

# Emergency Groundwater Program Update

Board of Public Utilities

June 15, 2017



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# Presentation Outline

- Groundwater Background
- Groundwater Master Plan
- Emergency Groundwater Program
- Implementation Challenges
- Redirection
- Current Status



# City's Historical Use of Groundwater

- Prior to 1959, City relied primarily on groundwater for water supply
- After 1959, City relied almost exclusively on purchased water from SCWA for water supply
- In July 2005, City converted Farmers Lane Wells from emergency to active status
- City began using Farmers Lane Wells in 2007 to provide supplemental supply during summer months



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# Current City Wells

- Farmers Lane Wells No. 1 and 2
  - Provide potable water supply
- Carley Well & Peters Spring Well
  - Provide landscape irrigation
  - Also permitted as emergency stand-by wells
- Farmers Lane Well No. 3
  - Only used for minor amounts of landscape irrigation
- Leete Well
  - Only permitted as emergency stand-by well
- Inactive Wells
  - Freeway Well: Out of service due to contamination by others
  - Sharon Park Well: Inactive due to severe sanding



# Groundwater Policy Background

- 1998 – City identified need to develop additional 8.7 million gallons per day (mgd) of emergency groundwater supply
- September 2003 – Council directed Water staff to ask BPU to evaluate role of local supply in meeting water supply needs
- December 2003 – BPU adopted Resolution No. 776
  - Directed Water to pursue development of water sources to provide reliable water supply through the General Plan Building Horizon
  - Include development of local groundwater, additional recycled water use, additional supplies from SCWA and other sources as they become available
  - Evaluate sources based on supply reliability, cost, timing and environmental impact



# Restructured Agreement Requirements

- Restructured Agreement contain specific requirements for local supply and recycled water:
  - 1.13 Recycled Water and Local Supply Project Requirements – Within 10 years from the date of the Agreement, the Water Contractors shall use best efforts to develop at least 7,500 AFY of recycled water or local supply projects, with approximately 50% coming from recycled water projects.
  - 1.15 Local Production Capacity Goals – Highly desirable for each Water Contractor to develop and maintain local water production capacity capable of meeting approximately 40% of the Water Contractor's average day maximum month demand.

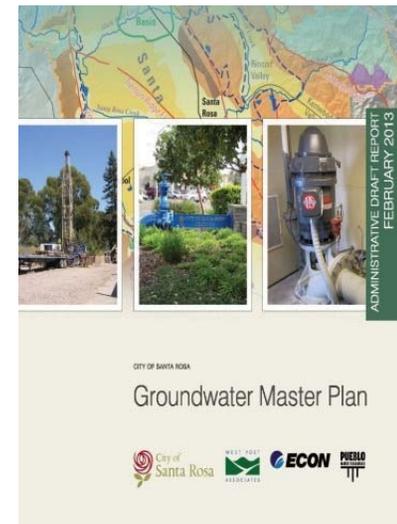


# Groundwater Master Plan Timeline

- 2011
  - March: BPU authorized staff to prepare and issue an RFP
  - October: BPU approved development of GW Master Plan
- 2012
  - May: BPU Study Session – Update on GW Master Plan & Related GW Programs
  - July: BPU Ad Hoc Committee—Discuss GW Quality
  - August: BPU Ad Hoc Committee—Discuss Emergency GW Supply
  - October: BPU Study Session on Emergency GW Supply Analysis
  - November: Presentation to WAC and TAC on Groundwater Master Plan and preliminary findings

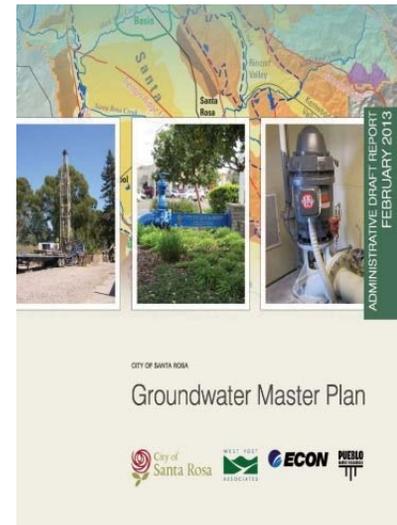


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# Groundwater Master Plan Timeline

- 2013
  - April 2: BPU Ad Hoc Committee
  - June 6: BPU Study Session
  - July 22: Published Mitigated Neg Dec for 30-day public comment
  - September 19: BPU adopted Mitigated Neg Dec and Groundwater Master Plan



