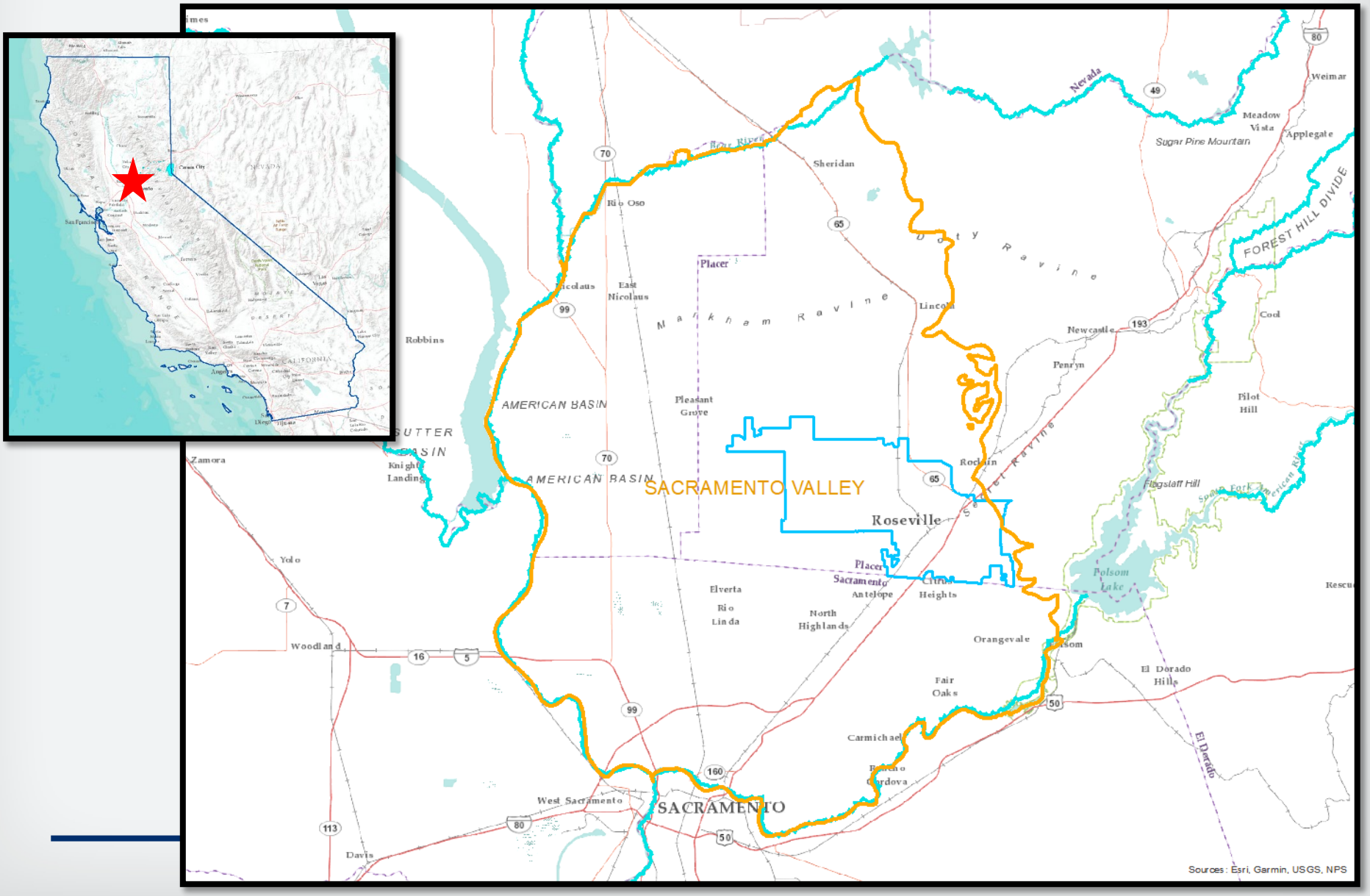
Santa Margarita Groundwater Agency Workshop

City of Roseville Environmental Utilities – Aquifer Storage and Recovery (ASR) Project Overview

