

IN COLLABORATION WITH
THE WATER RESEARCH
FOUNDATION



Presented Previously at

WATERREUSE[®] 2023 SYMPOSIUM

MARCH 5-8, 2023 • MARRIOTT MARQUIS ATLANTA
ATLANTA, GA

REIMAGINING
WATER
TOGETHER

Building Local Groundwater Resiliency: High-Capacity Injection at Existing AWTF

Jessica Koop, PE and Everett Ferguson, PG, CHG
Water Replenishment District of Southern California

June 13, 2023

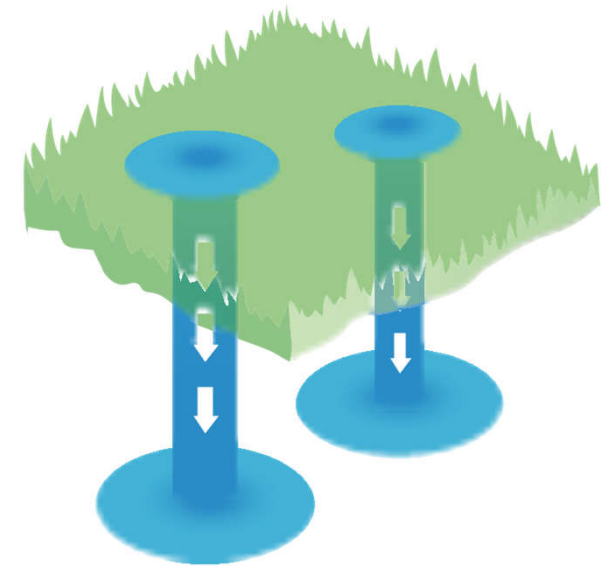


- Overview/Objectives
- Background
- Project Concept
- Project Implementation
- Lessons Learned
- Next Steps



Overview/Objectives

- Review entire process for the successful installation of an injection well for groundwater recharge of advanced treated water
- WRD's engineering and hydrogeology groups collaboration on this multi-discipline project
- Overview on component of an injection well and equipment required for its functionality and standard operation
- Discuss both the design and drilling phases of the project





