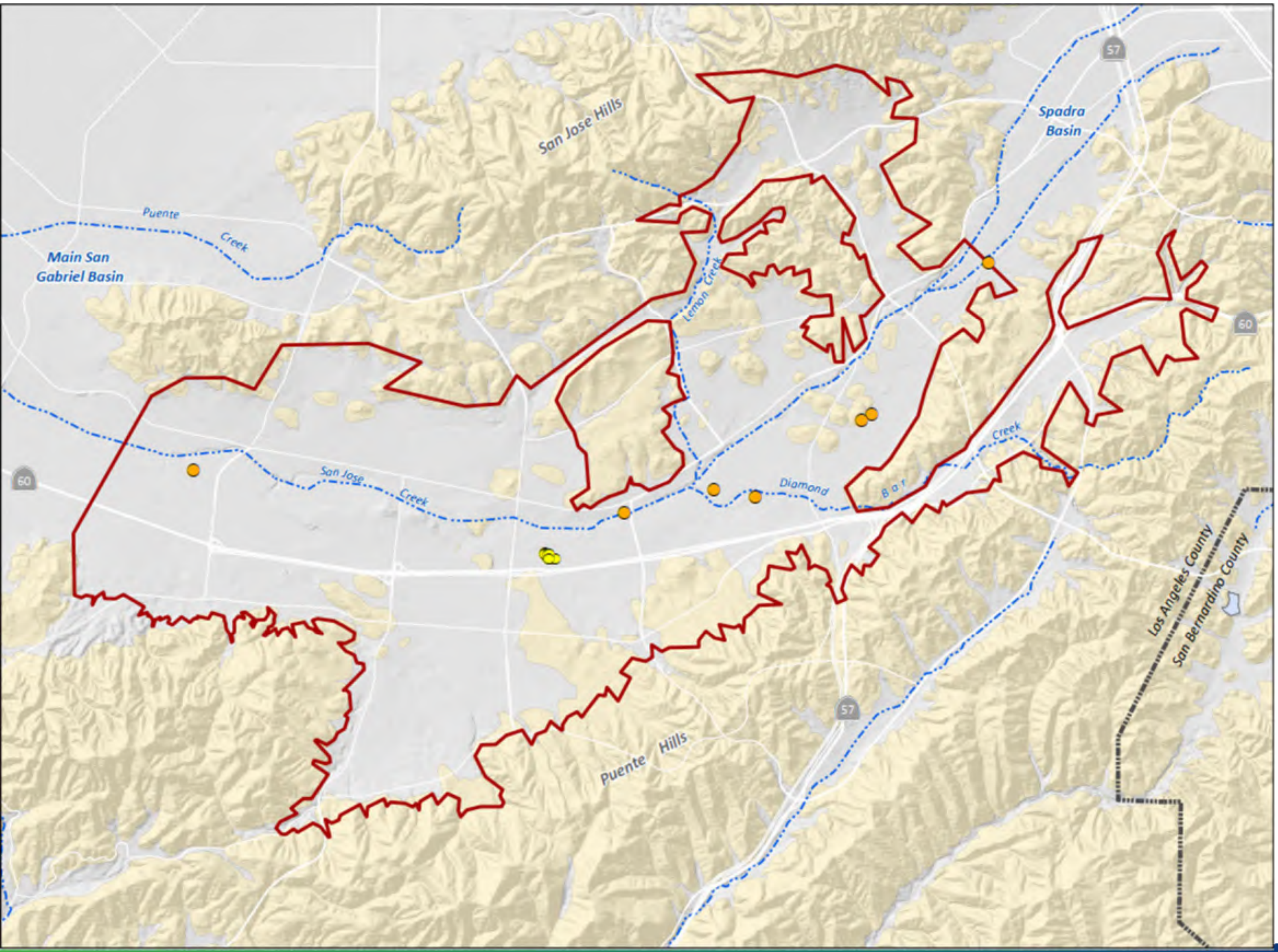
(a) All MCL standards used for this analysis are California Primary MCL standards; the Federal EPA MCL standards are typically higher than, equivalent to, or non-existent for all the contaminents in Puente Basin wells with a MCL exceedance.
(b) For the per- and polyfluoroalkyl substances (PFAS), PFOA and PFOS, these are the Propsoed Federal EPA MCLs. The California NLs are slighlty higher than then the Propsoed Federal EPA MCLs (PFOA - 5.1 µgl, and PFOS - 6.5 µgl).

Exceedance Analysis

Contaminants of Concern:

- Constituents that are associated with salt and nutrient management: TDS and nitrate.
- Constituents associated with known point-source contamination sites and exceed a primary MCL in 25 or more wells. These constituents are TCE, PCE, and cis-1,2-DCE.

Total Dissolved Solids (TDS)

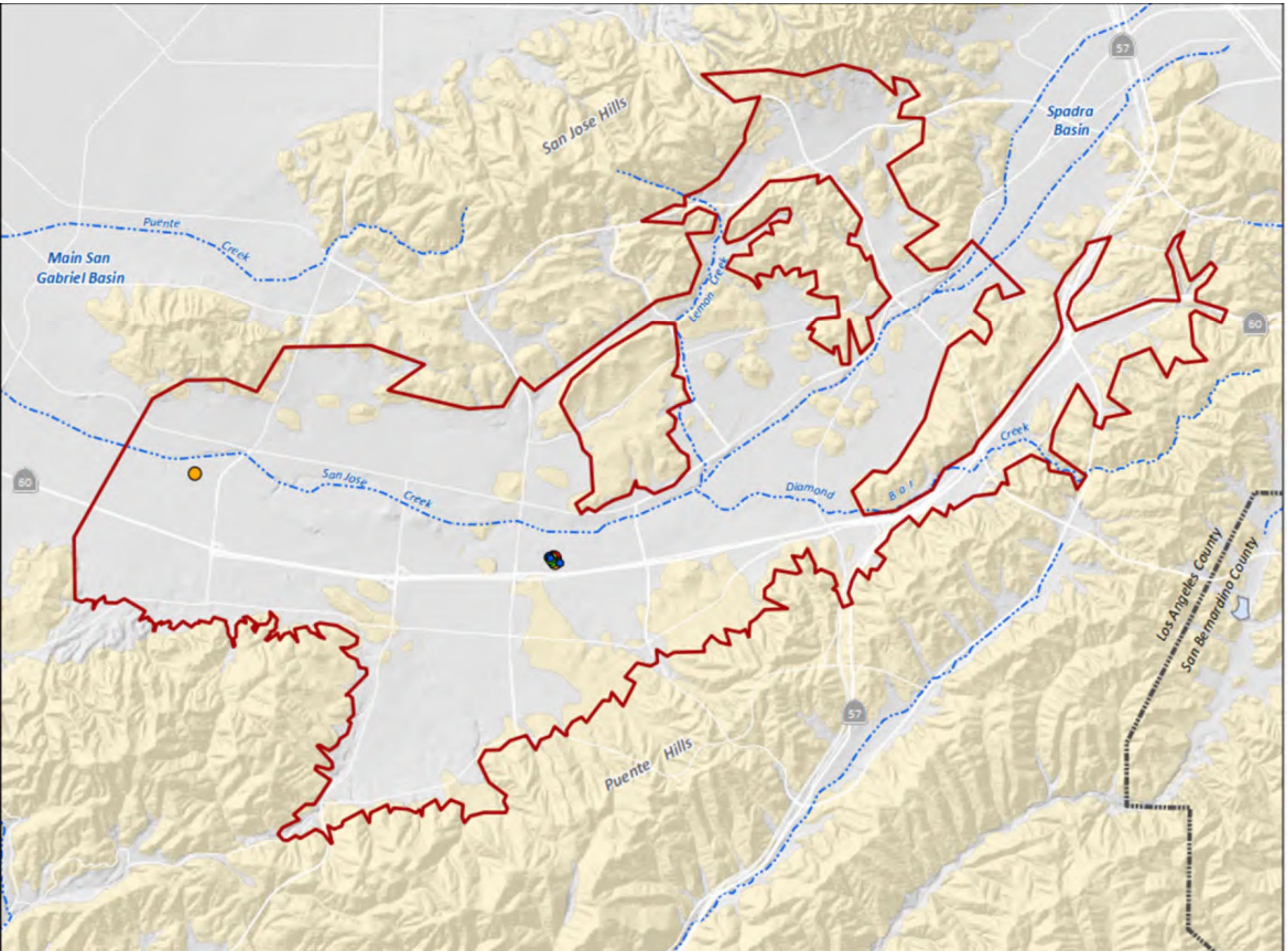


TDS (mgl)