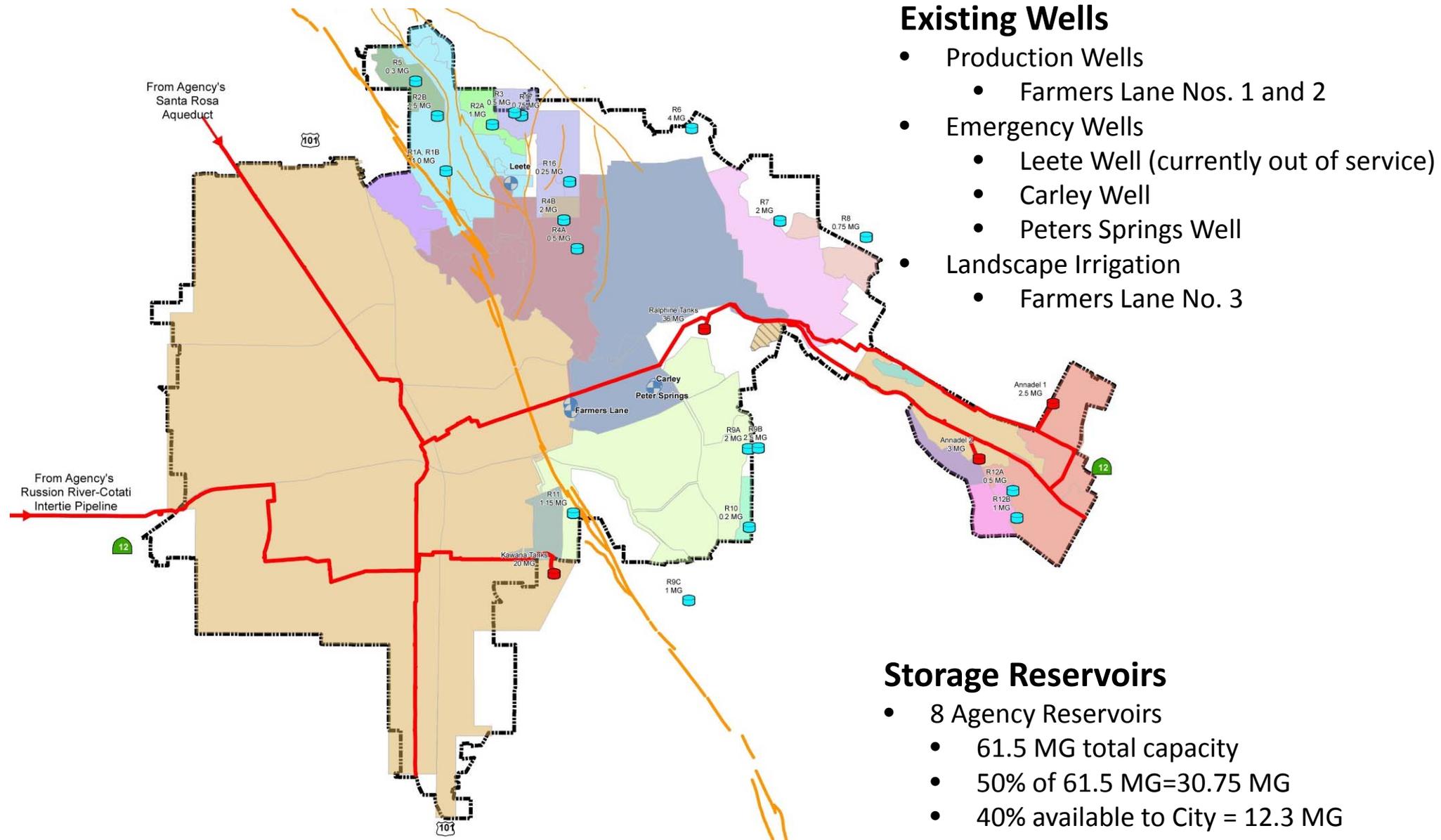
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# Groundwater Master Plan Objective

- Provide a strategic road map for the City regarding how groundwater resources could be most effectively used to meet the needs of the City's existing and future customers
  - Expand City's understanding of GW resources
  - Focuses on need for emergency supply wells
  - Future production not evaluated due to lack of data from the USGS Study
  - Update Groundwater Master Plan every 5 years



# City's Existing Water System



## Existing Wells

- Production Wells
  - Farmers Lane Nos. 1 and 2
- Emergency Wells
  - Leete Well (currently out of service)
  - Carley Well
  - Peters Springs Well
- Landscape Irrigation
  - Farmers Lane No. 3

## Storage Reservoirs

- 8 Agency Reservoirs
  - 61.5 MG total capacity
  - 50% of 61.5 MG=30.75 MG
  - 40% available to City = 12.3 MG
- 25 City Reservoirs
  - 28.3 MG total capacity
  - 50% of 28.3 MG=14.2 MG

## 33 Pressure Zones

- 31 Hillside Pressure Zones
- 2 Aqueduct Pressure Zones (Central City & Oakmont)

# Emergency GW Analysis Assumptions

## EMERGENCY SCENARIOS

- Full Loss of Agency Supply
- Partial Loss of Agency Supply

## OUTAGE DURATIONS

- Short-term (2 days)
- Long-term (14 days)

## FACILITY STATUS

- All Tanks Half Full
- Pump Stations Operational
- Pipelines Operational
- Existing City Wells Operational
- New Emergency Wells Produce 700 gpm (equivalent to 1 mgd)

## DEMAND CONDITIONS

- Existing & Buildout Conditions
- Buildout Demand based on uniform growth in City
- Health & Safety = 50% Average Day Demand

## LEVEL OF SERVICE

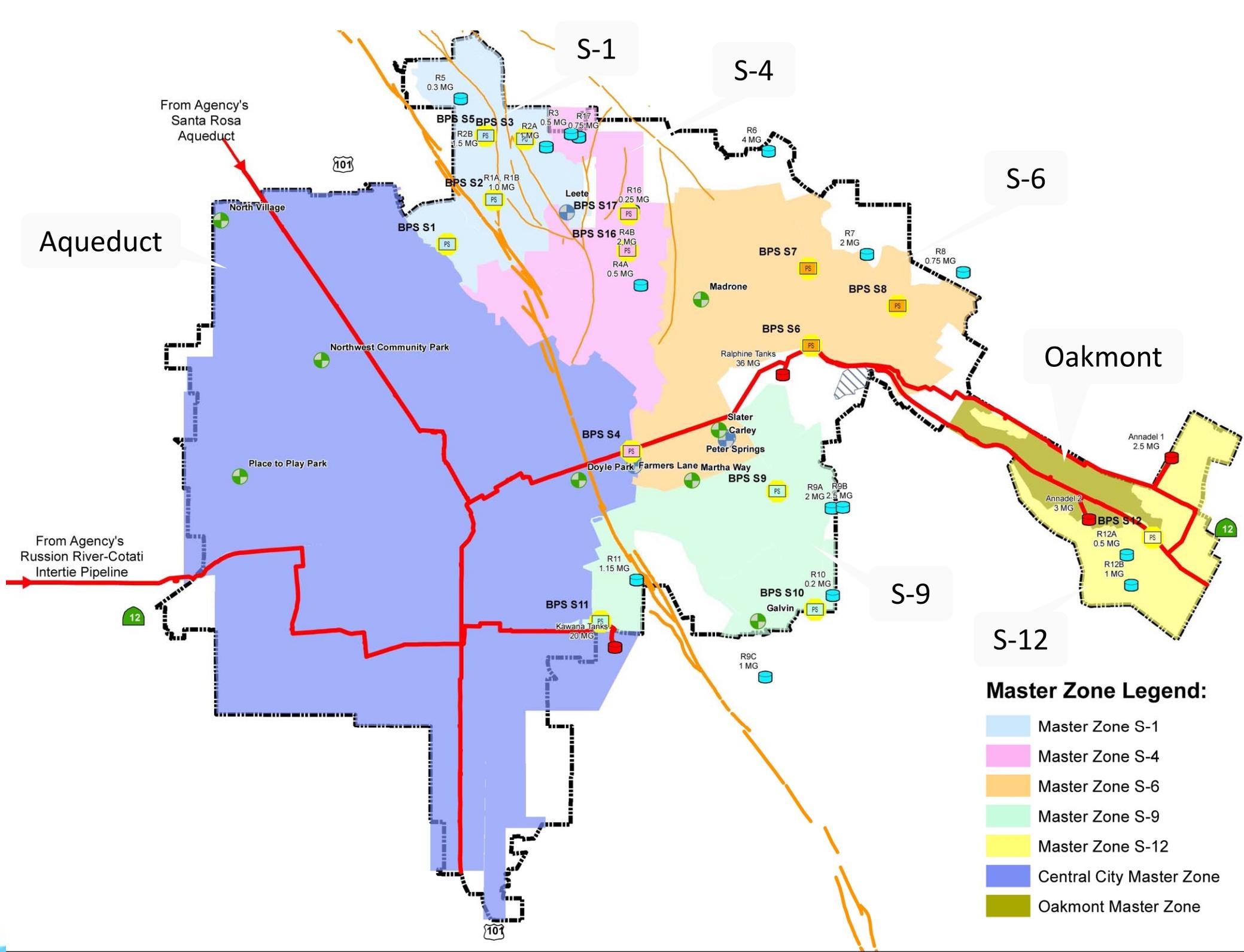
- Service to all pressure zones to extent possible
- Provide supply to key pump stations or other key locations within City for distribution to customers