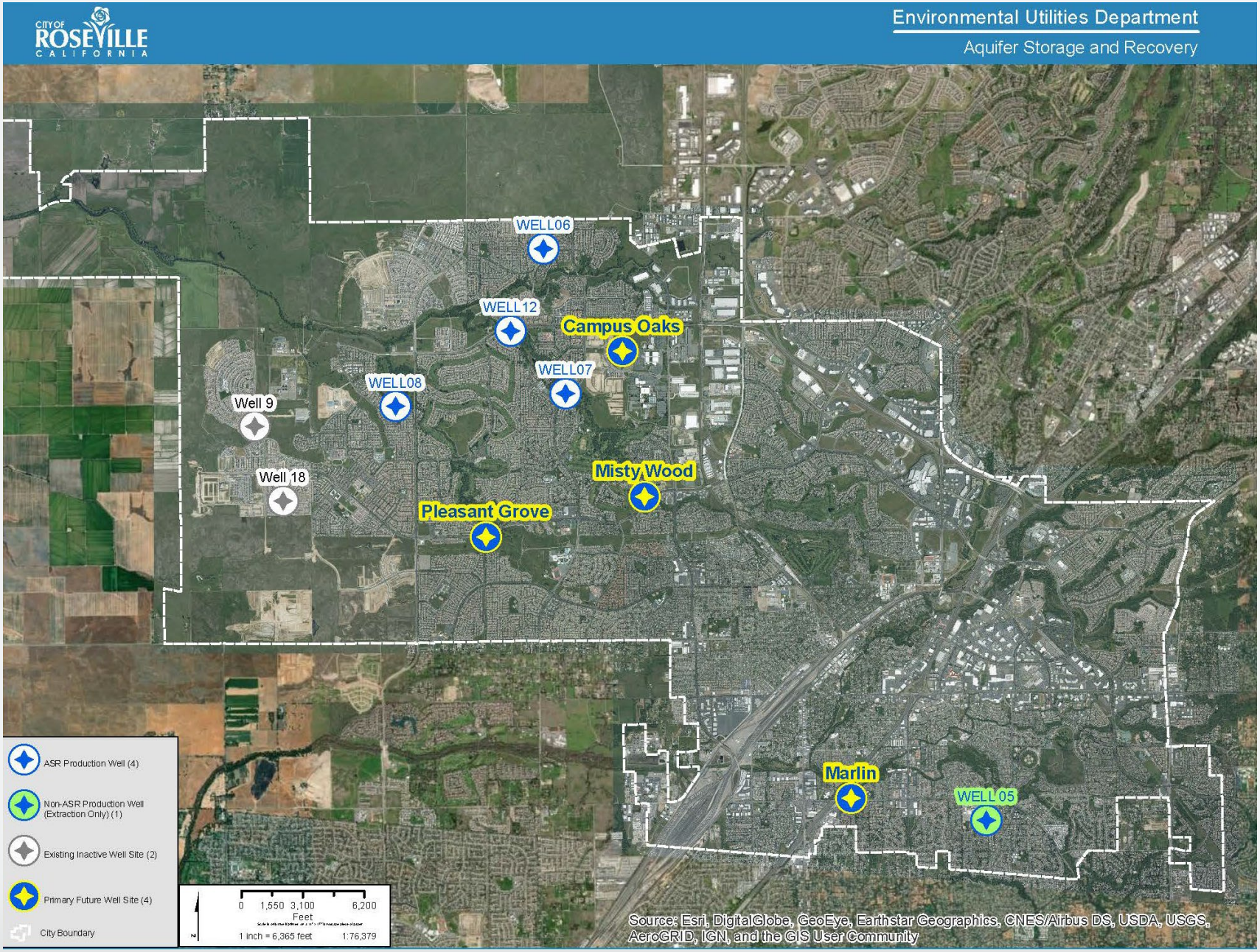
CITY OF ROSEVILLE CALIFORNIA

September 7, 2022

City of Roseville

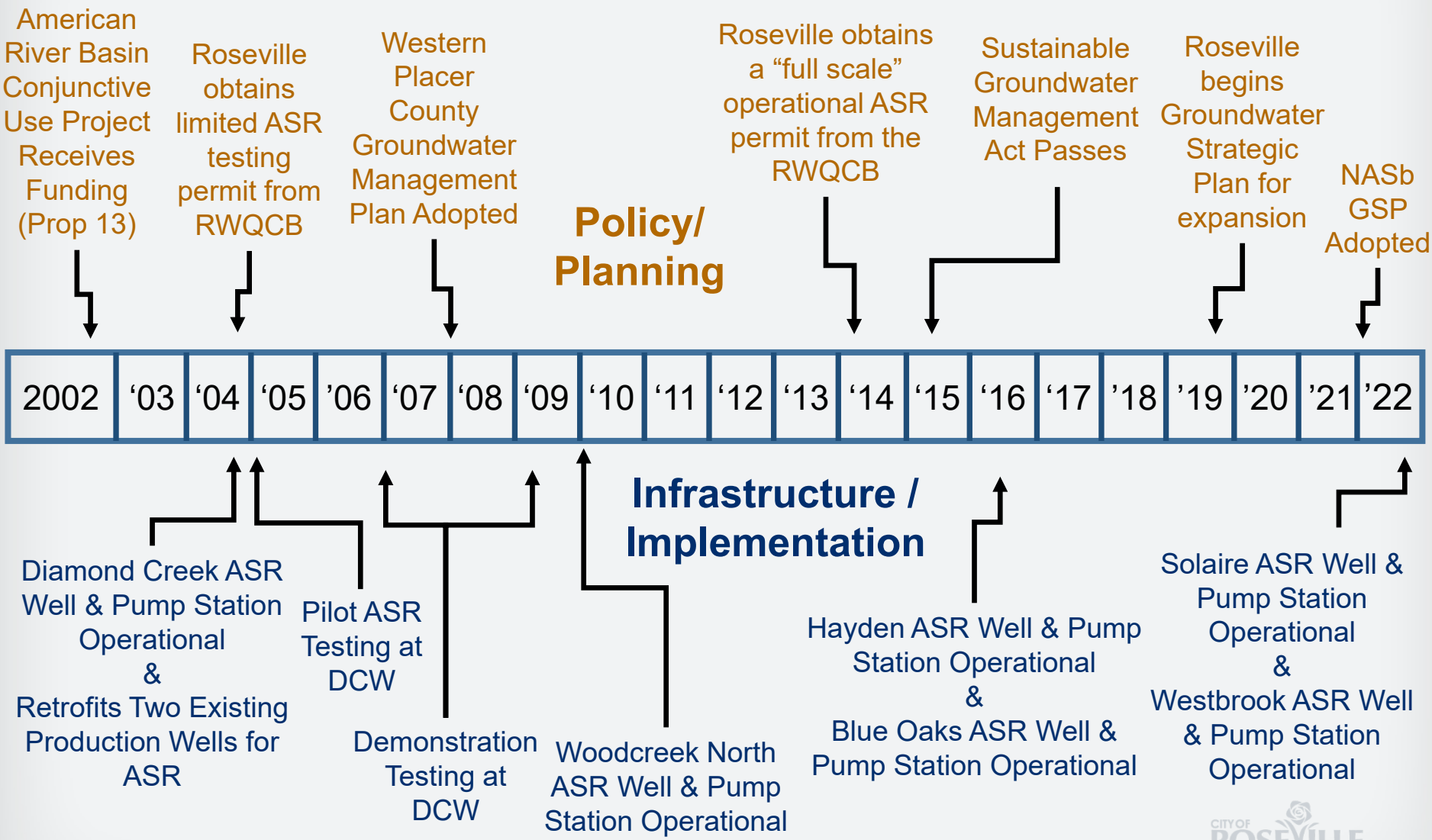


ASR Well Locations



Brief History and Groundwater Planning

A Brief History



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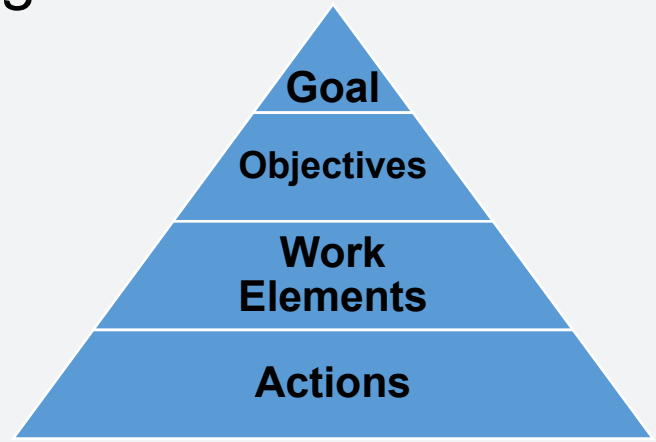
Roseville's Groundwater Program

- Organizational Construct



- Objectives
  - Quality
  - Quantity
  - Readiness
  - Sustainability

- Work Elements/Actions

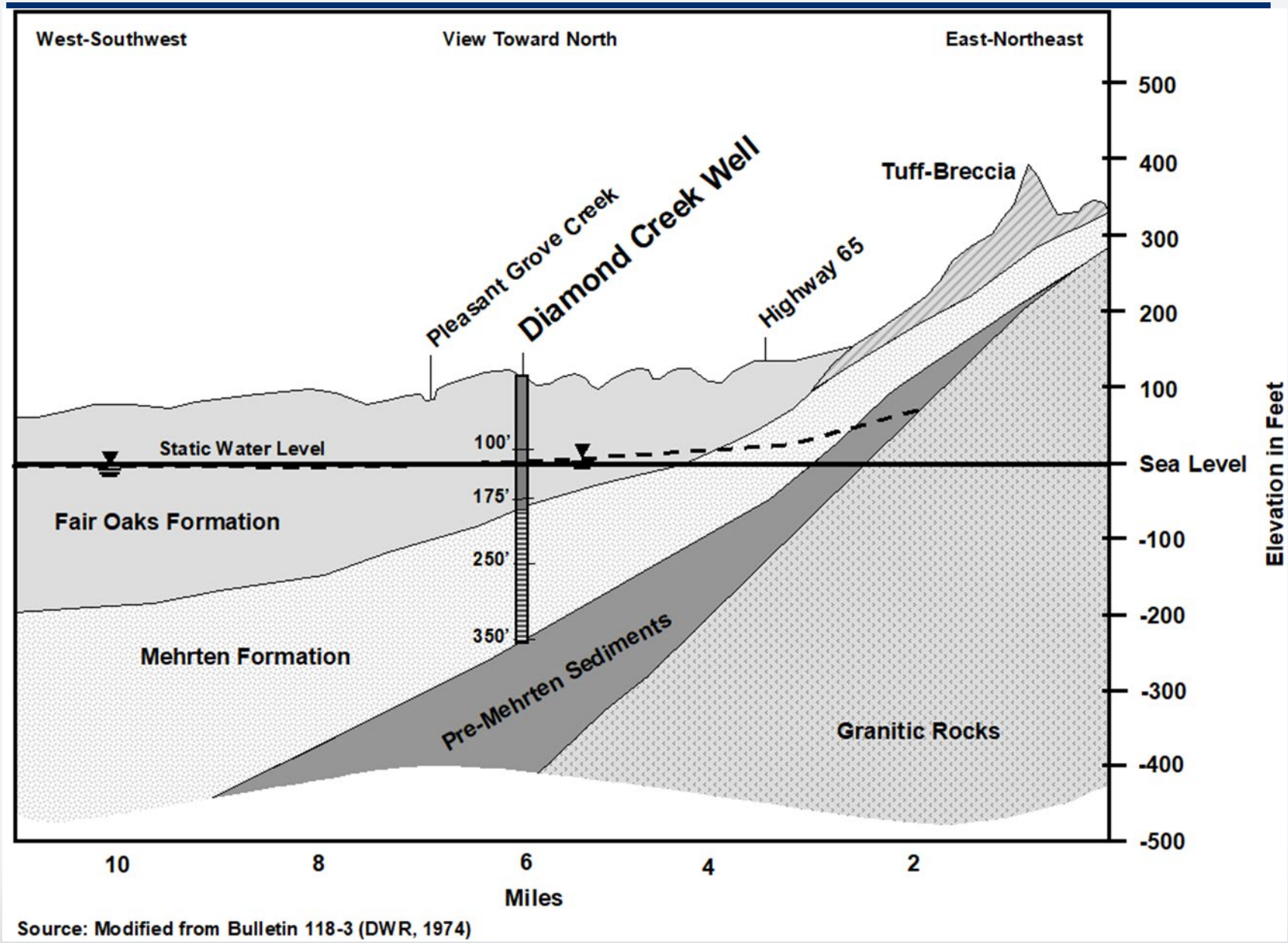
Legal/ Water Rights	Regulatory/ Permitting	Operation & Maintenance	Planning, Construction, & Capital Improvements
Roseville Well Permitting	Water Quality Sampling & Analysis	Outreach/ Education	Regional & Statewide Participation

Roseville's Groundwater Program Goal

To operate and maintain facilities that can recharge, store, and recover water to improve the City's water supply reliability benefiting the economy, the environment, and sustainable management of water resources.