- ND
- < 250
- 250 - 500
- 500 - 1,000
- 1,000 - 2,000
- > 2,000

California Secondary MCL = 500 mgl

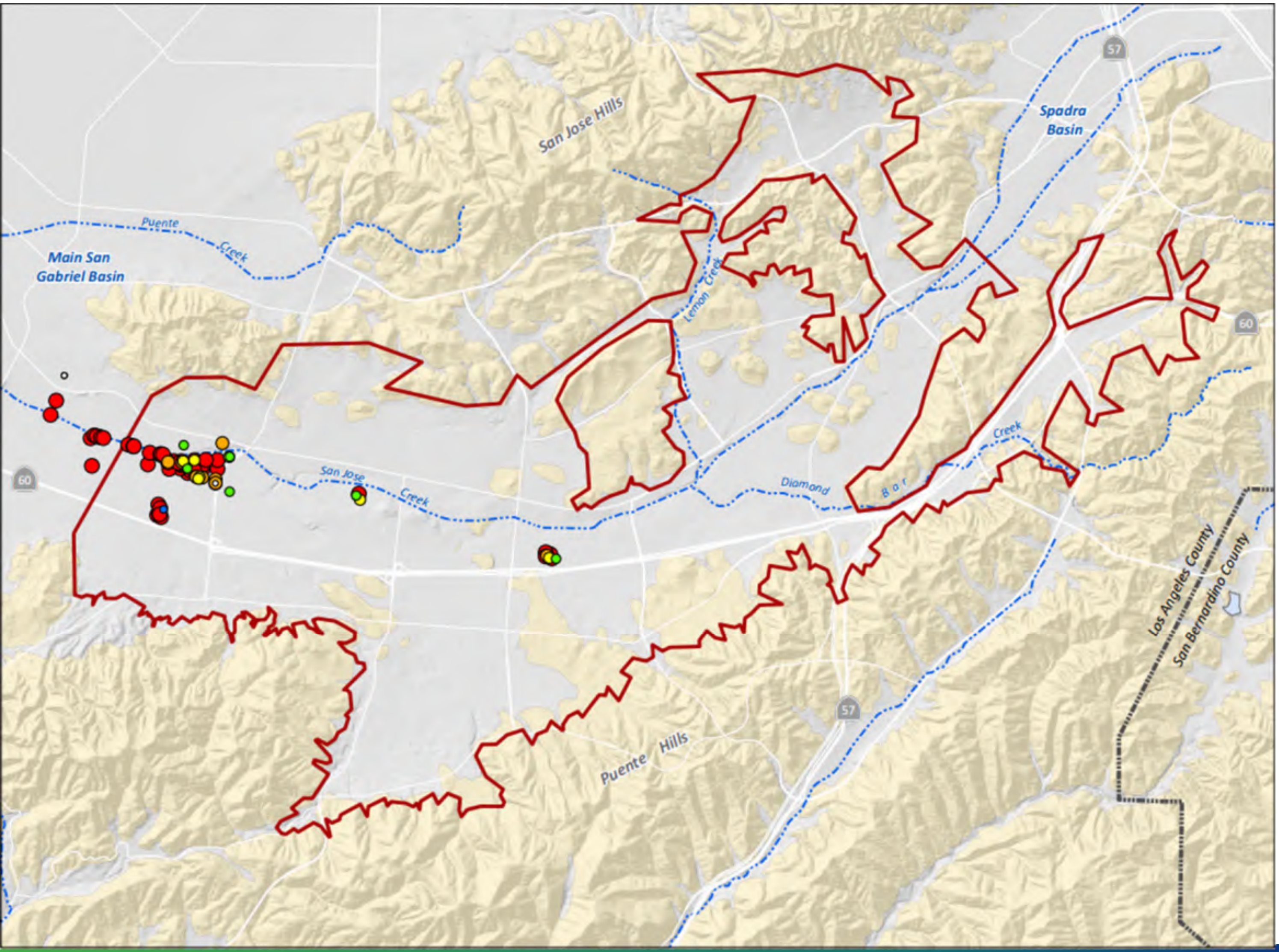
Nitrate-Nitrogen



Nitrate-Nitrogen (mgl)
- ND
- < 5
- 5 - 10
- 10 - 20
- 20 - 40
- > 40

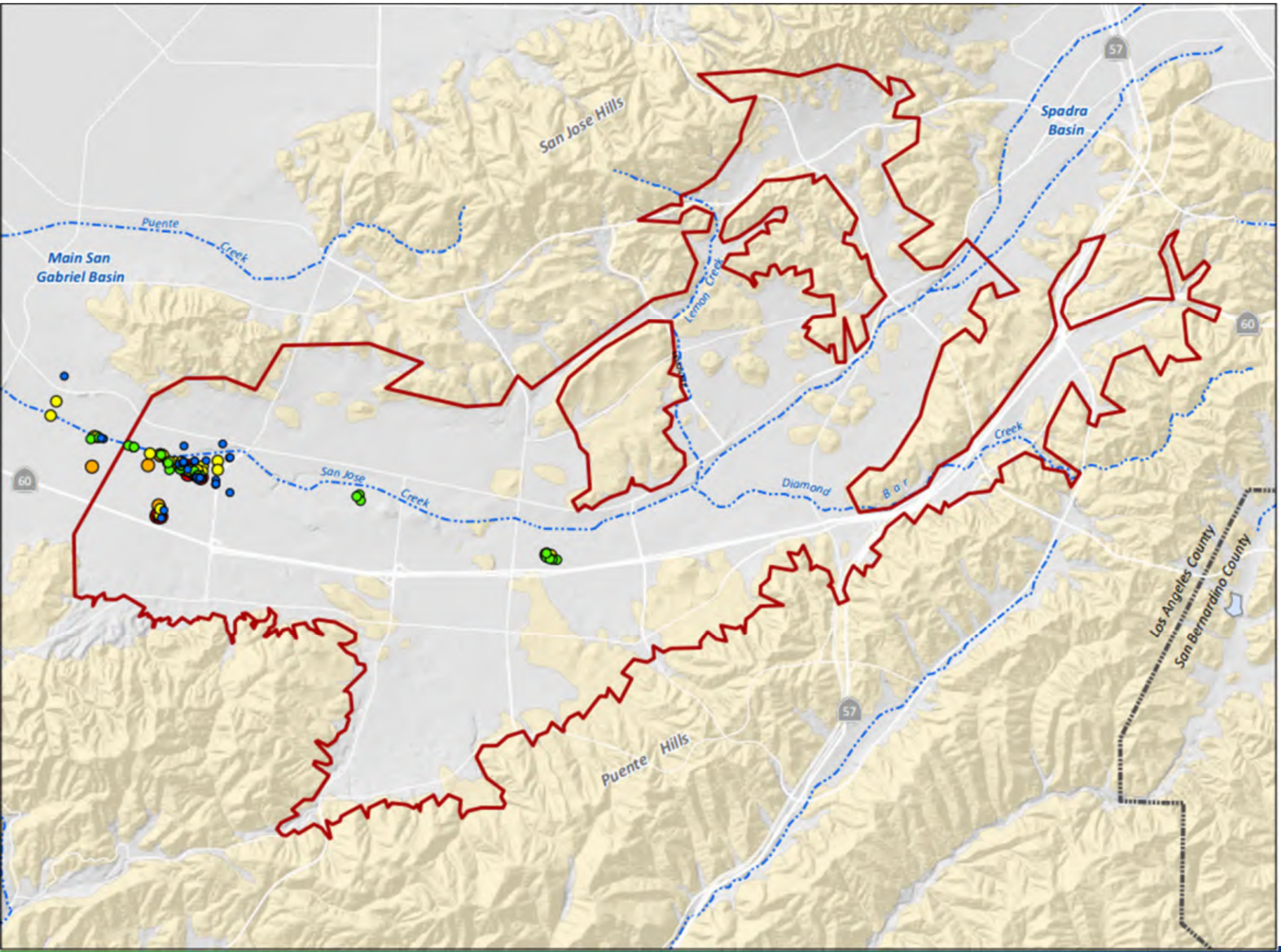
California Primary MCL = 10 mgl