# Operational Zones

<b>“Master Zones”</b>	<b>Pressure Zones</b>
S-1 (Fountain Grove)	R1, R2, R3, R5
S-4 (Montecito Valley)	R4, R16, R17
S-6 (Rincon Valley)	R6, R7, R8
S-9 (Bennett Valley)	R9, R10, R11
S-12 (Oakmont Hillside)	R12, R13, R14, R15
Central City	Aqueduct Zone
Oakmont	A8

Each “Master Zone” has a key pump station that can provide water to other Pressure Zones within that “Master Zone”





Aqueduct

S-1

S-4

S-6

Oakmont

S-9

S-12

**Master Zone Legend:**

- Master Zone S-1
- Master Zone S-4
- Master Zone S-6
- Master Zone S-9
- Master Zone S-12
- Central City Master Zone
- Oakmont Master Zone

# Methodology

- Calculate Health & Safety Demand
  - 50% of Average Day Demand for each scenario for each Master Zone
- Determine available City and/or Agency storage in each Master Zone
- Identify existing well capacity in each Master Zone
- Calculate supply shortage under each scenario
- Determine the number of new emergency wells required within each Master Zone



# Required New Emergency Wells

Master Zone	Existing Demands		Buildout Demands	
	2-day outage	14-day outage	2-day outage	14-day outage
S-1 (Fountain Grove)	0	0	0	1*
S-4 (Montecito Valley)	0	0	0	0
S-6 (Rincon Valley)	0	1	0	3
S-9 (Bennett Valley)	0	~1	0	~1
S-12 (Oakmont Hillside)	0	1	0	1**
Central City	3	3	6	6*
Oakmont	1	1	1	1**
<b>Total New Emergency Wells @ 700 gpm</b>	<b>4</b>	<b>5 to 6</b>	<b>7</b>	<b>10 to 11</b>

\* S-1 well could also be used to serve Central City

\*\* S-12 well could also be used to serve Oakmont

Total required wells reduced to account for wells which can be used to serve multiple zones.

Each new emergency well is assumed to produce 700 gpm (1 mgd)

If > 700 gpm, less emergency wells will be required

If < 700 gpm, more emergency wells will be required

# Required Additional Emergency Supply

Master Zone	Existing Demands		Buildout Demands	
	14-day outage, gpm	14-day outage, mgd	14-day outage, gpm	14-day outage, mgd
S-1 (Fountain Grove)	0	0	340	0.5
S-4 (Montecito Valley)	0	0	0	0
S-6 (Rincon Valley)	646	0.9	1,385	2.0
S-9 (Bennett Valley)	~0	~0	~0	~0
S-12 (Oakmont Hillside)	81	0.1	298	0.4
Central City	1,845	2.7	3,584	5.2
Oakmont	164	0.2	208	0.3
<b>Add'l Emergency GW Supply Req'd</b>	<b>~2,700</b>	<b>~3.9</b>	<b>~5,800</b>	<b>~8.4</b>

Current Emergency Supply Capacity (Farmers 1&2, Carley, Peters Spring) = ~4.3 mgd  
 Future Required Emergency Supply = 4.3 mgd + 8.4 mgd = 12.7 mgd

# Emergency Groundwater Program

- Master Professional Services Agreement (MPSA) with West Yost Associates
  - BPU approved 7/24/14
  - \$3.5 Million
  - Project Work Order (PWO) 1 – 1st Emergency Well
- Test Well Siting Studies
  - \$422,000
  - BPU approved December 2014



# Emergency Groundwater Program

- Conducted Test Well siting studies (to identify and prioritize potential test well sites)
- Focus on four Super Zone areas per Master Plan (where no previous test wells had been installed)
  - Oakmont
  - Southwest Area
  - Southeast Area
  - Rincon Valley



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# Rigorous Site Selection Criteria