Hydrogeology, Water Quality, and Other Technical Considerations

Roseville Geology



Injection and Extraction

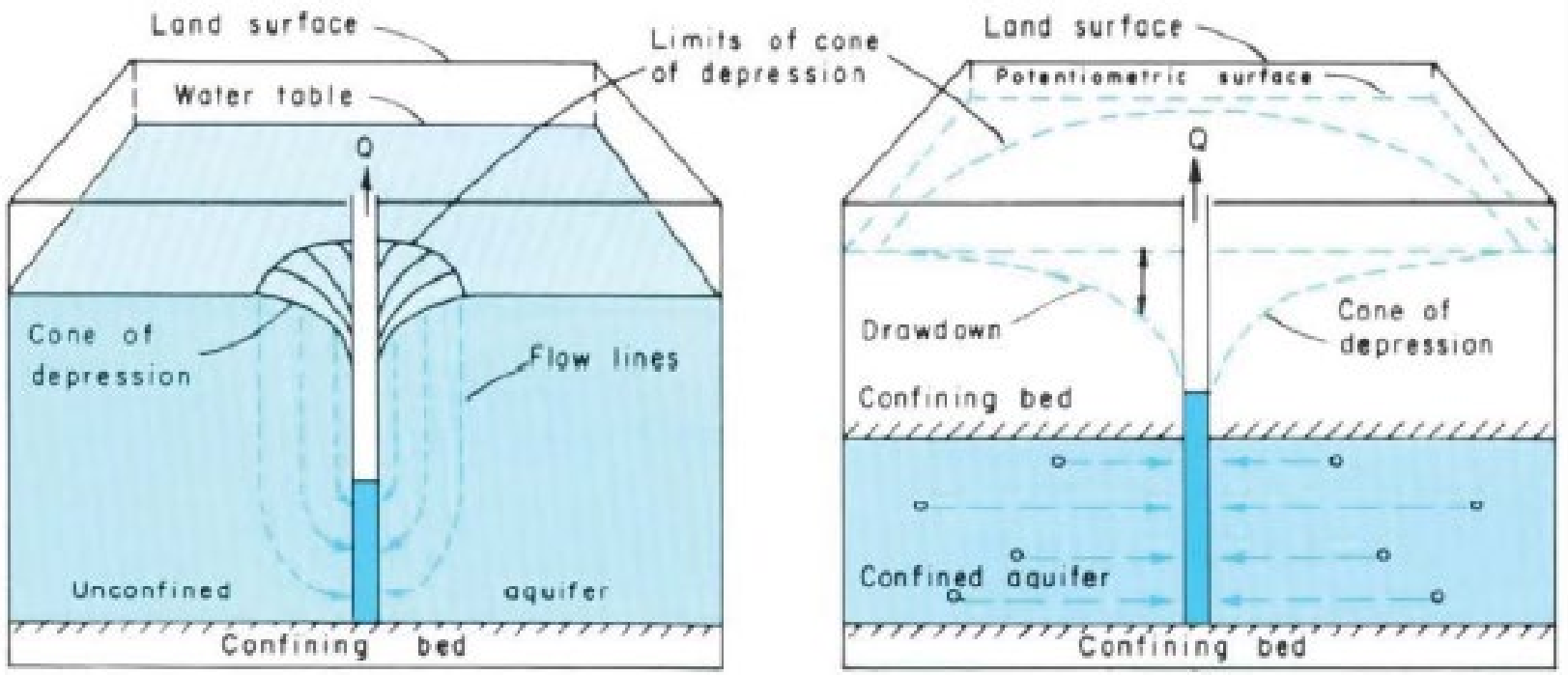


Figure 15. Cone of Depression Resulting from Well Pumping (Heath, 1983)

Injection and Extraction (cont.)

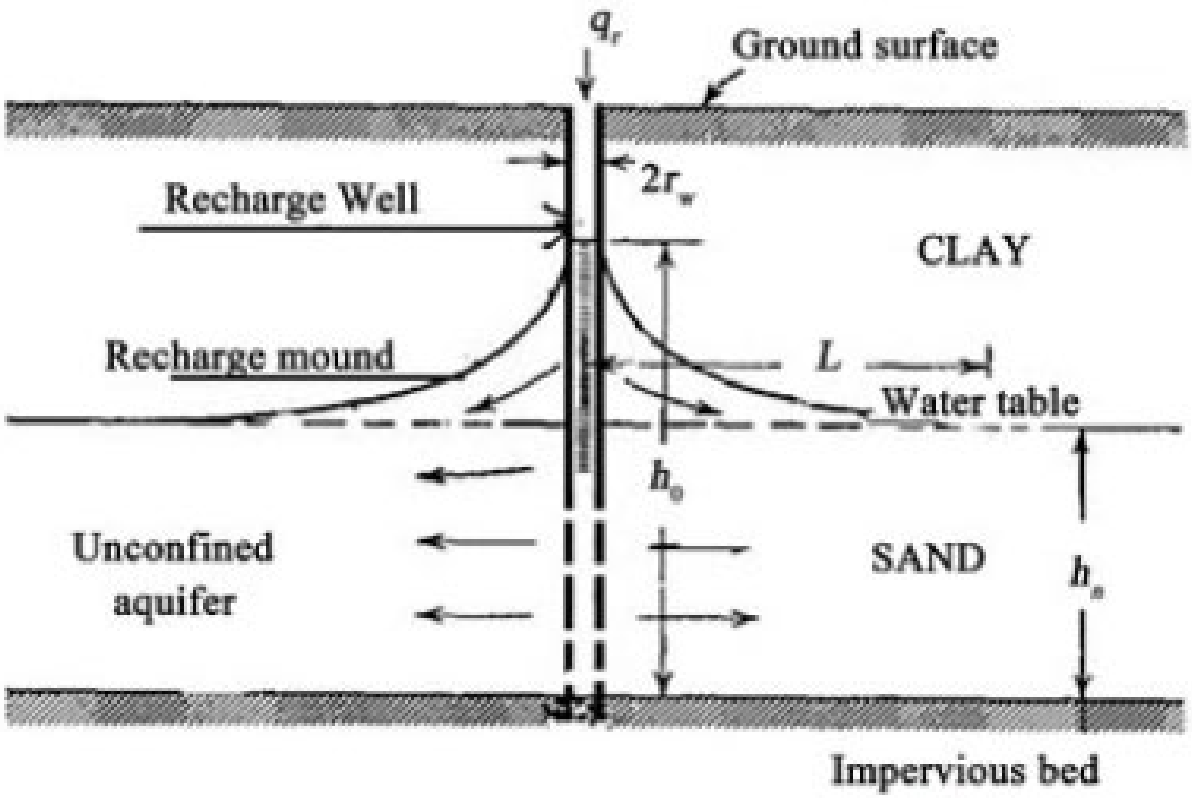
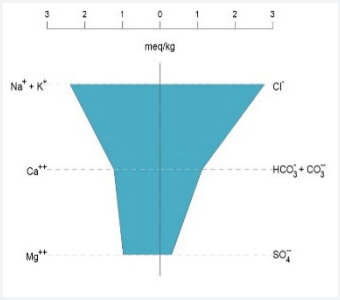


Figure 16. Groundwater Mound During Well Injection

ASR Project - Water Quality



Native Groundwater

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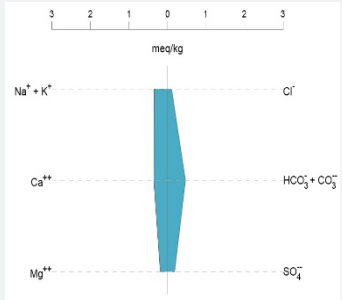

Injection Water

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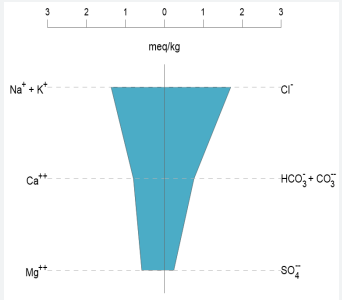


Blended Water

Public Outreach & Engagement

Brochures and ASR Movie

Water Rights, Regulatory, & Permitting

Water Rights and Surface Water Availably

Production and Recharge Timing Constraints

SRI Year Type	#of years (%)	GW Production (for City)	GW Production (for Regional/Statewide)	Recharge
Wet	28 (30%)	No (<1%)	No need/market	Yes - CVP (if WFA is Wet/Average - MFP)
Above Normal	13 (14%)	No (<1%)	No need/market	Yes - CVP (if WFA is Wet/Average - MFP)
Below Normal	17 (18%)	No (<1%)	Yes (some need/market)	Yes - CVP (if WFA is Wet/Average - MFP)
Dry	21 (22%)	No (<1%)	Yes	No
Critical	15 (16%)	Yes	Yes	No

WFA Year Type	#of years (%)
Wet	51 (54%)
Average	23 (24%)
Dry	17 (18%)
Driest	3 (3%)

CITY OF ROSEVILLE CALIFORNIA

Regional Water Quality Control Board

STATE WATER RESOURCES CONTROL BOARD
WATER QUALITY ORDER 2012-0010

GENERAL WASTE DISCHARGE REQUIREMENTS FOR
AQUIFER STORAGE AND RECOVERY PROJECTS
THAT INJECT DRINKING WATER INTO GROUNDWATER

The State Water Resources Control Board (State Water Board) finds that:

1. A stable supply of high quality water is critical to the continued welfare, wellbeing, and economic development of California. According to the California Department of Water Resources (DWR), the demand on groundwater will continue to increase as California's population grows from 37 million (2005 estimate) to a projected 60 million by 2050 based on current trends.
2. Groundwater is an important water source for municipal water supply, agriculture, and individual water users across California. According to the DWR 2009 Water Plan:
   a. In 1995, an estimated 13 million Californians, nearly 43 percent of the state's population, were served by groundwater. Many small to moderate-sized towns and cities (e.g., Fresno, Davis, Lodi) rely solely on groundwater for their drinking water supplies. California public water supply systems use more than 16,000 wells to supply water to the public.
   b. Groundwater has played a leading role in transforming California into the nation's top agricultural producer, most populous state, and the seventh largest economy in the world.
   c. With the growing limitations on available surface water exported through the Sacramento-San Joaquin Delta and the potential impacts of climate change, reliance on groundwater through conjunctive management (i.e., coordinated and planned use and management of surface water and groundwater resources together to maximize the availability and reliability of water supplies) will become increasingly important in meeting the state's future water needs.
   d. In some areas of the state, groundwater has been overdrafted, resulting in lowered groundwater elevations and reduced groundwater storage. A comprehensive assessment of overdraft in the state's groundwater basins has not been conducted since the 2003 update of DWR Bulletin 118-80, but it is estimated that overdraft is between 1 million and 2 million acre-feet annually.
   e. Other basins may be subject to overdraft in the future if current water management practices are continued. Overdraft can result in increased water production costs, land subsidence, water quality impairment, and environmental degradation.