Tetrachloroethylene (PCE)



PCE (µgl)
- ND
- < 2.5
- 2.5 - 5
- 5 - 10
- 10 - 20
- > 20

California Primary MCL = 5 µgl

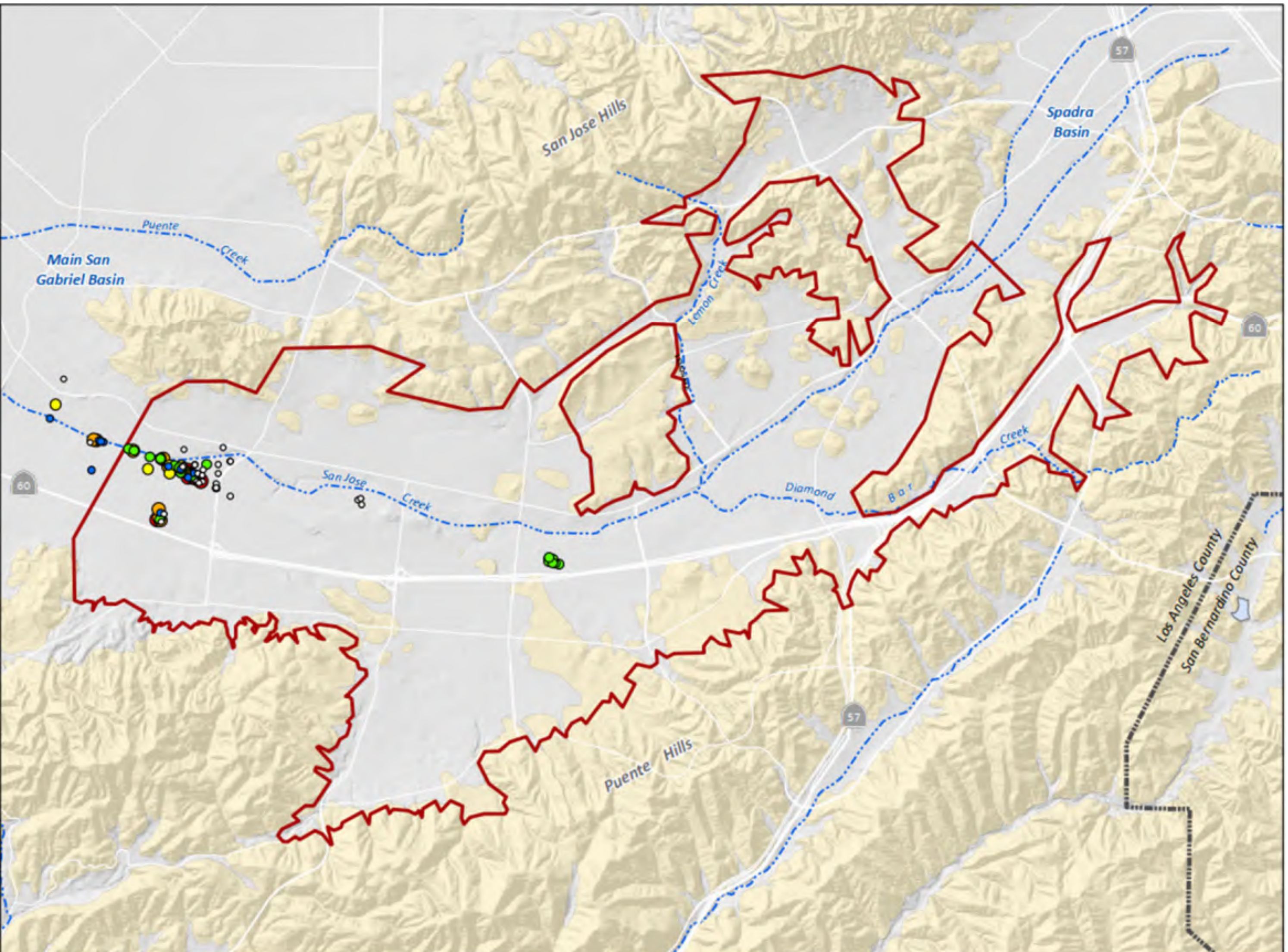


Trichloroethylene (TCE)

TCE (µgl)
- ND
- < 2.5
- 2.5 - 5
- 5 - 10
- 10 - 20
- > 20

California Primary MCL = 5 µgl

cis-1,2-Dichloroethene (cis-1,2-DCE)