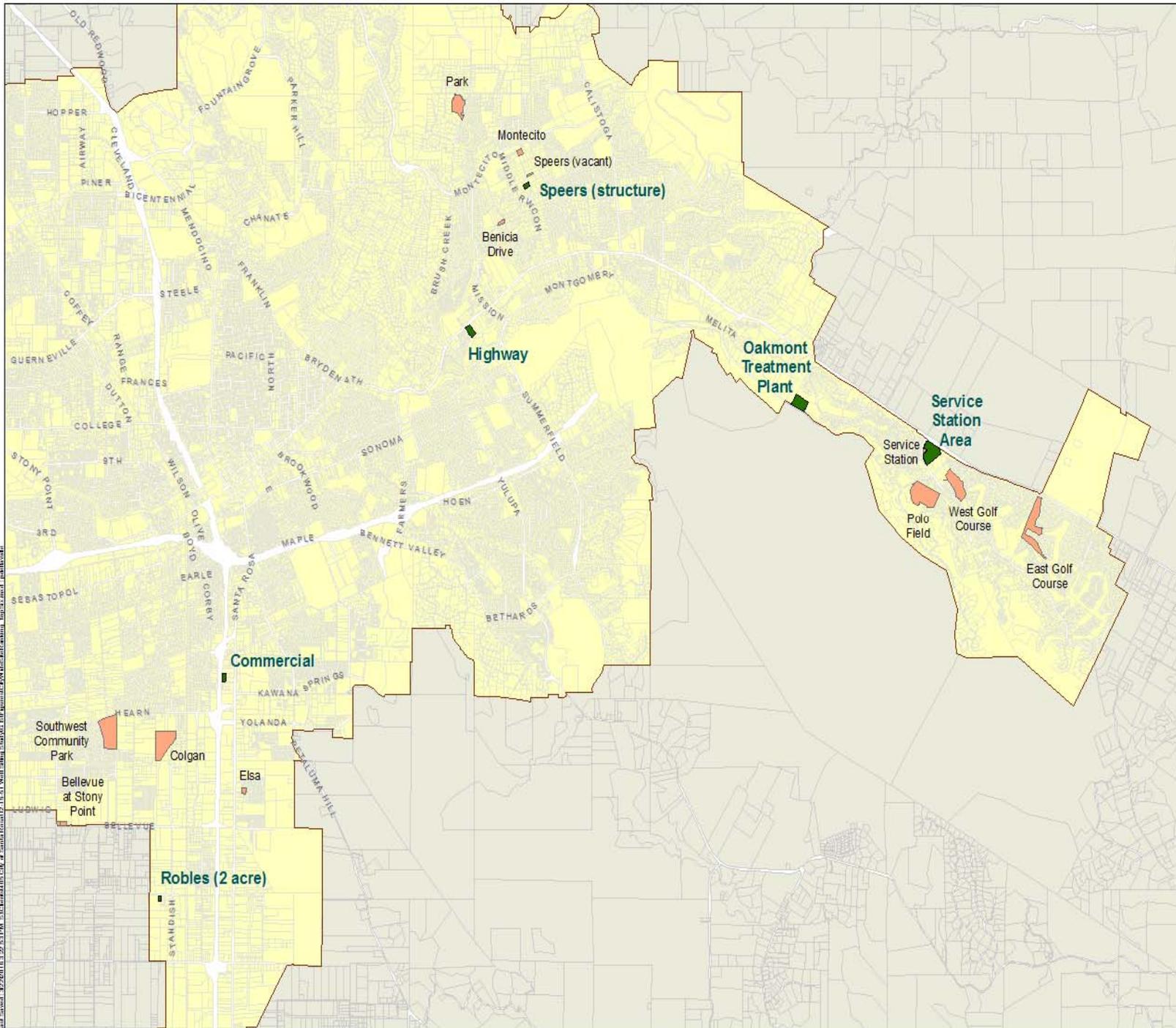
- Appropriate relative to Fault Traces, Monitoring, Geology, Recent GW Program Results
- In/Near Previous Target Areas (1989 & 1997)
- >50 Feet From Sewers
- >1,000 Feet From Known Toxic Release Sites
- >Half Acre Parcel Size With Good Access
- Preferably City-Owned Parcels
- Good Water Main Access/Supply (hydrant)
- Sufficient Sanitary Sewer Capacity
- Willing Property Owner (Access Agreement)
- Generally Feasible For Drilling Operations



# City-wide Test Well Site Ranking

Site No.	Site Name	Ranking Criteria and Weighting Factors										Total Score	Initial Ranking	Too Close to Higher Ranked Site/Revised Rank	Current Status (as of June 15, 2017)
		Area of Need 1	Geologic Value 3	Ownership 1	Use Conflicts 1	Drilling Rig Access 1	Other City Interest 1	Utility Proximity 1	CTS 1	Proximity to Hazardous Materials 1	Proximity to Residences 1				
7	Highway	4	4.5	4	5	5	5	4	5	4	3	52.5	1	1	Not available, too expensive
1	Oakmont Treatment Plant	5	2.5	5	5	5	3	5	5	5	5	50.5	2	2	Cultural resources found
19	Speers (structure)	4	4	4	4	5	3	3	5	5	2	47	3	3	Owner plans to develop, site 18 selected
3	Service Station Area	5	4	2	3	5	2	4	5	5	3	46	4	4	
2	Service Station	5	4	1	1	5	2	4	5	5	3	43	5	x	
18	Speers (vacant)	4	4	2	3	4	3	3	5	5	2	43	5	3	NIMBY
17	Montecito	4	4	2	3	3	3	3	5	5	2	42	7	x	
6	Polo Field	5	4	2	1	4	1	3	5	5	3	41	8	x	
8	Commercial	3	2	2	5	5	3	3	4	5	5	41	8	5	
14	Robles (2 acre)	3	2	5	5	3	3	4	1	5	5	40	10	6	
13	Southwest Community Park	3	2	3	1	5	3	3	5	5	4	38	11	7	Conflicts with park master plan
4	West Golf Course	5	3.5	1	1	3	1	3	5	5	3	37.5	12	x	
5	Central Golf Course	5	3.5	1	1	3	1	3	5	5	3	37.5	12	8	
10	Elsa	3	2	3	5	4	2	3	3	5	3	37	14	9	
15	Park	4	2	5	3	2	2	2	5	5	3	37	14	10	
11	Bellevue at Stony Point	3	2	4	5	4	3	2	1	5	3	36	16	11	
16	Benicia Drive	4	4	2	1	2	1	3	5	5	1	36	16	x	
9	Colgan	3	2	3	2	3	3	2	1	5	4	32	18	12	

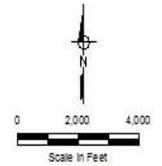
Note: Sites within approximately 1/2 mile of a higher ranking site have been removed from top ranking.