   Aquifer Storage and Recovery (ASR) projects will improve statewide water management by increasing local storage that will be responsive to the needs of local communities and environmental resources. Statewide implementation of ASR projects will help California fulfill its vast conjunctive use potential. This is particularly true in the Central Valley, which possesses not only the state's largest sources of surface water, but also by far the state's largest aquifer.
3. According to DWR Bulletin 118-80, a basin is subject to critical conditions of overdraft when present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts. The following eleven basins were identified as being in a critical condition of overdraft:

Pajaro Basin	Cuyama Valley Basin	Eastern San Joaquin County Basin
Kern County Basin	Chowchilla Basin	Madera Basin
Kings Basin	Kaweah Basin	Tulare Lake Basin
Tule Basin	Ventura Central Basin	

STATE WATER RESOURCES CONTROL BOARD
MONITORING AND REPORTING PROGRAM – ORDER WQ 2012-0010
GENERAL WASTE DISCHARGE REQUIREMENTS FOR
AQUIFER STORAGE AND RECOVERY PROJECTS
THAT INJECT DRINKING WATER INTO GROUNDWATER

This Monitoring and Reporting Program (MRP) allows determination of the potential for groundwater degradation and incorporates requirements for monitoring of injected water and groundwater. This MRP is issued pursuant to Water Code section 13267. The Permittee shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer.

All samples shall be representative of the volume and nature of the monitored medium. The time, date, and location of each grab sample shall be recorded on the sample chain of custody form. Injection flow monitoring shall be conducted continuously using a flow meter and shall be reported in gallons per day and cumulative totals.

Field test instruments (such as those used to monitor pH) may be used provided that:

1. The operator is trained in the proper use of the instrument;
2. The instruments are field calibrated prior to each use;
3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency; and
4. Field calibration reports are submitted as described in the "Reporting" section of this MRP.

INJECTION WELL MONITORING

Injection wells shall be monitored when water is being injected into the aquifer. Monitoring of the injection wells shall include, at a minimum, the following

Constituent/Parameter	Units	Type of Sample	Sampling Frequency	Reporting Frequency
Well Operational Status [1]	N/A	Recorded	Daily	Quarterly
Daily Average Injection Rate	gpd [2]	Meter	Continuous	Quarterly
Injected Water, cumulative total for year to date	ac•ft/yr	Meter	Continuous	Quarterly
Extracted Water, cumulative total for year to date	ac•ft/yr	Meter	Continuous	Quarterly

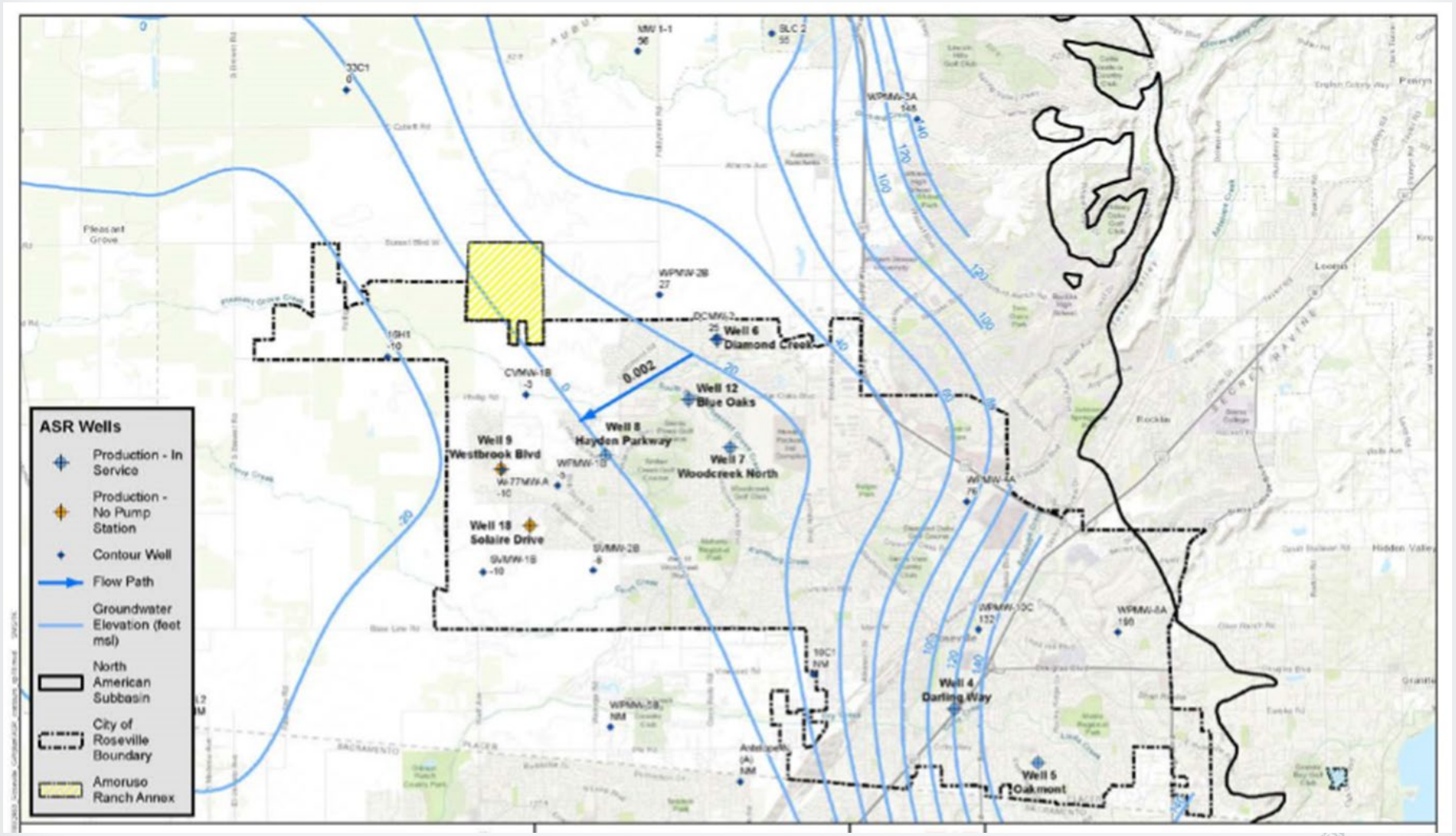
[1] Well Operational Status shall be reported for each well associated with the ASR project. Injection activity shall be recorded on a daily basis.
[2] Alternative units may be used to report the data.

INJECTED WATER MONITORING

Injected water is limited to potable water that the Permittee produces through its CDPH permitted domestic water supply permit. Section 116470 of the California Health and Safety Code requires:

1. An Annual Water Quality Report (AWQR). The AWQR characterizes the injected water.
2. Public water systems that serve more than 10,000 service connections and that detect one or more contaminants in drinking water that exceed the applicable public health goal, are required to prepare a report that addresses the contaminant issue.

Groundwater Contours (before ASR)