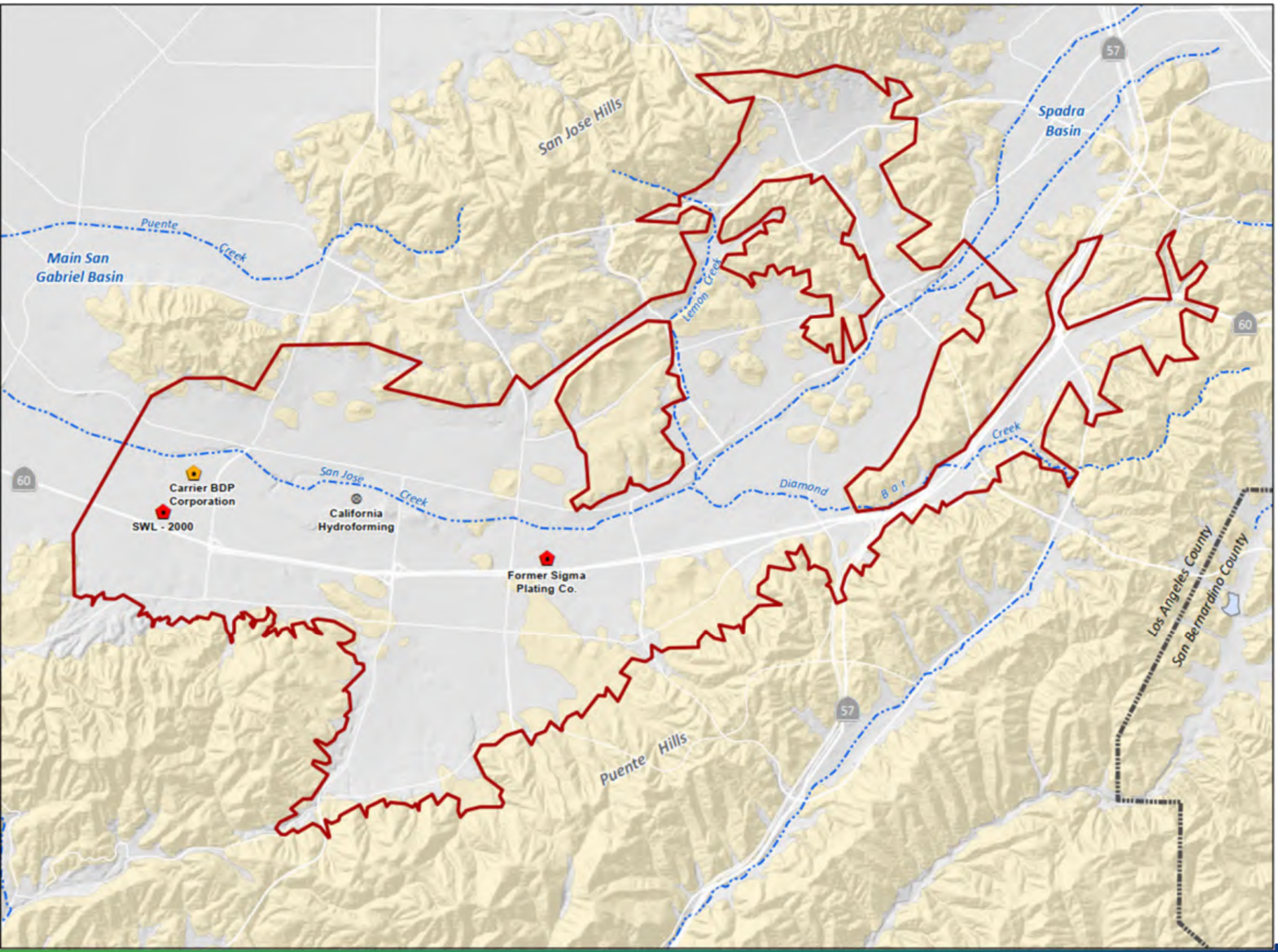


cis-1,2-DCE (µgl)

- ND
- 1 - 3
- 3 - 6
- 6 - 12
- 12 - 24
- > 24

California Primary MCL = 6 µgl

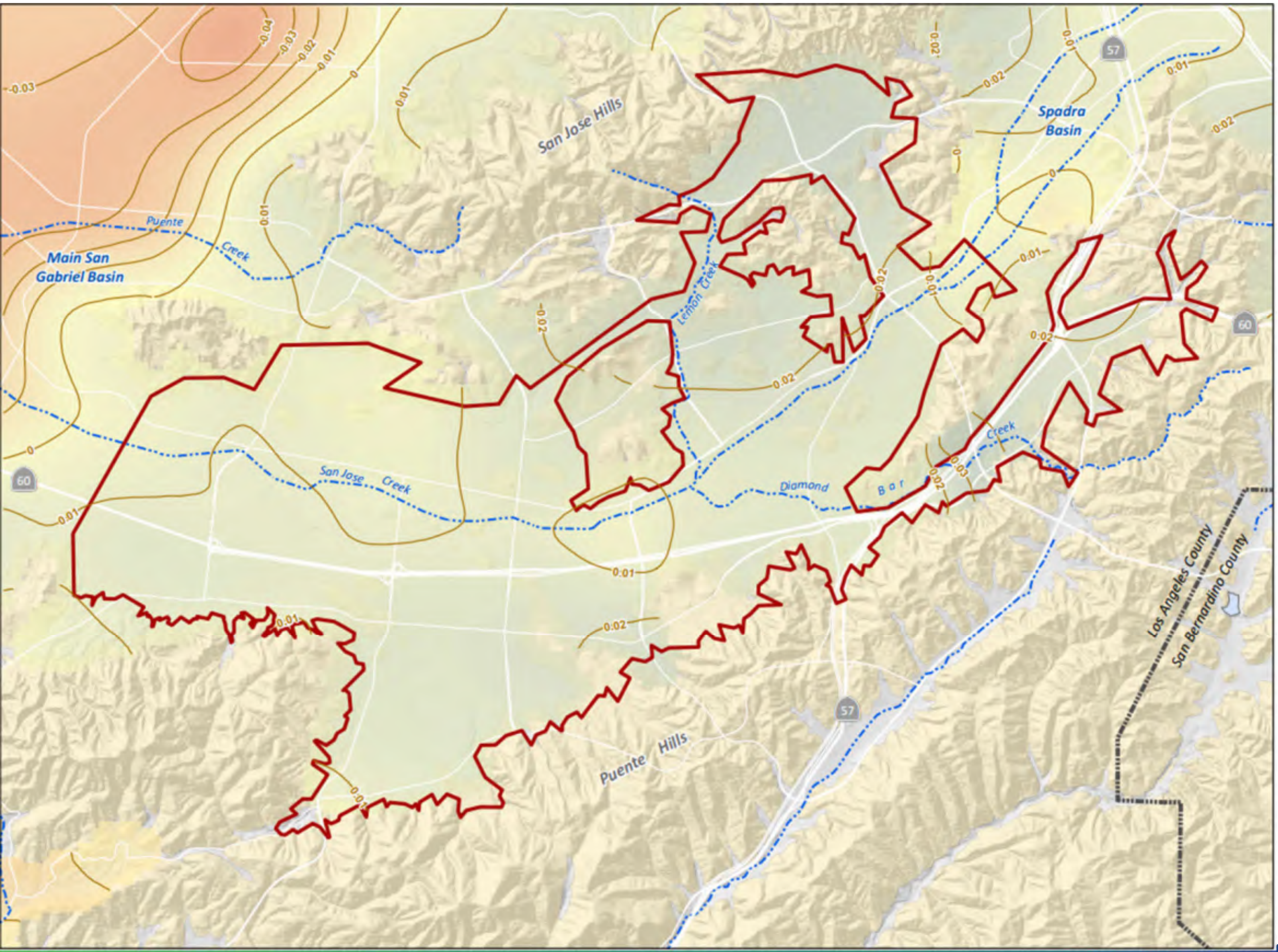
Point Source Groundwater Contamination Sites



Status on GeoTracker*

- Active Case-Remediation
- Active Case-Site Assessment
- Active Case-No Specified Action
- Active Case-Verification Monitoring
- Inactive Case**