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**Symbology**

- Top Six Ranked Sites
- Selected Test Well Parcels
- City of Santa Rosa
- Urban Growth Boundary



**City-wide Test Well Site Ranking**

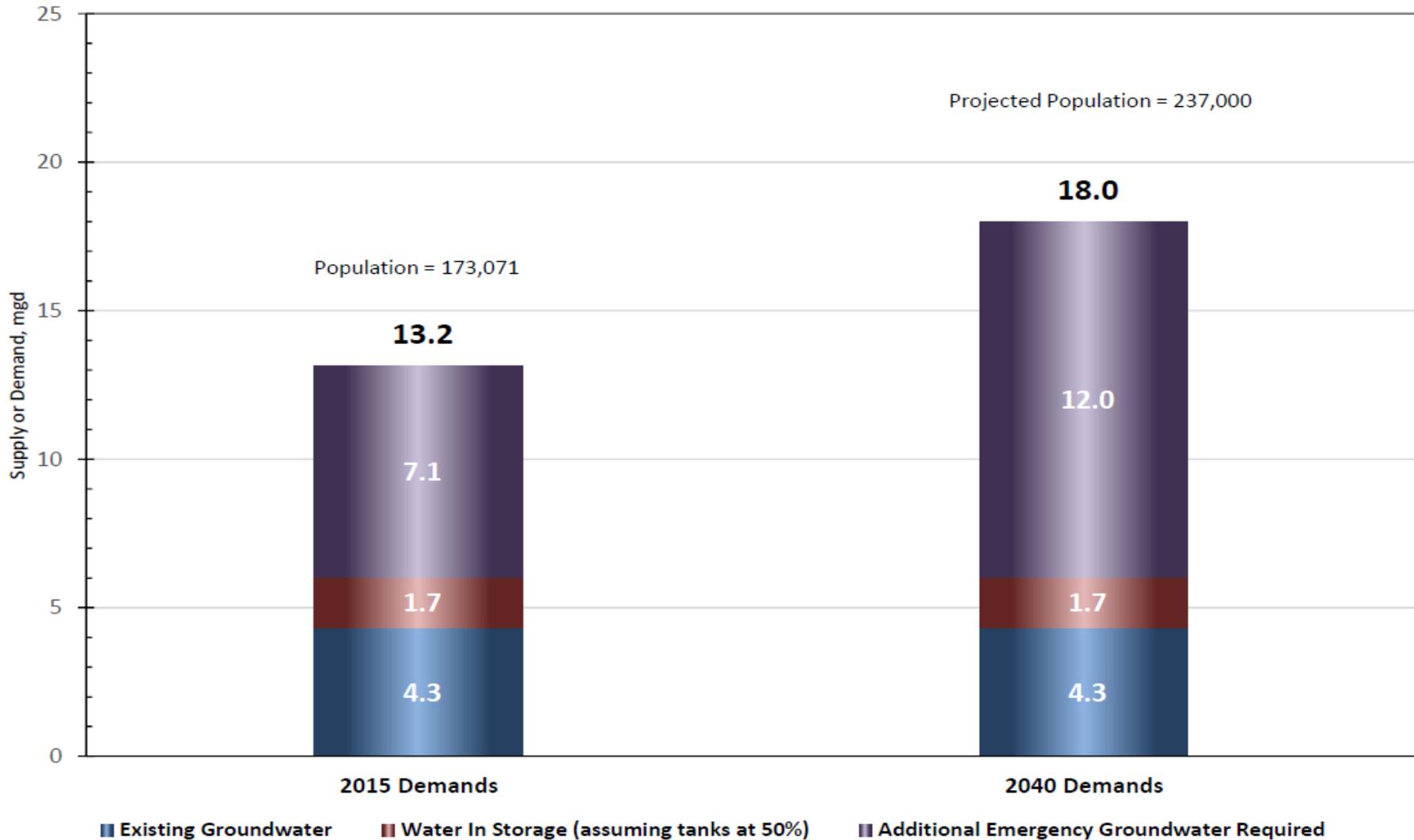
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Groundwater Program

# Preliminary Findings

- GW Resources beneath the City is more limited than initially envisioned
- Well yields in the 1,000 – 1,200 gpm range, like Farmers Lane wells, are the exception
- More typical well yields 350 – 450 gpm
- Therefore 700 gpm wells for the purposes of determining the number of new emergency wells is too aggressive
- Instead of 10-11 emergency wells, we will likely need ~20 wells located throughout the City
- Staff continues to evaluate the financial viability of installing ~20 wells