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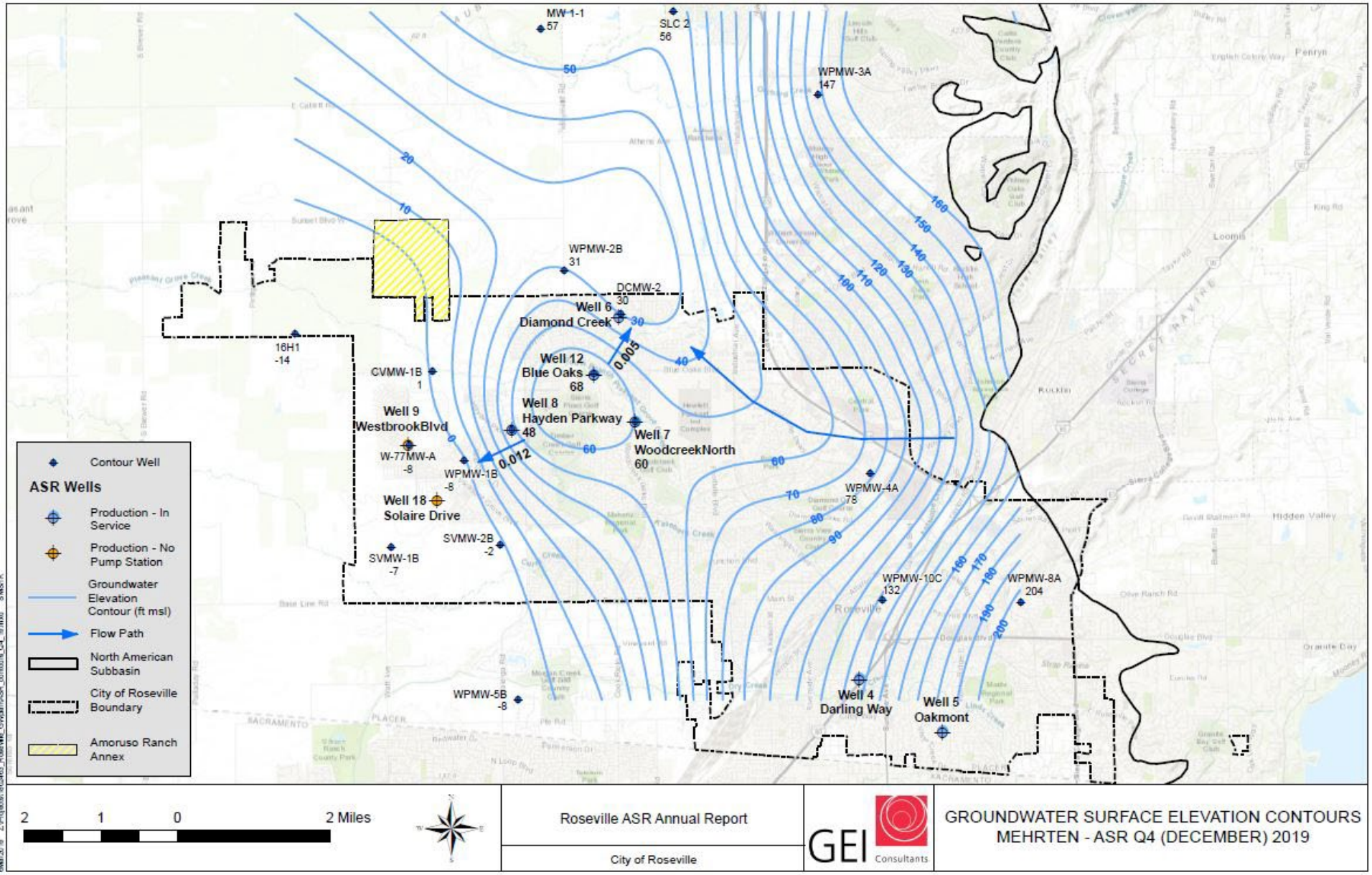
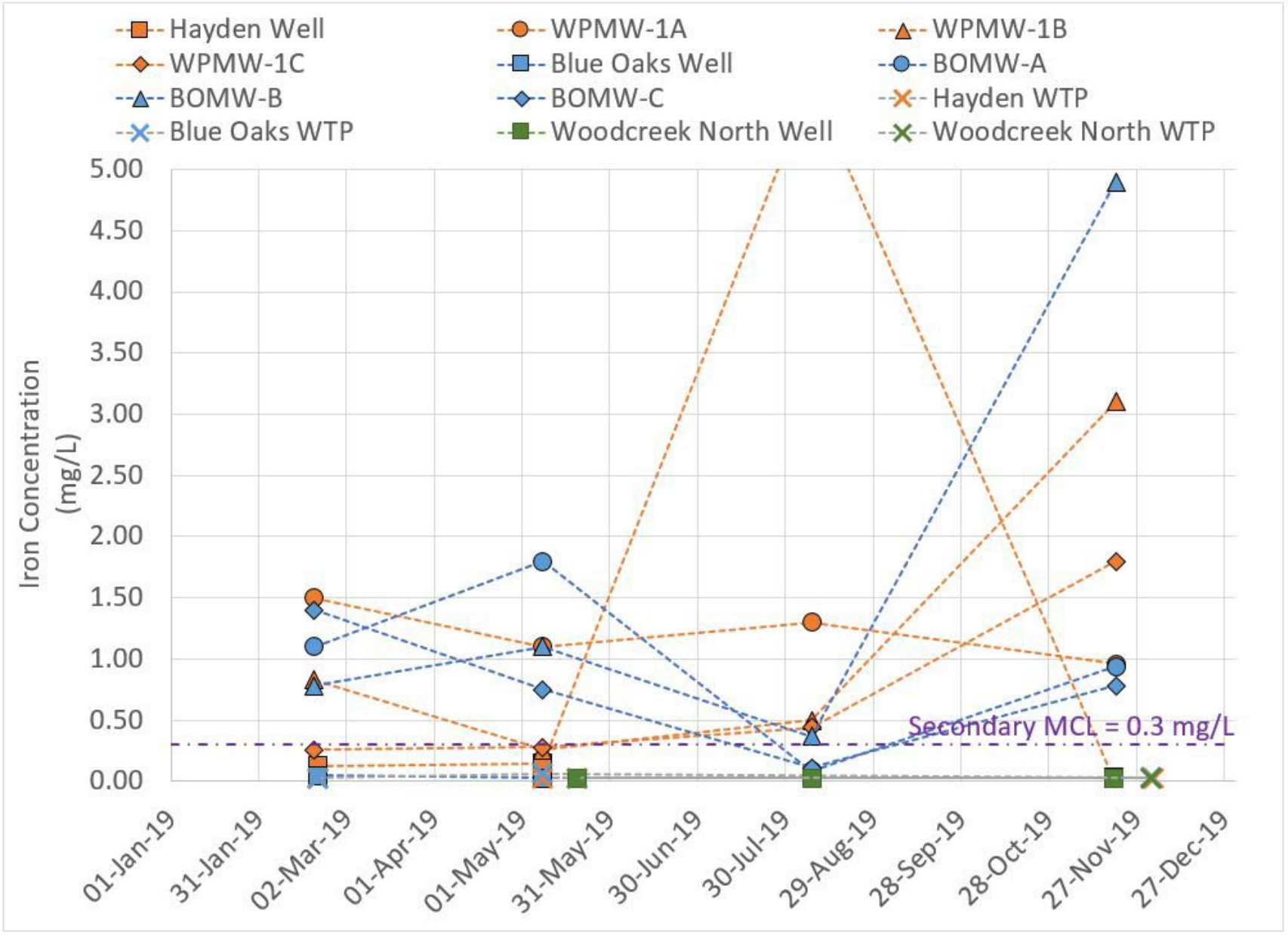
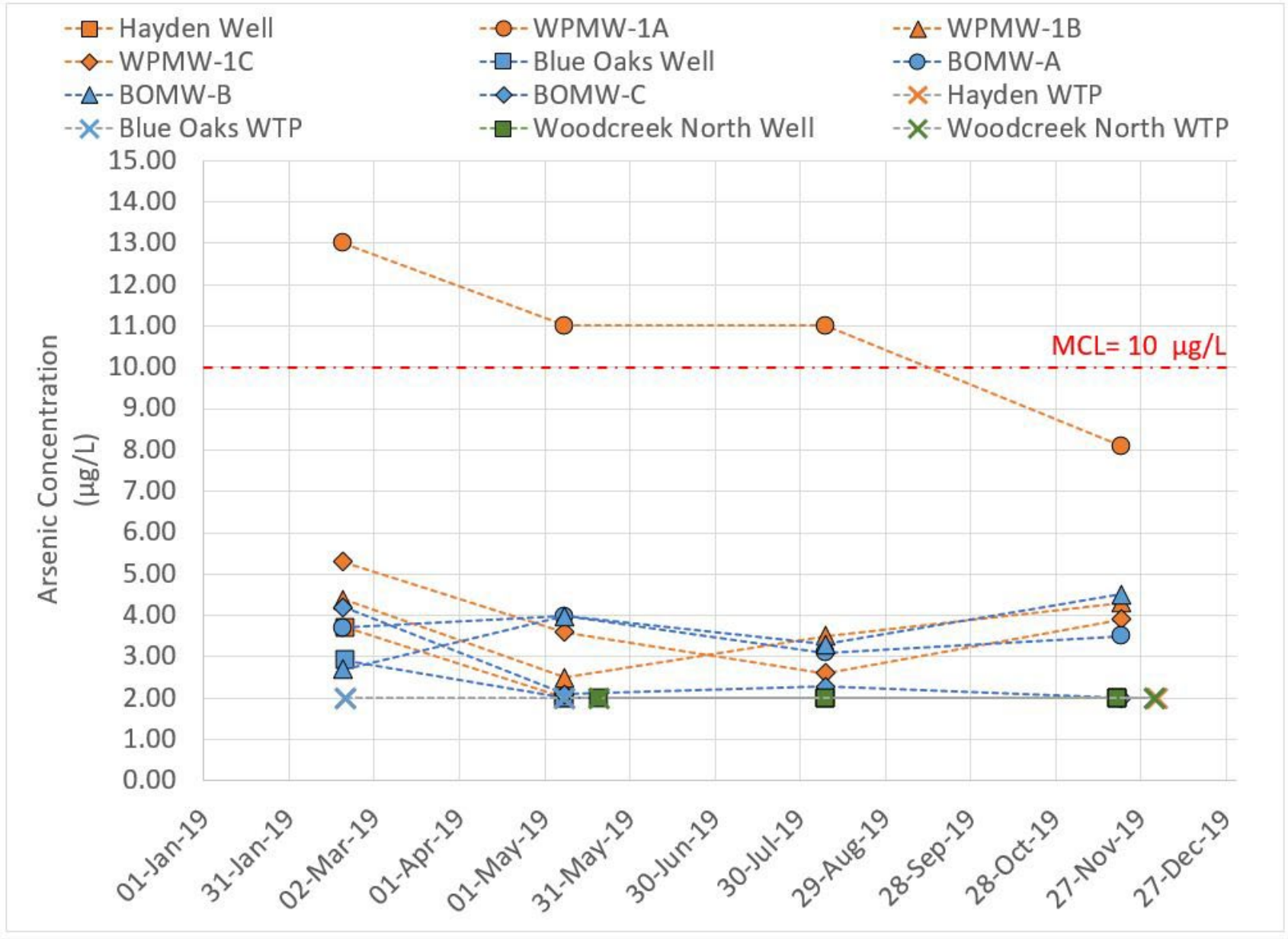
Groundwater Contours (during ASR)