Subsidence



Relative Change in Land Surface Elevation as Measured by InSAR

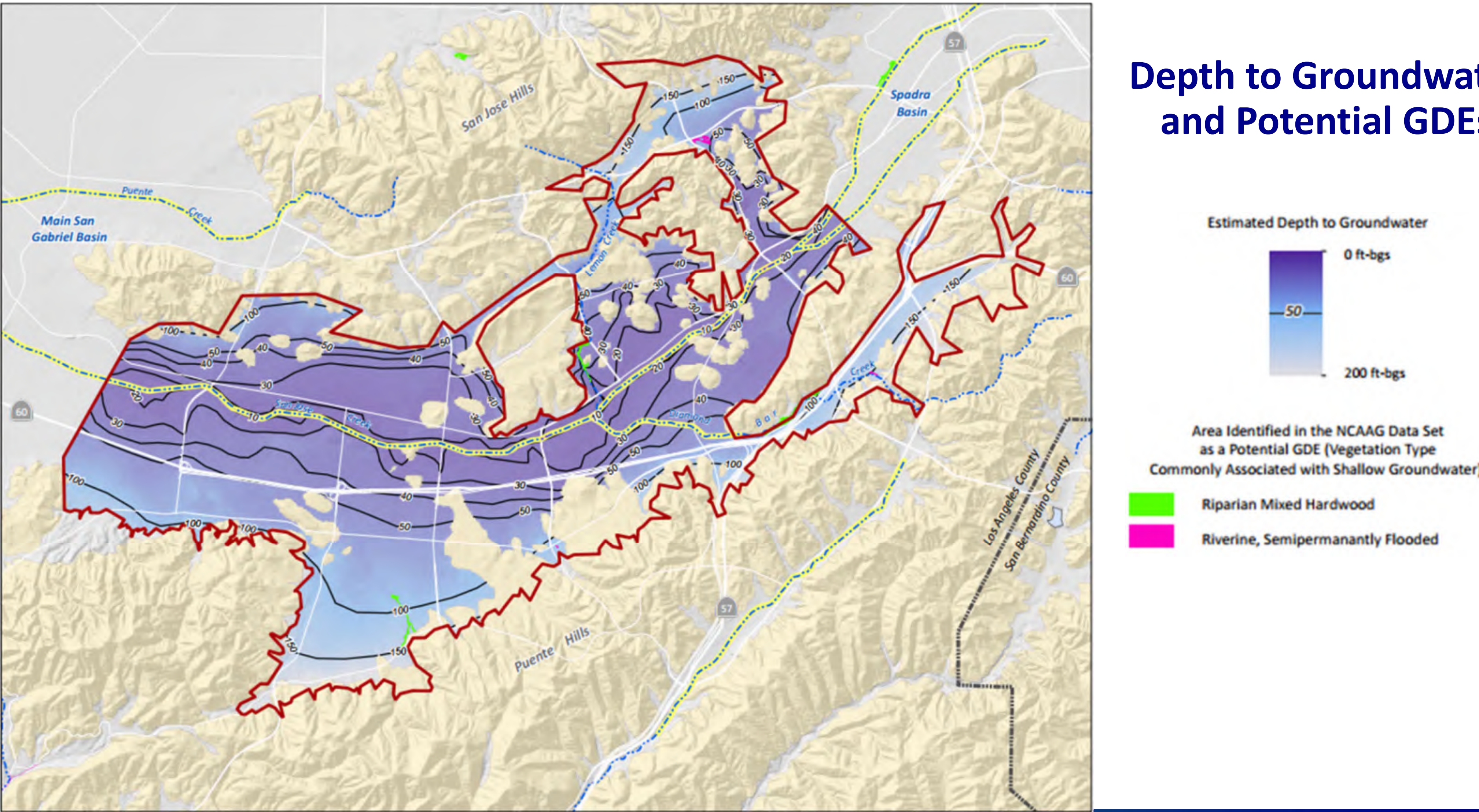
+ 0.1 ft

0

- 0.1 ft

-.04- Vertical Ground Motion Contour (ft)

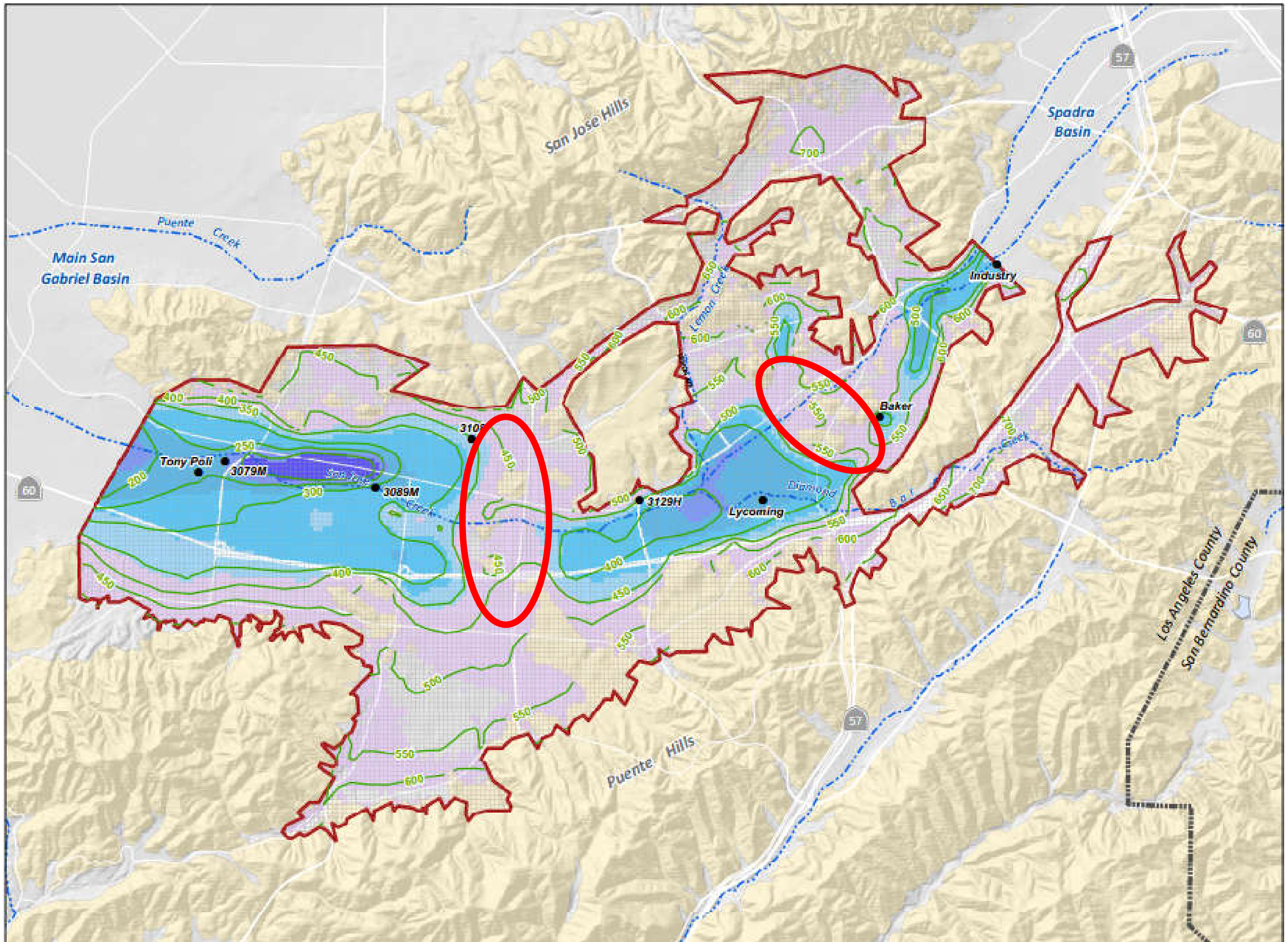
Depth to Groundwater and Potential GDEs



Data Gaps

- Aquifer Properties in the Bedrock High Areas in the Puente Basin
- Groundwater Quality
- Surface Water Discharge
- GDEs

Data Gap - Aquifer Properties in the Bedrock High Areas in the Puente Basin



Groundwater in Storage in Each 60 x 60-meter Grid (af)