# Additional Groundwater Need

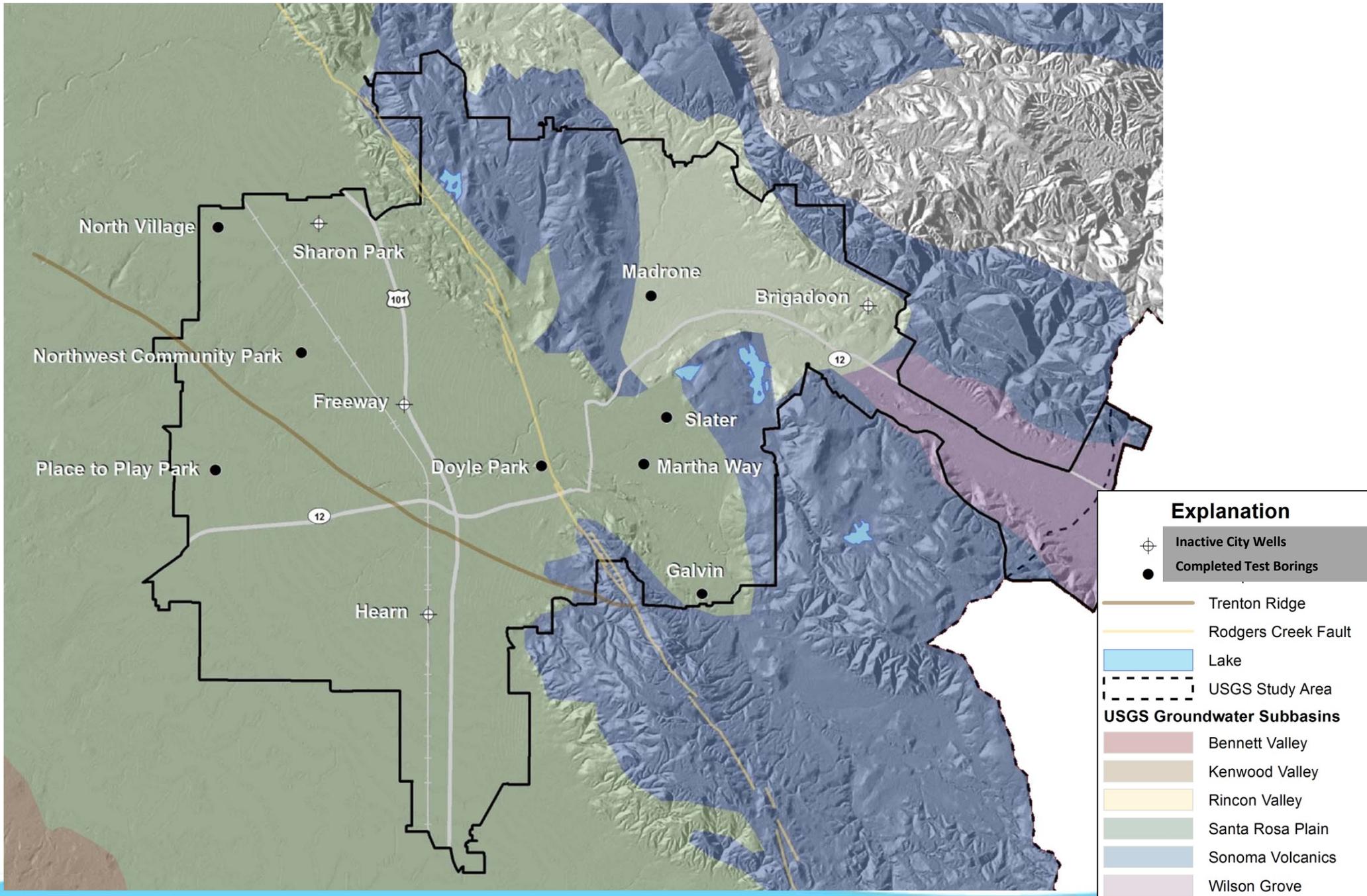


# Implementation Challenges

- Difficulty with property acquisition/negotiating site access
- Project Team explored parallel approaches:
  - Continue to pursue new well sites
  - Convert existing test wells
  - Protect City's existing emergency supply wells
  - Look for opportunities for agreements with others for emergency GW supplies



# Test Boring Sites



# Conversion of Test Borings into Emergency Wells

Name	Location	Screen Inside Diameter, inches	Yield, gpm	Assumed Pump Capacity, gpm
Bicentennial	Northwest City	8	100	None
Doyle Park	Northeast City, west of Rodgers Creek Fault	8	10	None
Galvin	Bennett Valley Golf Course	4	+115	115
Madrone	Madrone Middle School/Rincon Valley	8	465 <sup>(a)</sup>	465
Martha Way	Northeast City, east of Rodgers Creek Fault	8	450 <sup>(a)</sup>	450
North Village	Northwest City	8	<100	None
A Place-to-Play	West 3 <sup>rd</sup> Street	8	475 <sup>(a)</sup>	475
Northwest Community Park	East of Marlow	8	300 <sup>(a)</sup>	300
Herbert Slater Middle School	Northeast City, east of Rodgers Creek Fault	8	375 <sup>(a)</sup>	375
<b>Potential Total Emergency Well Capacity</b>				<b>2,180 gpm ~3.1 mgd</b>
(a) Pumping rate during testing, actual yield could be greater with larger pump.				

# Recommended Conversions

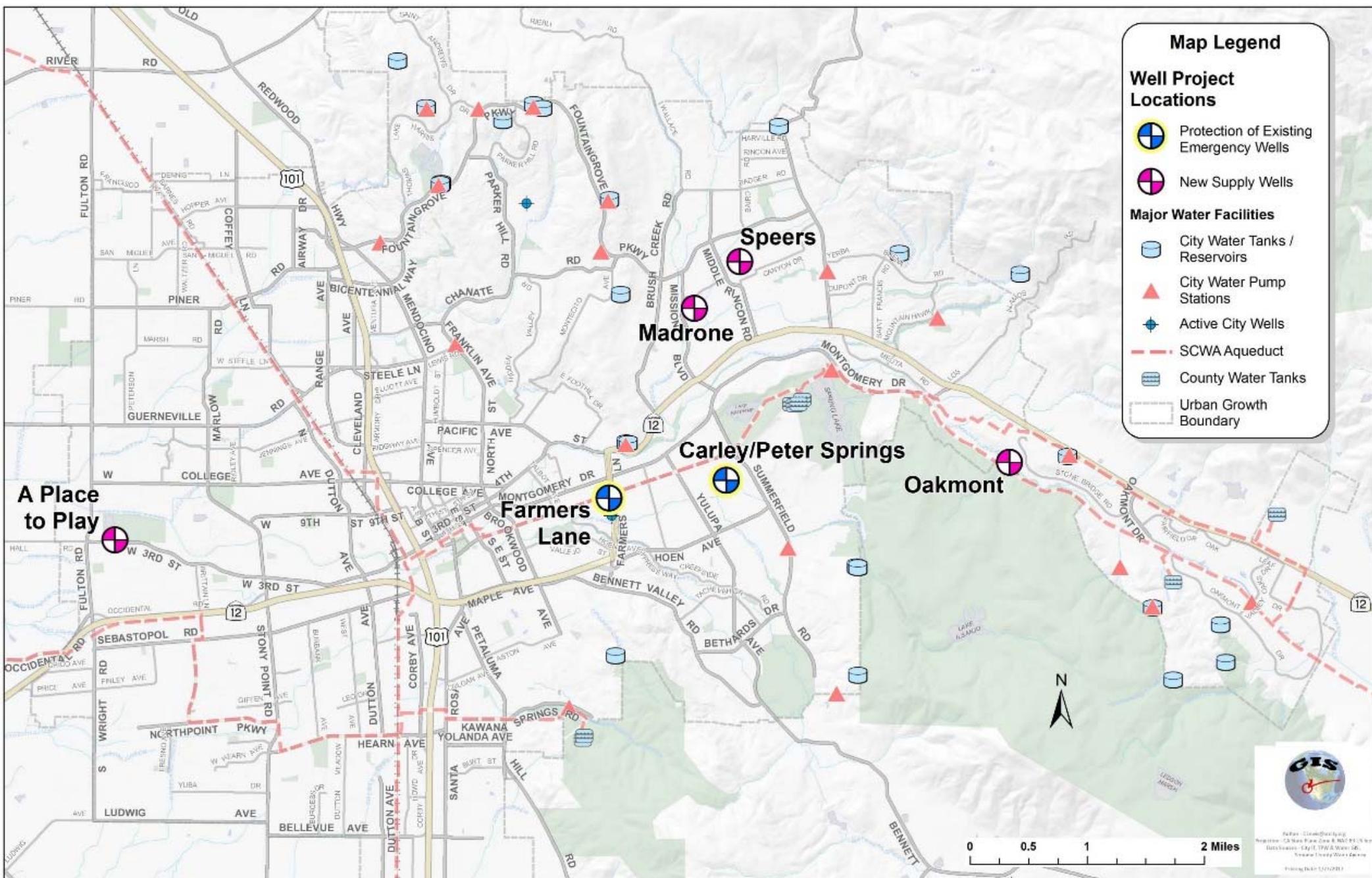
- North West Community Park (300 gpm)
- Place to Play (475 gpm)
- Martha Way (450 gpm)
- Madrone (465 gpm)
- Slater (375 gpm)