LOCAL WATER DEMANDS



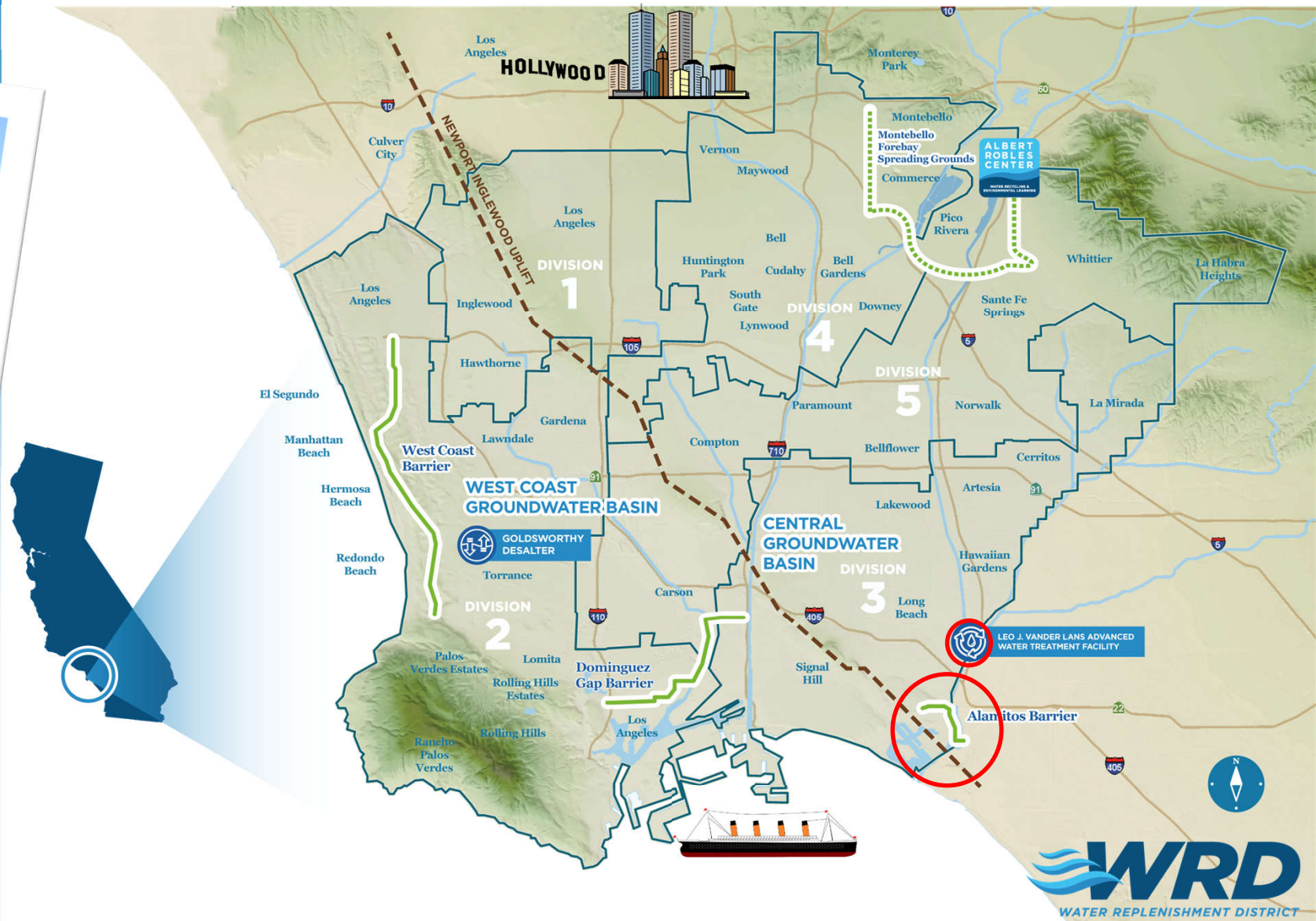
~ 50% supplied from groundwater wells



~ 50% supplied by imported water



WRD replenishes the groundwater basins that supply nearly 50% of demand



WRD SERVES:
420 sq. miles, 43 cities, 4 million residents

Background – LVL AWTF

- Originally built in 2003, expanded in 2014
- LVL Total Production Capacity = 8 MGD
- MF/RO/UVAOP advanced water treatment plant
- Operated under contract and in partnership with Perc Water
- Current source water from Long Beach Water Reclamation Plant under agreement with Long Beach Utilities
- Injection at Alamitos Seawater Intrusion Barrier (4-7 MGD)



Project Concept

- LVL AWTF has additional capacity above existing Barrier demands
- New onsite high-capacity injection well to provide additional supply for improved *local groundwater resiliency*
- Injection well located on the LVL AWTF property with **~2 MGD capacity** (goal)
- Two monitoring wells were installed for regulatory monitoring requirements
- Injection well will be fed from the existing LVL AWTF Product Water Pump Station (PWPS)



Project Implementation- Drilling

Before we could start the drilling project, we had several tasks to complete:

- Well Permits
- Off-site Well Access Agreement
- Temporary NPDES
 - Construction Produced & Aquifer Pump Test Water
- California Title 22 Permit
 - Engineering Report & Tracer Study Plan



Project Implementation- Drilling

- Drilling Test Borehole and Wells
 - Yellow Jacket Drilling Services
 - GEI/Intera Team
- Initial Testing and Evaluation
 - Go / No Go Decision
- Proposed Injection Well Design
- Well Construction
 - Injection Well (IW) and
 - 2 Monitoring Wells (MWs)
- Well Development & Testing