- 0 - 2.5
- 2.5 - 5.0
- 5.0 - 7.5
- 7.5 - 10
- 10 - 15
- Unsaturated

-300- Bottom of Aquifer Elevation Contour (ft-amsl)

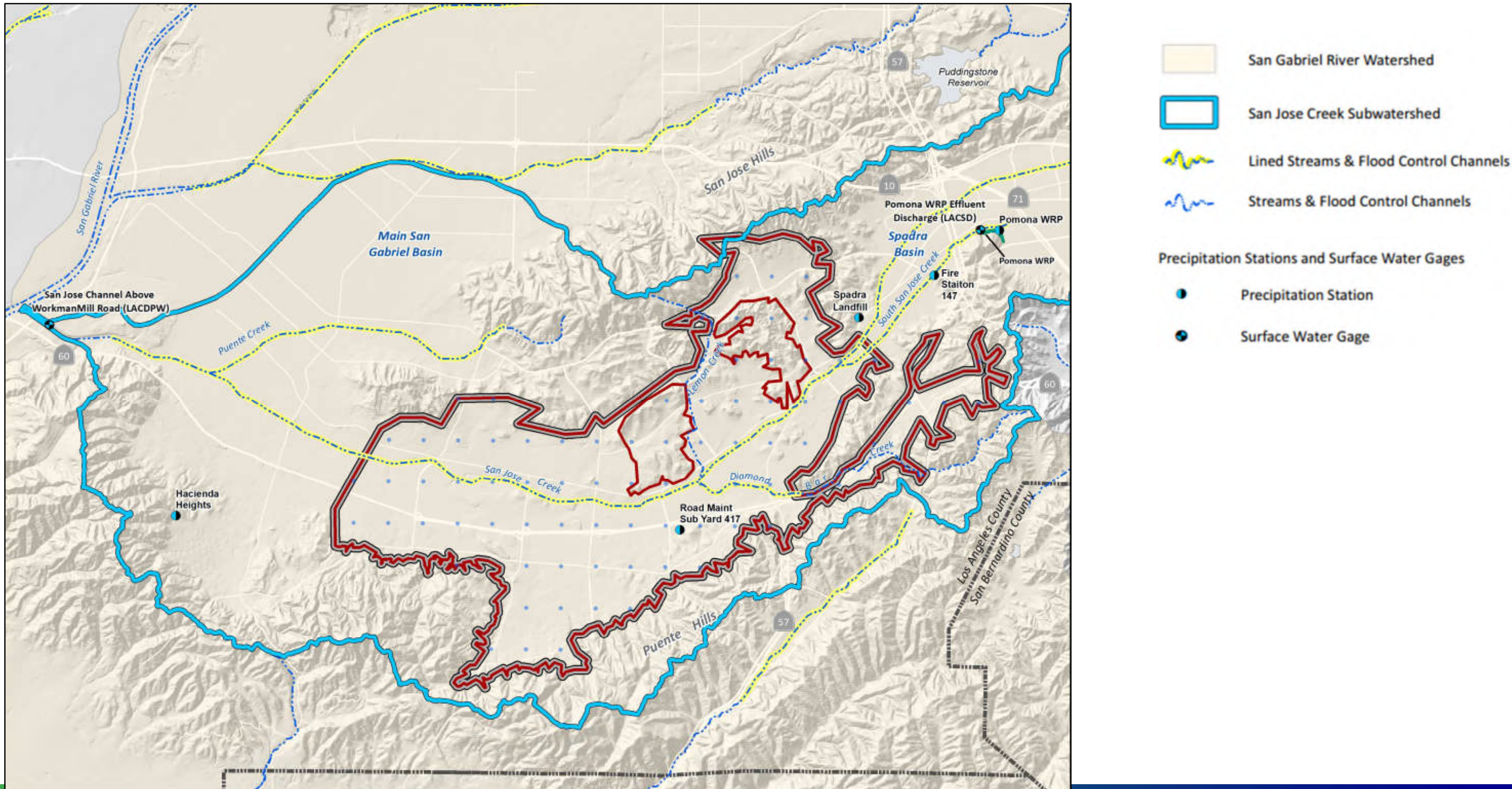
60 x 60-meter Grid

Wells with Water Level Time-Series in Figure 3-13

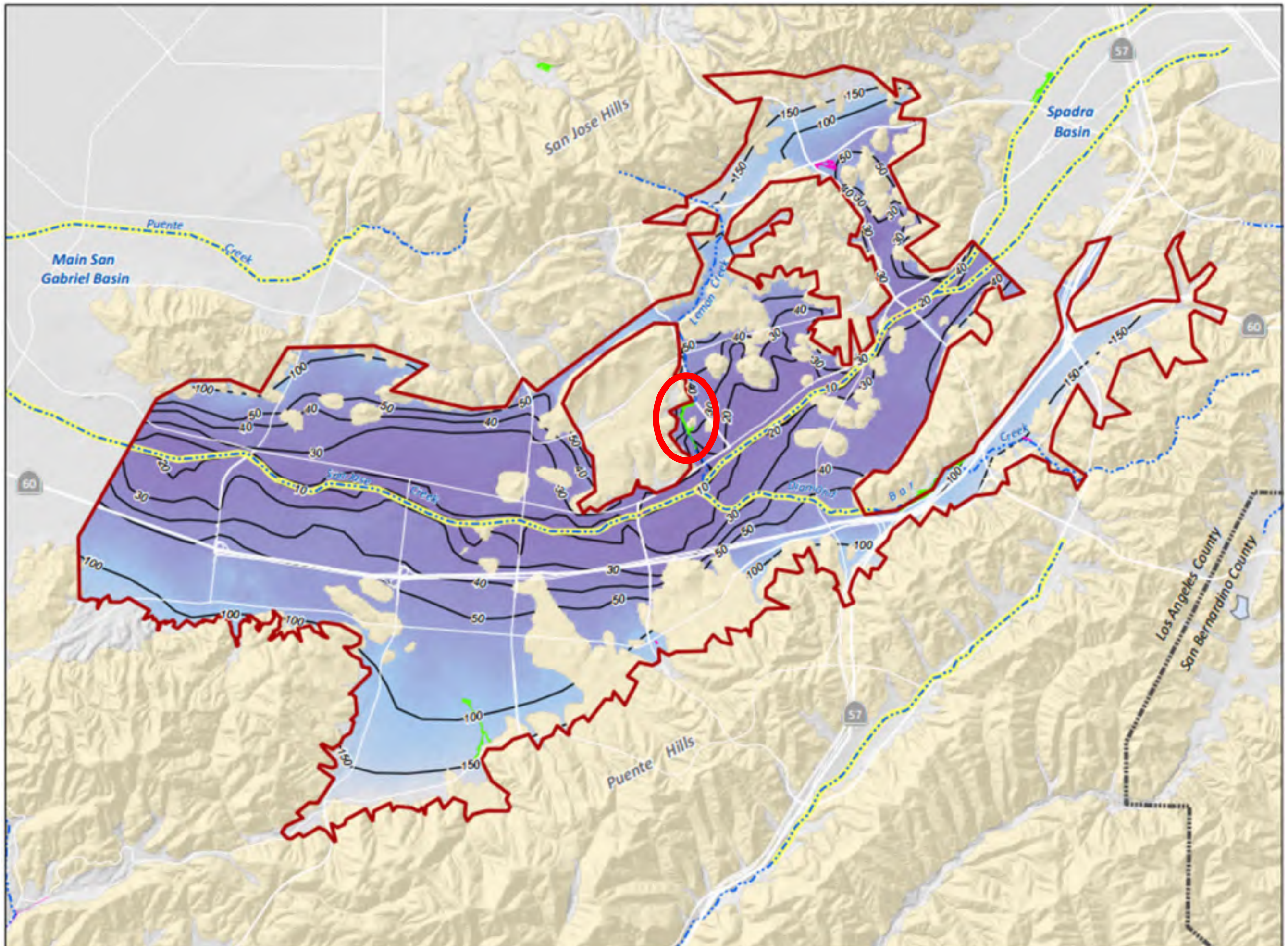
Data Gap – Groundwater Quality

- Groundwater sampling for TDS, Nitrate, PCE, TCE, and other VOCs are not consistently collected at all groundwater pumping wells throughout the basin.
- Data is needed to understand other water quality parameters and emerging contaminant
  - General minerals
  - Perchlorate
  - 1,2,3-Trichloropropane
  - Other VOCs of concern
  - PFAS