# Emergency Groundwater Program

- November 5th – BPU Ad Hoc Subcommittee
- Convert test borings to emergency wells
  - Emergency Well - \$2.2 – 2.8 Million
  - Conversion of test boring - \$1.5 – 1.9 Million
- Continue to pursue property acquisition
- Continue to pursue additional test borings
- Partnership opportunities





# Current Status

- Protection of Existing Facilities:
  - Farmers Lane Well Upgrades (Fall 2017)
  - Farmers Lane Treatment Plant Upgrades (Fall 2018)
  - Carley and Peter Springs (FY 18/19)
  - Leete Well Evaluation (FY 18/19)



# Current Status

- Conversion of test borings
  - A Place to Play
    - Master Plan Amendment
    - Design
  - Madrone School
    - Discussions with School Board
    - Easement



# Current Status

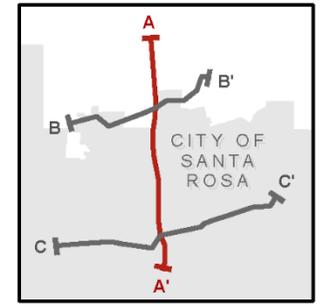
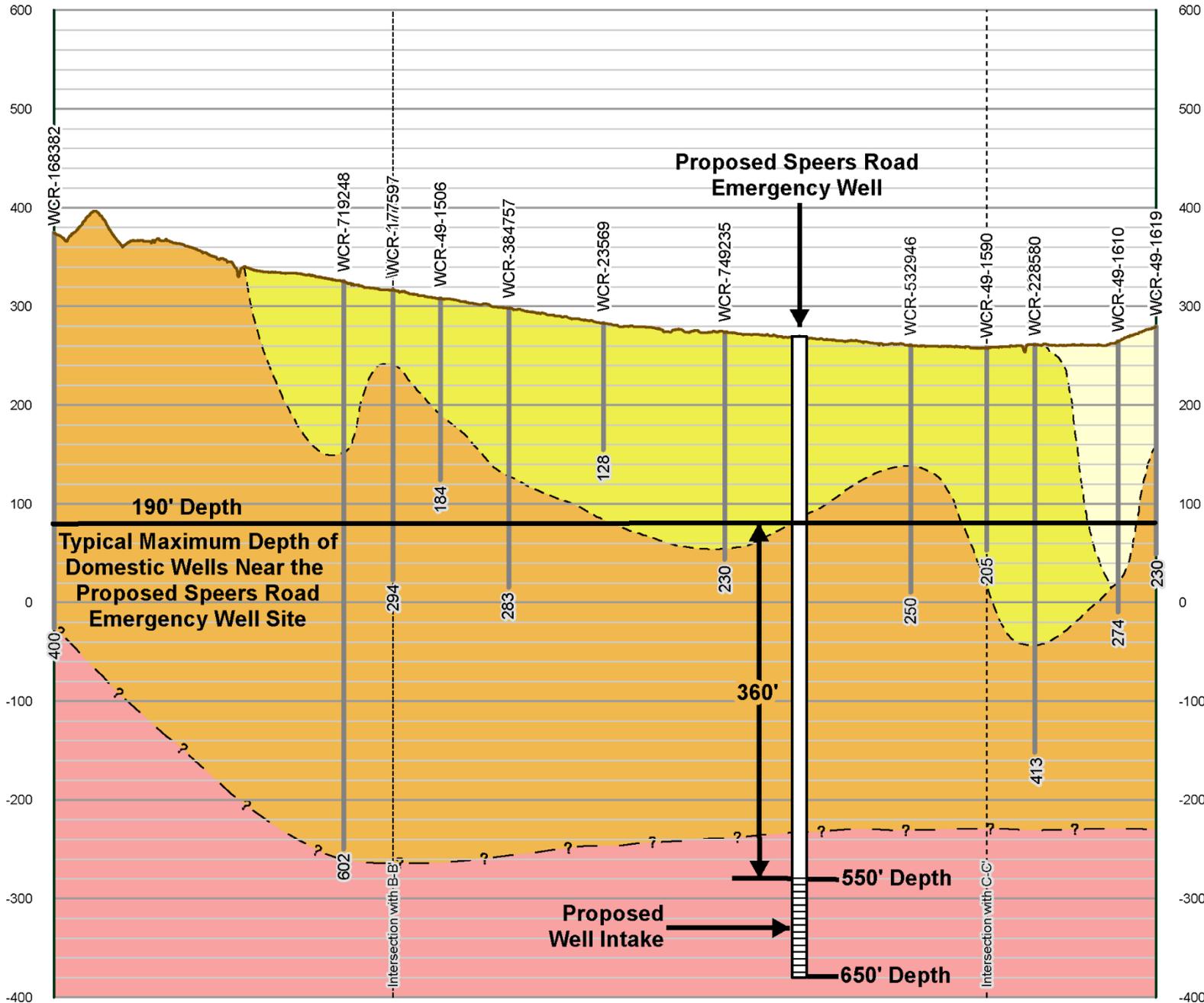
- New test borings
  - Oakmont Treatment Plant
    - Site constraints
  - 618 Speers Road
    - Concerns/questions from residents
    - May - Initial community meeting
    - June – 2<sup>nd</sup> community meeting