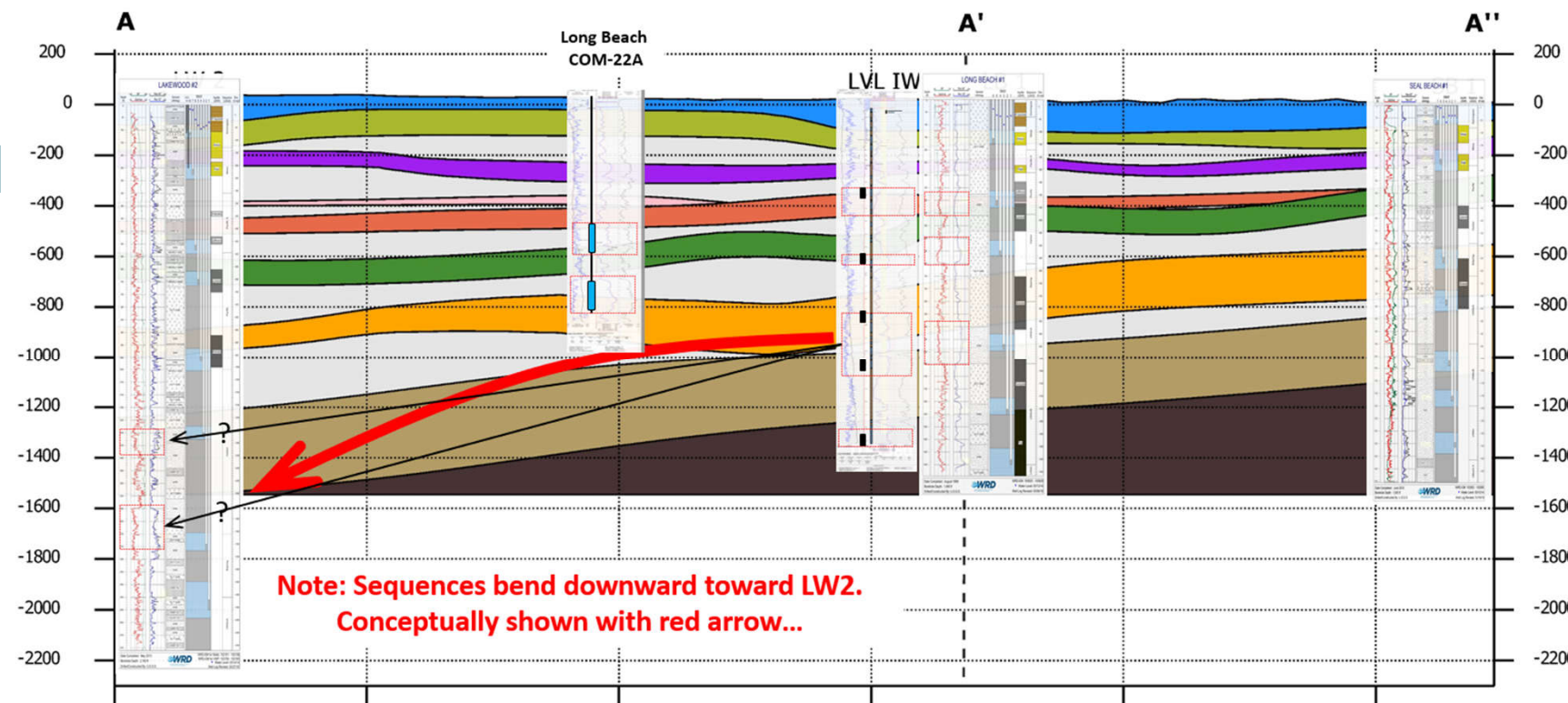


ONSITE INJECTION
WELL (LVL IW-01)
REVERSE ROTARY
DRILL RIG



Project Implementation- Drilling

- Initial 16.5" Borehole
– Began in April 2022
- Soil cuttings compared to surrounding wells
- TD at 1,360 ft bgs
- Prepared borehole for critical testing