Data Gap – Surface Water Discharge



Data Gap – GDE



Estimated Depth to Groundwater

0 ft-bgs

50

200 ft-bgs

Area Identified in the NCAAG Data Set as a Potential GDE (Vegetation Type Commonly Associated with Shallow Groundwater)

Riparian Mixed Hardwood

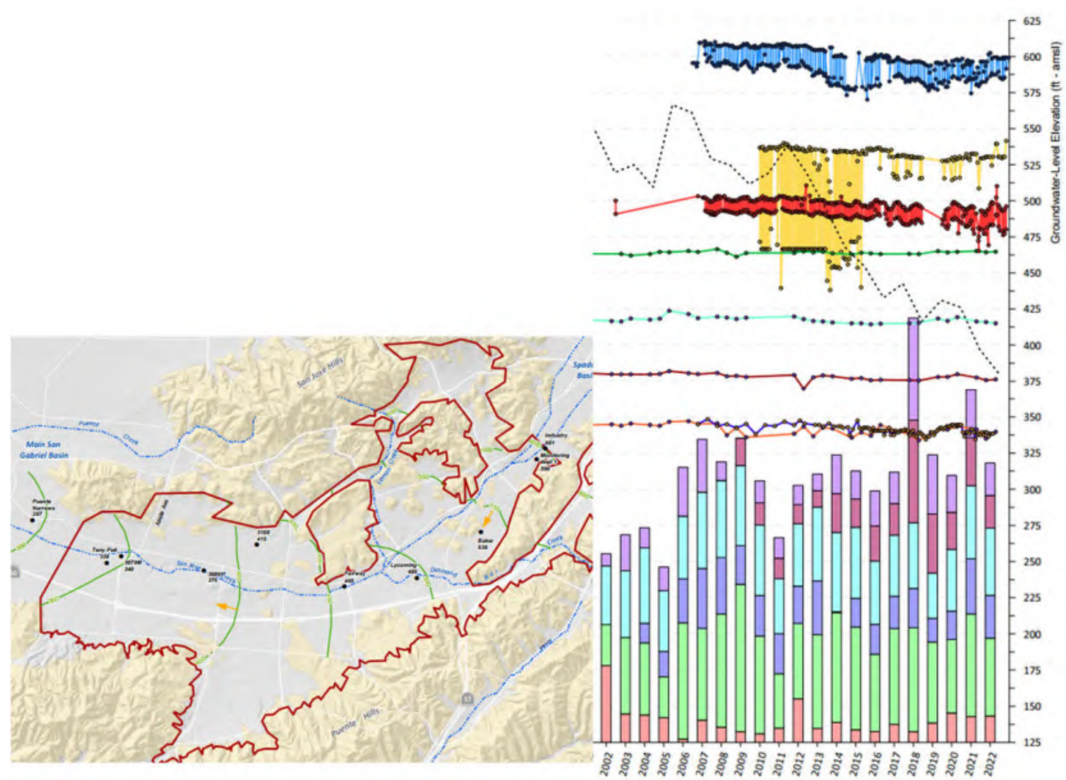
Riverine, Semipermanantly Flooded

Basin Management Implications (Section 4.0)
and
Goals for Basin Management

Basin Management Implications

Size of the Basin and yield of groundwater that can be reliably pumped (~ 1,400 afy) is small

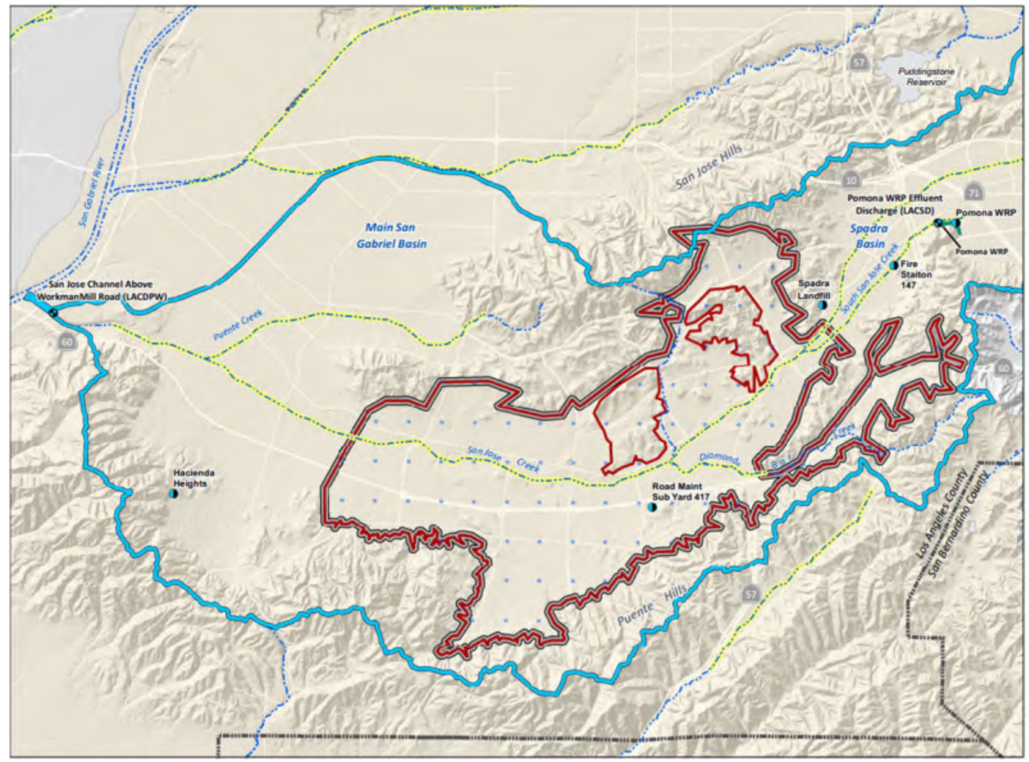
- Increased pumping without recharge could cause significant declines in groundwater levels → could cause:
  - significant changes in the direction of flow
  - pumping sustainability challenges at wells
  - Impacts to GDEs (if exist)
  - Reduction in outflow to Main San Gabriel Basin