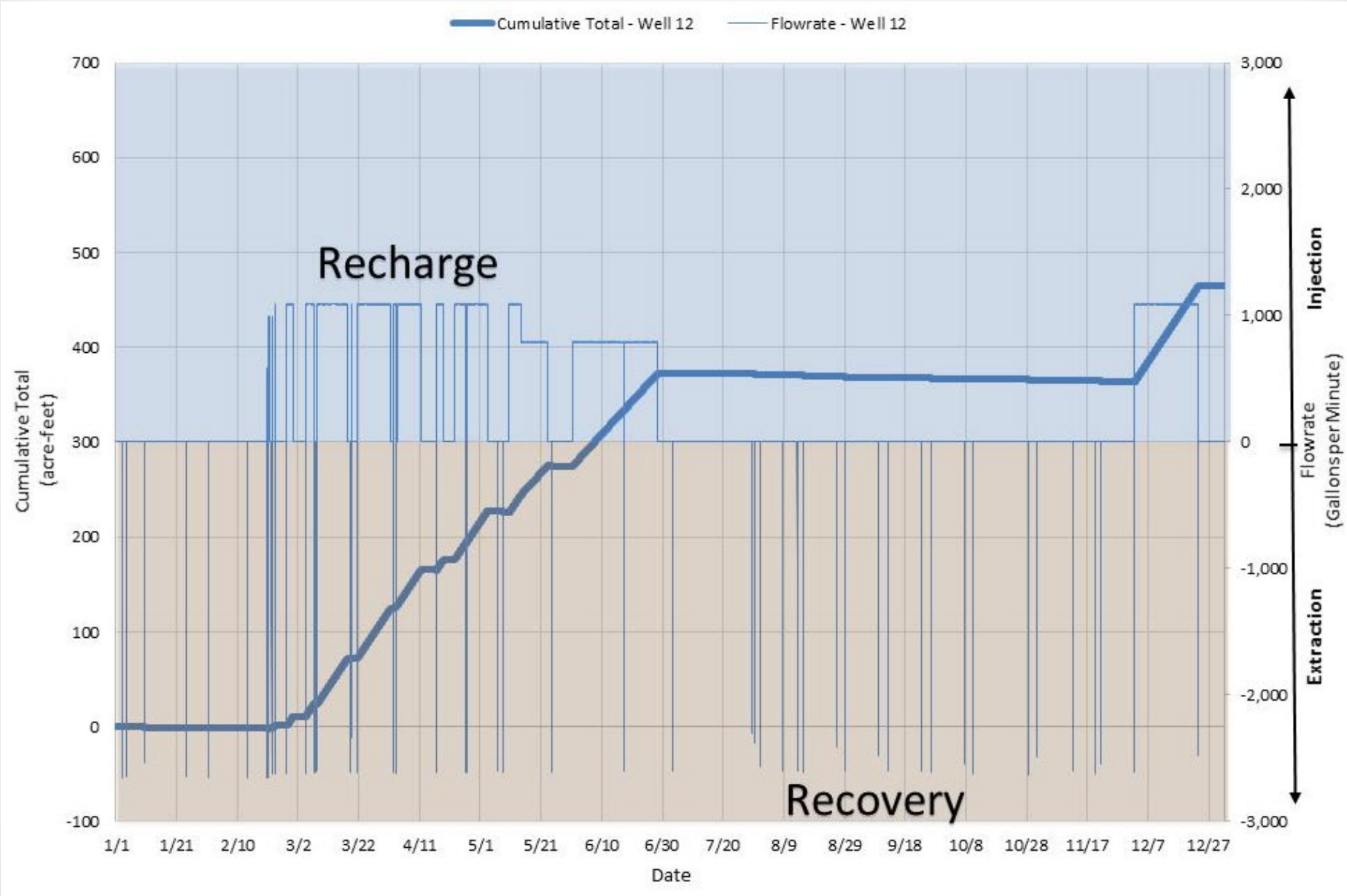
Water Quality (Iron)



Water Quality (Arsenic)



Flowrate and Volume



Planning & Design

ASR Well – Design Aesthetics

Diamond Creek (Well No. 6)

Blue Oaks Blvd (Well No. 12)

Well & Pump Station Design

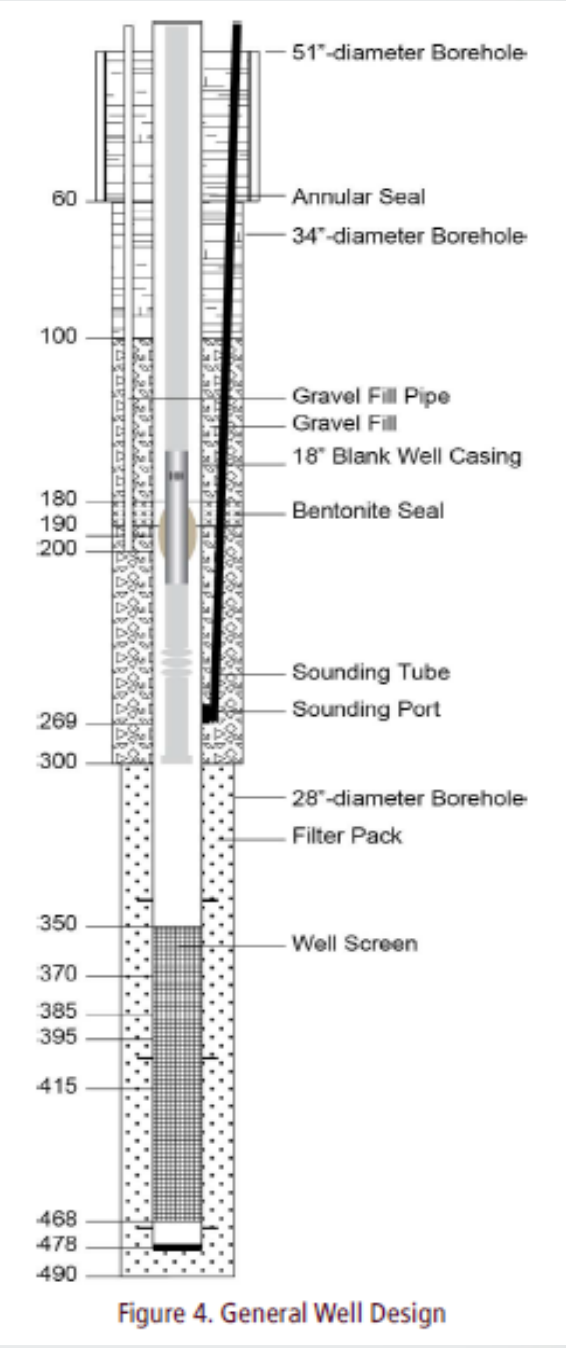
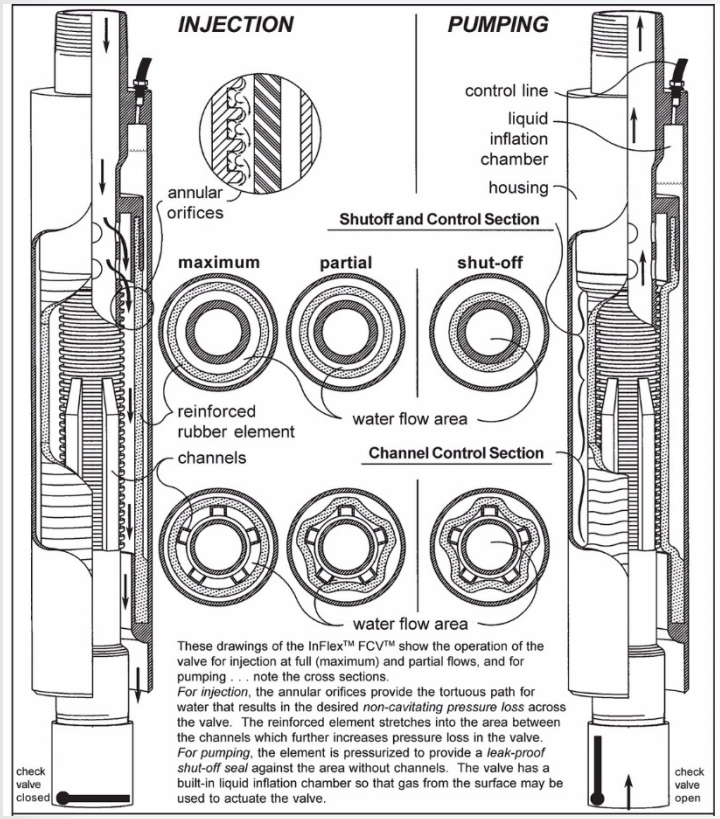


Figure 4. General Well Design

Well & Pump Station Design (cont.)

Baski Flow Control Valve



Stainless steel casing, screen, and sounding port +/-$120,000

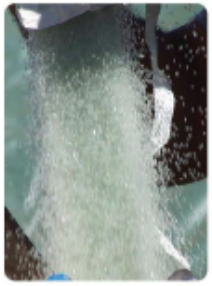
Stainless steel casing and screen are used in ASR wells to increase well lifespan and performance. Stainless steel helps combat corrosion, reduce from bacterial growth, and is a longer lasting material than HSLA or other lower grade metals. Oxygenated and potentially corrosive water used for injection can lead to corrosion and weakening of mild steel, and iron-rich water can lead to precipitates and fee bacterial growth, reducing well performance. Using stainless steel reduces these risks along with maintenance and rehabilitation costs associated. Stainless steel is widely being used for traditional supply wells as well.