# Cross Section A-A'

**A**  
North

**A'**  
South



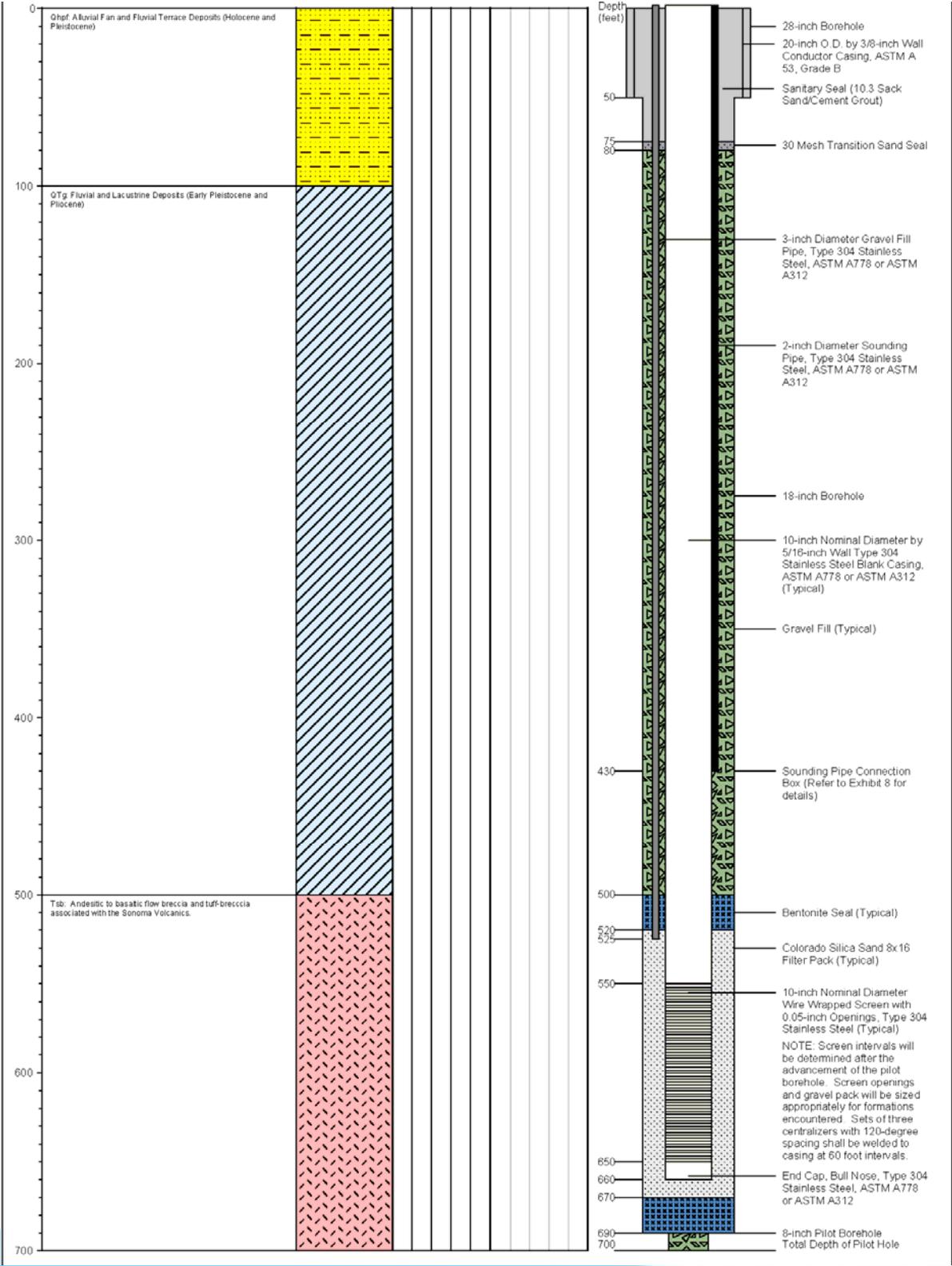
## LEGEND

- Qhf: Alluvial Fan and Fluvial Terrace Deposits (Holocene)
- Qhpf: Alluvial Fan and Terrace Deposits (Holocene and Pleistocene)
- QTg: Fluvial and Lacustrine Deposits (Early Pleistocene and Pliocene)
- SV: Sonoma Volcanics
- Well Borehole with Well Completion Report Number and Depth in Feet

0 750 1,500

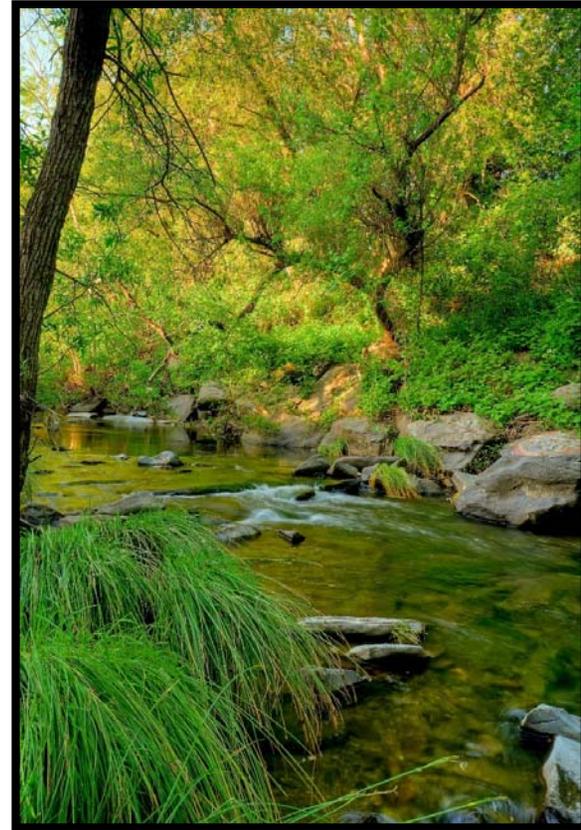


Scale in Feet  
1 inch = 1,500 feet  
Vertical Exaggeration = 10x



# Thank You

Questions/Comments?



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