Basin Management Implications

Recharge to the Puente Basin is Limited

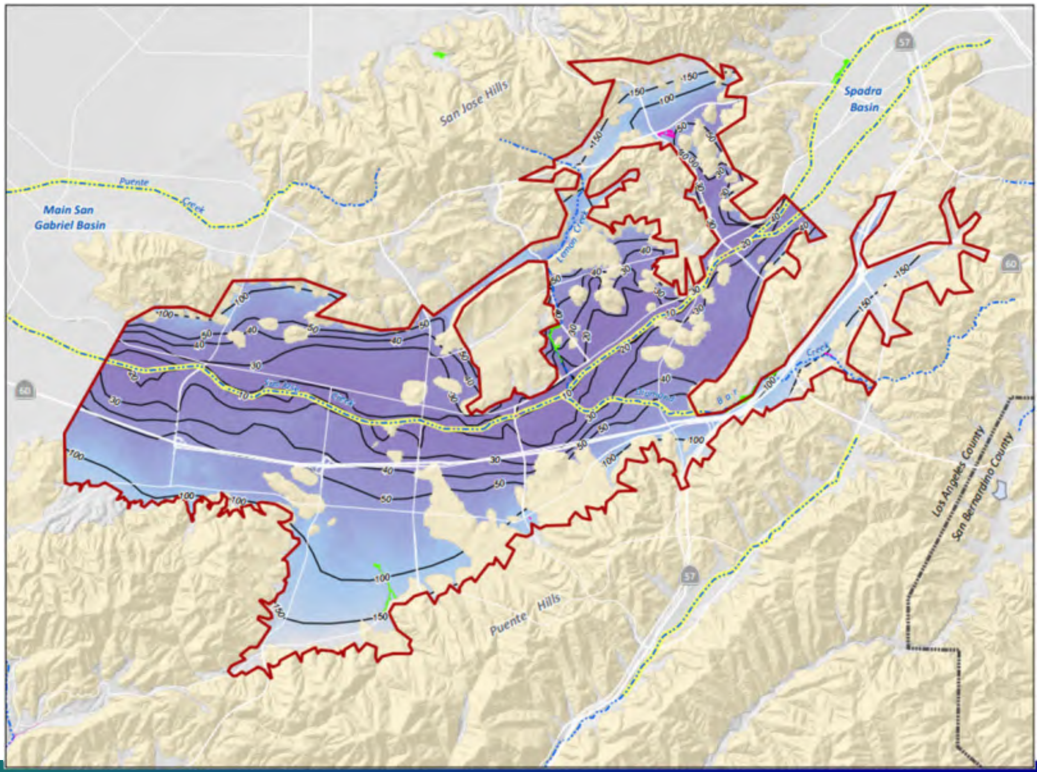
- Reasons:
  - small tributary watershed
  - concrete-lining of the creeks that cross the basin,
  - small volume of subsurface inflow from upgradient basin
  - absence of artificial recharge of supplemental water
- Could decrease more with conservation (return flows)
- Primary reason the yield of the basin is 1,400 afy



Basin Management Implications

Depth to Groundwater is relatively shallow across the Puente Basin

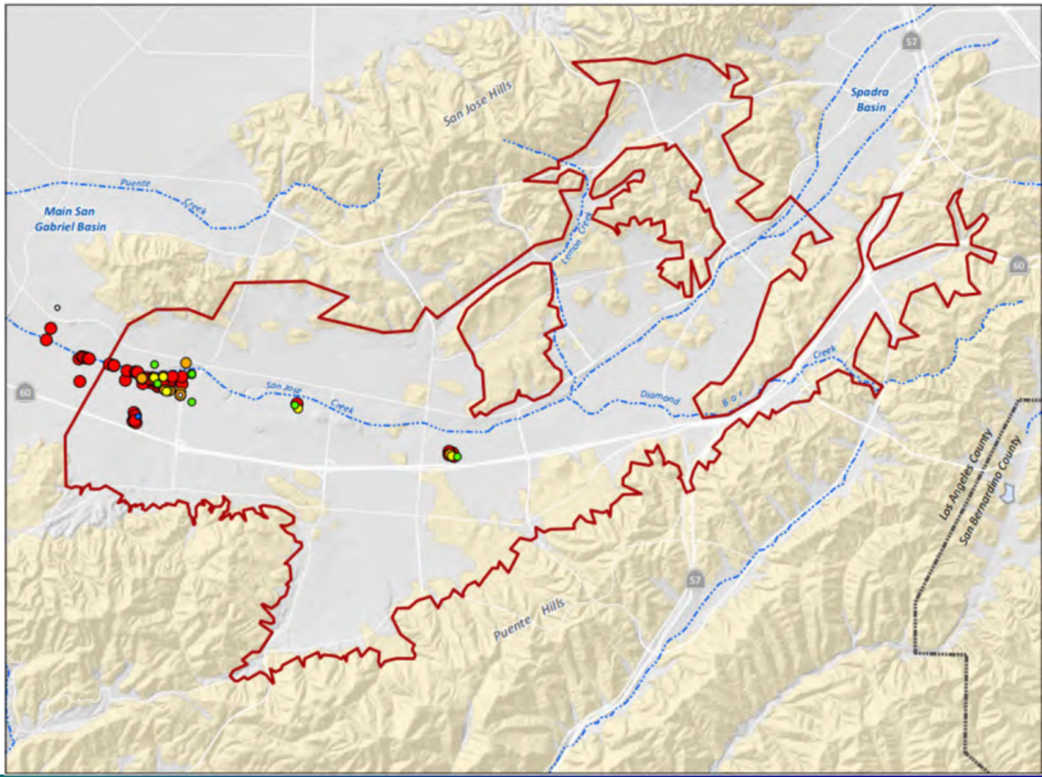
- 20-50 ft-bgs across the most the basin
- Limited volumes of unused storage
- If you increase recharge than you will have to increase pumping



Basin Management Implications

Currently Puente Basin is used for non-potable supply

- Analysis of available groundwater-quality data indicates that concentrations of TDS, nitrate, TCE, PCE, and other VOCs in the basin are generally higher than primary and secondary MCLs.
- Treatment would be required to produce a potable groundwater supply that complies with the drinking water standards.



Basin Management Implications

There are several gaps in data/understanding of the basin that may need to be filled to support the design and implementation of certain basin management strategies

Water Quality	• Needs more robust characterization of contaminants, gaps at existing pumping wells. Informs on the type of treatment needed. Optimize treatment.
GDEs	• If activities are going to drawdown levels near potential GDEs • Confirm GDE presence, consider impact, and monitoring
Supplies for Recharge	• Understand quantities, availability and reliability of water supplies for artificial recharge (surface water runoff, recycled water, and imported water)
Land Subsidence	• What is the potential for pumping-induced land subsidence
Underflow Obligation	• How and if the PBWA's underflow obligation through the Puente Narrows will be met
Aquifer in Bedrock Highs	• Data gap in aquifer properties in bedrock-high areas: subbasins, groundwater flow? Implications on how to develop GMP strategies.

Goals for Basin Management – Open Discussion

Next Steps: Develop a GMP Objective Statement →Used to describe various concepts (alternatives) for improved basin management

Questions:

1) Do you want to increase pumping in the Puente Basin?
   - By how much?
   - How would you use that pumped water?
2) Do you want to decrease the underflow through the Puente Narrows?
3) Do you want to utilize your underflow and clean-up credits, or save them?
4) Is there a potential project or type of project that you had in mind?

Next Steps

- **September 25, 2023 –** PBWA and stakeholders submit comments and suggested revisions on the Draft TM-1
- **October 2023** – Final TM-1
- **Sept/Oct 2023 -** Compile and document draft GMP Objective Statement
- **Oct/Nov 2023 –** Develop concepts for improved basin management
- **Prepare TM-2** – Describe the GMP objective, various concepts for improved basin management, and scope of work to evaluate alternatives for basin management (Phase 2)
- **Dec 2023/Jan 2024** – Meeting to review *TM-2*

THANK YOU

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