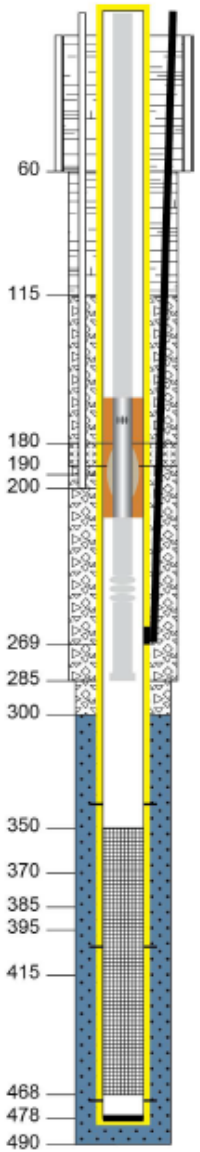
Flow Control Device - +approx. $90,000:

Flow control devices give operators greater control on injection rates and help to eliminate potential air entrainment in the aquifer which can reduce well performance. Flow control devices operate by adjusting the opening in which injected water can pass through and therefore regulating flow. They are controlled through either compressed gas or hydraulic fluid. Hydraulic flow control devices, such as the 3R device pictured, allow for fining tuning of injection than compressed gas systems and can be used to surge the well through cycling injection/extraction modes. Well surging helps to maintain well capacity.

SiLi Beads - +$10,000

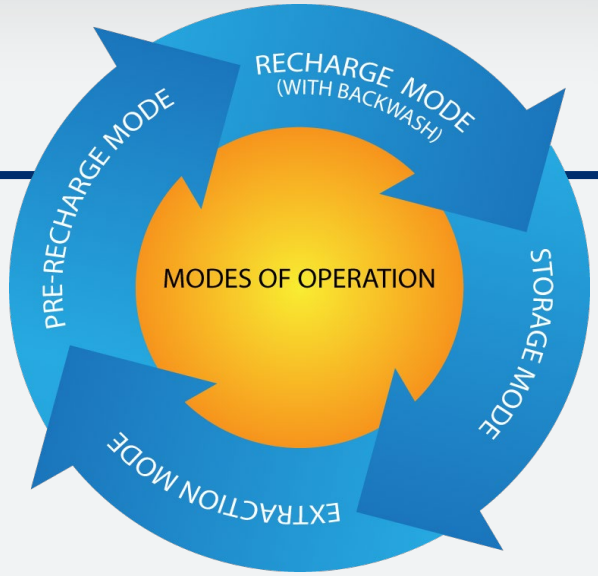
SiLi beads are perfectly spherical glass beads that are used for filter pack in place of traditional silica sand. Their shape and construction can provide greater well performance through increased void space and improved effectiveness in maintenance/rehabilitation. The glass construction of the beads also inhibits bacterial growth that can hinder well performance. SiLi beads are not necessary for an ASR well and there are programs that argue whether there is enough increase in well performance, if any, to justify the increase in costs.





Operations

SOPs



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Standard Operating Procedures

(Version 2.0)

City of Roseville

Aquifer Storage & Recovery Project

DRAFT

January 2021

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GEI Consultants & LRE Water

Reviewed by:

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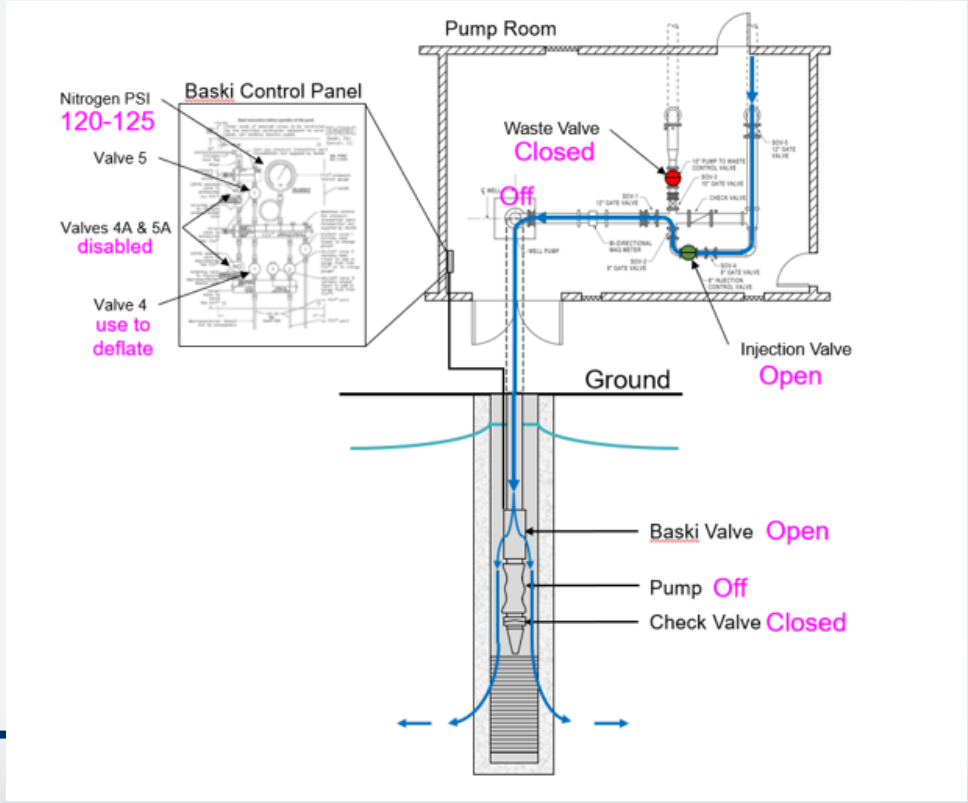
Trevor Joseph, City of Roseville



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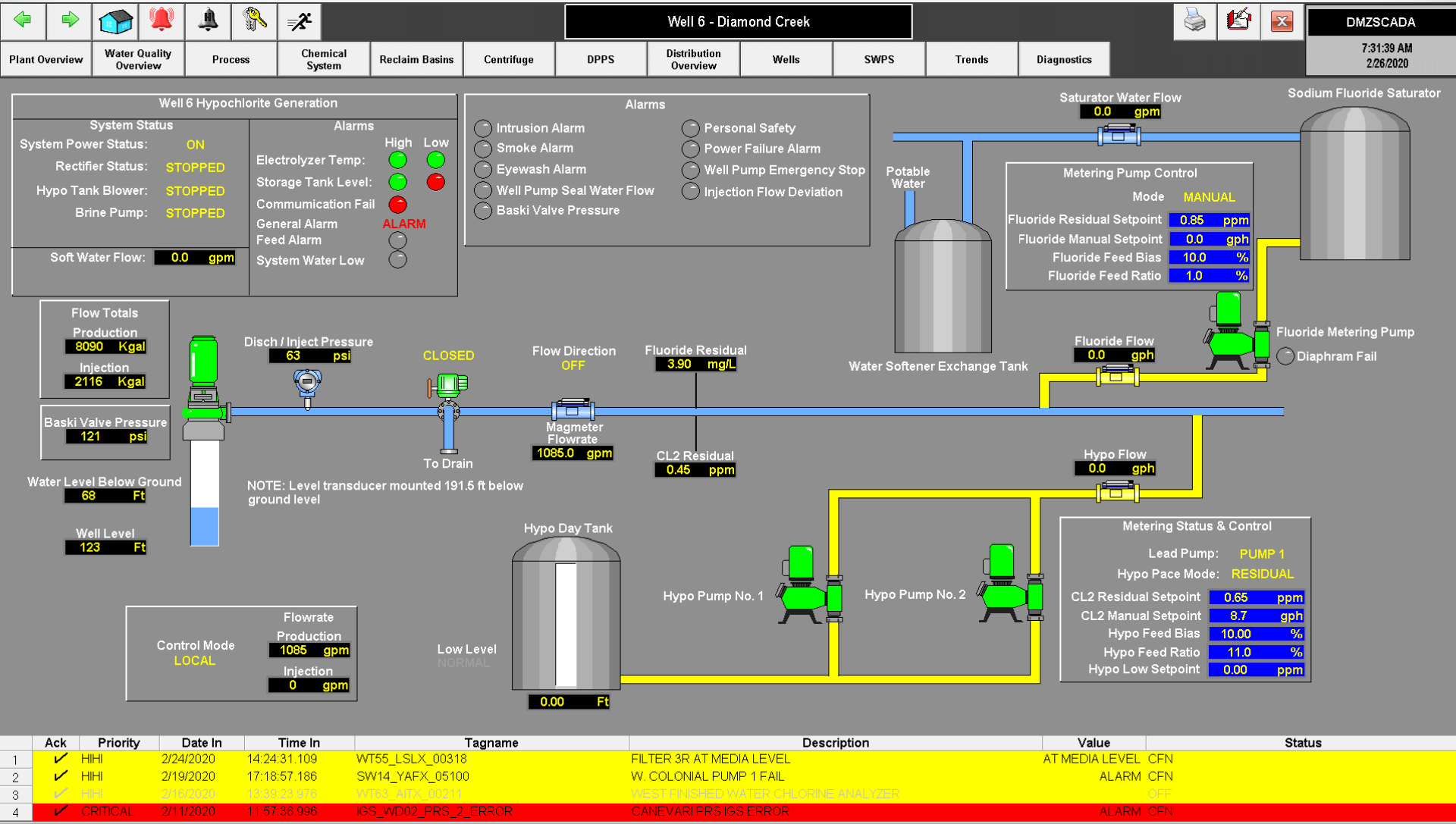
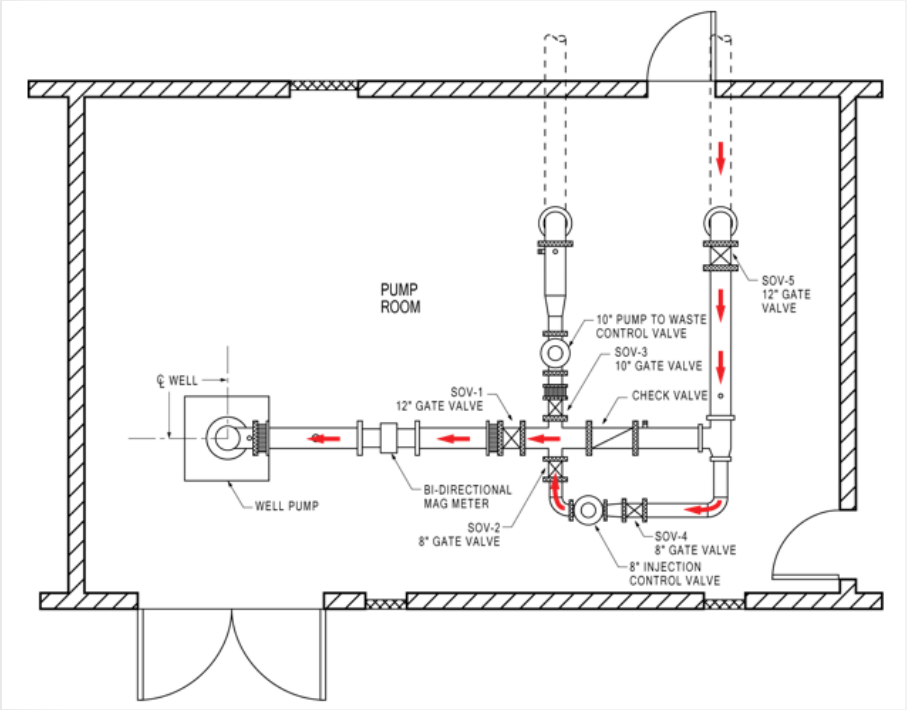


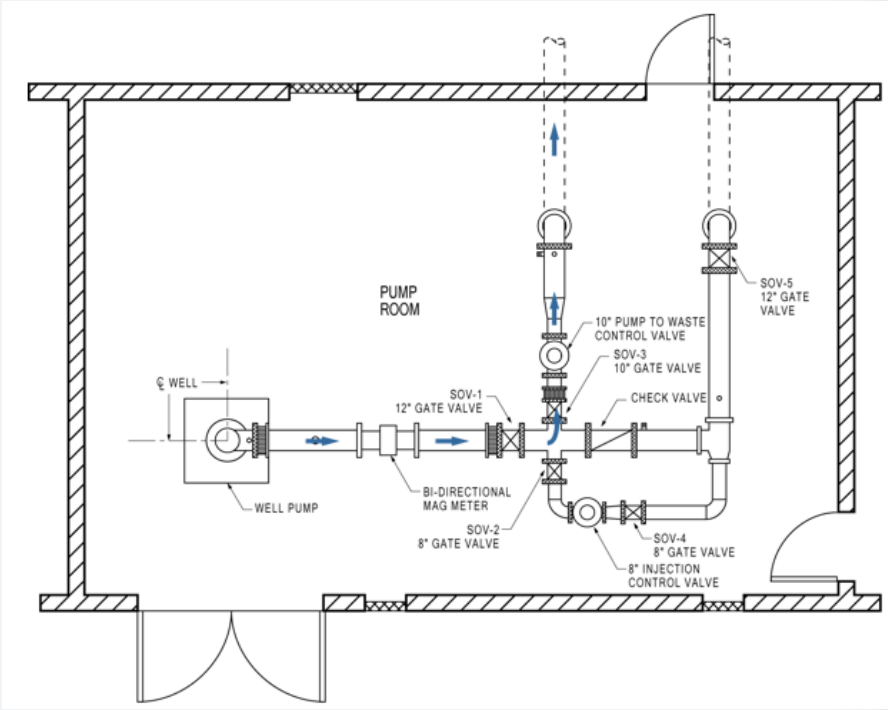
	Ack	Priority	Date In	Time In	Tagname	Description	Value	Status
1	✓	HIHI	2/24/2020	14:24:31.109	WT55_LSLX_00318	FILTER 3R AT MEDIA LEVEL	AT MEDIA LEVEL	CFN
2	✓	HIHI	2/19/2020	17:18:57.186	SW14_YAFX_05100	W. COLONIAL PUMP 1 FAIL	ALARM	CFN
3	✓	HIHI	2/16/2020	13:39:23.976	WT63_AITX_00311	WEST FINISHED WATER CHLORINE ANALYZER		OFF
4	✓	CRITICAL	2/11/2020	11:57:36.996	IGS_WD02_PRS_2_ERROR	CANEVARI PRS IGS ERROR	ALARM	CFN

ASR Well Operational Modes

Injection



Extraction



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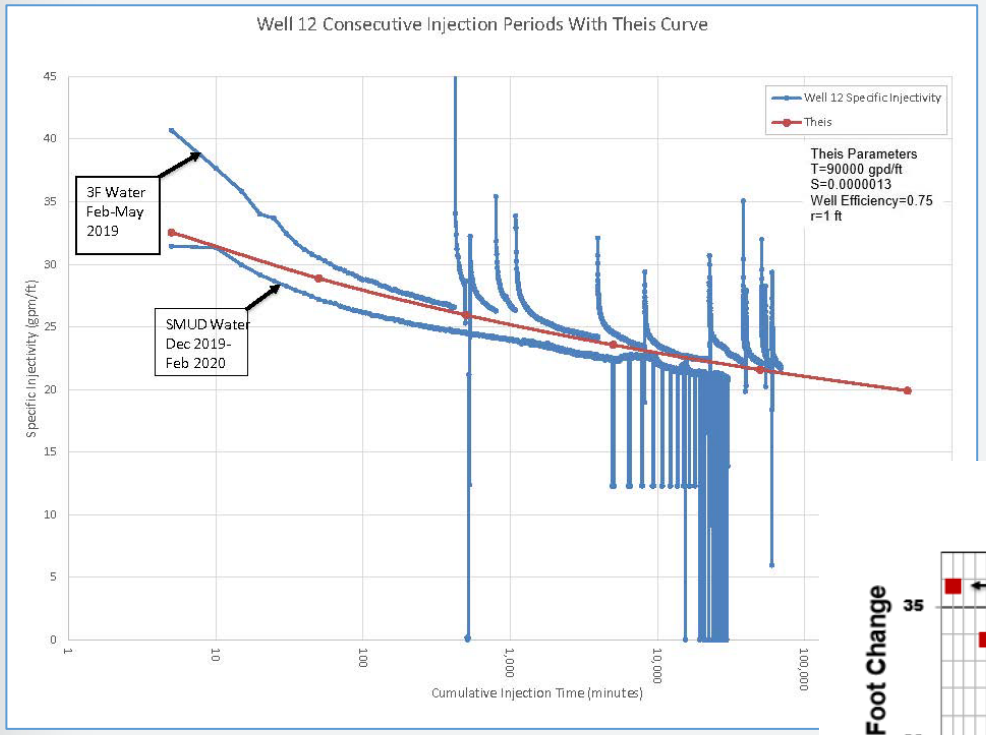
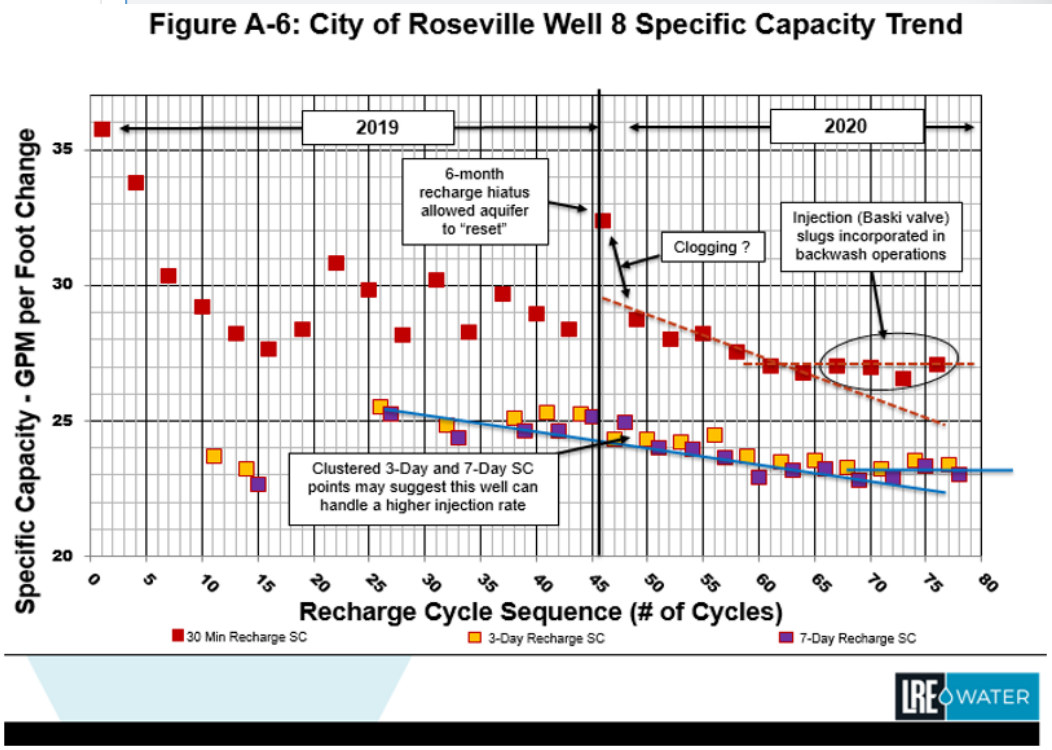
ASR Well Performance and Backwashing





Questions and Comments

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