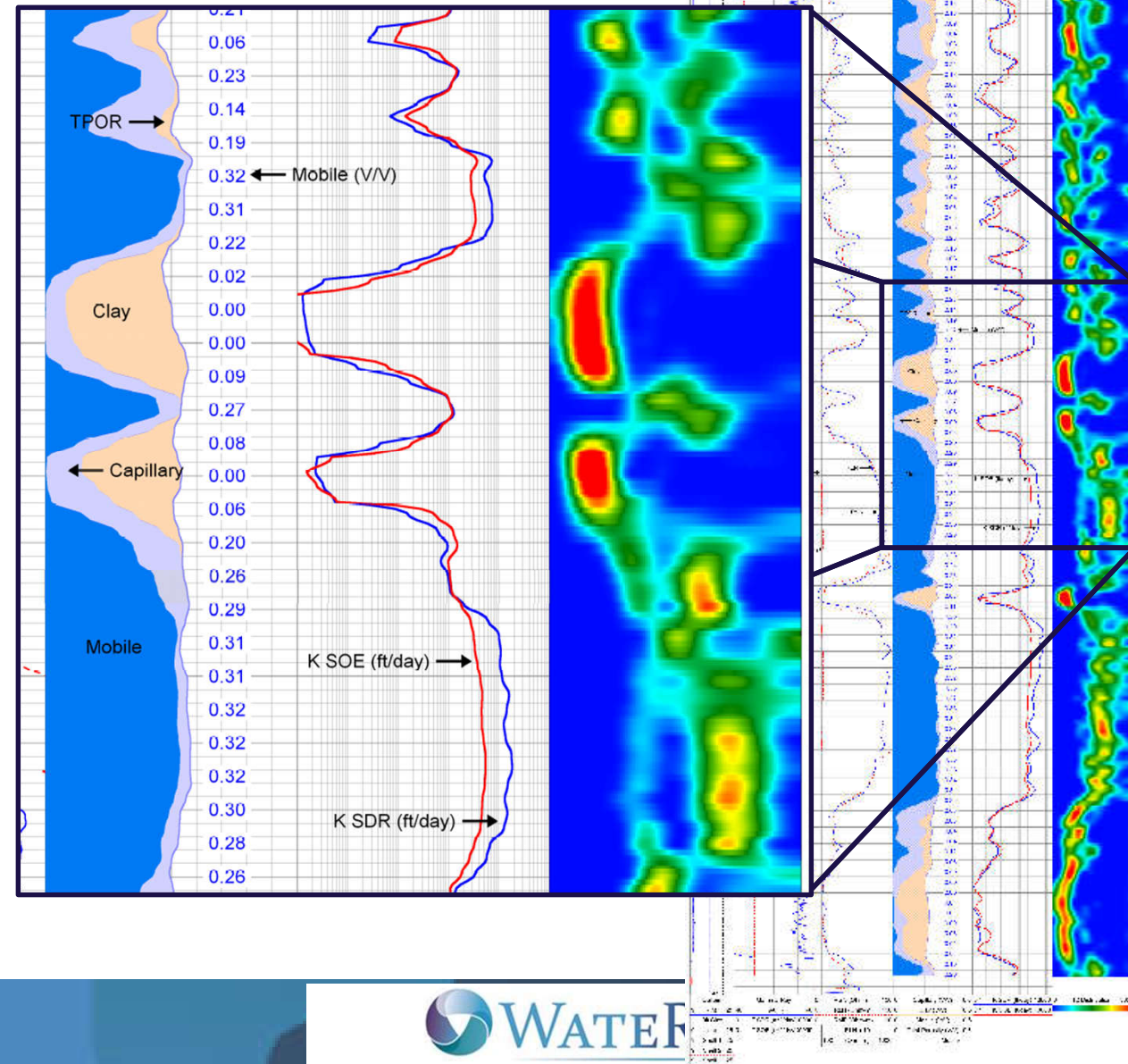


Project Implementation- Drilling

- Go / No-Go Evaluation

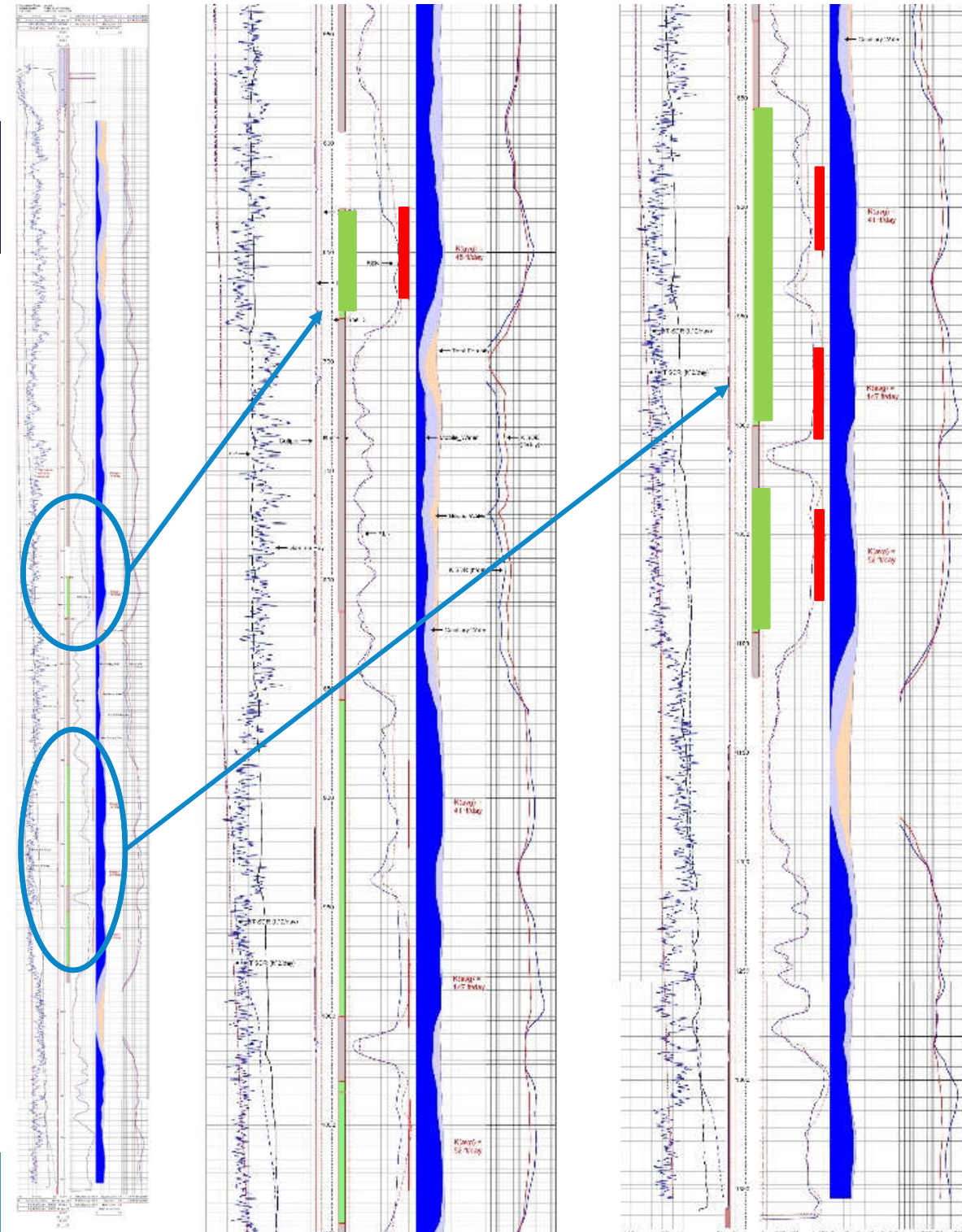
Lithology

- Geophysical survey
 - Standard GP & Nuclear Magnetic Resonance (NMR)
- Zone Testing
 - 6 Temporary Isolated Zones
- Falling Head Test results indicated K_{avg} values ranged from 41-175 ft/day.
- Suggested a production well could yield between 2,500_{low} – 3,000_{avg} gpm
- Assuming injection @ 60% of production, we would need 2,300 gpm to provide the targeted 2 mgd (1,389 gpm)



Project Implementation- Drilling

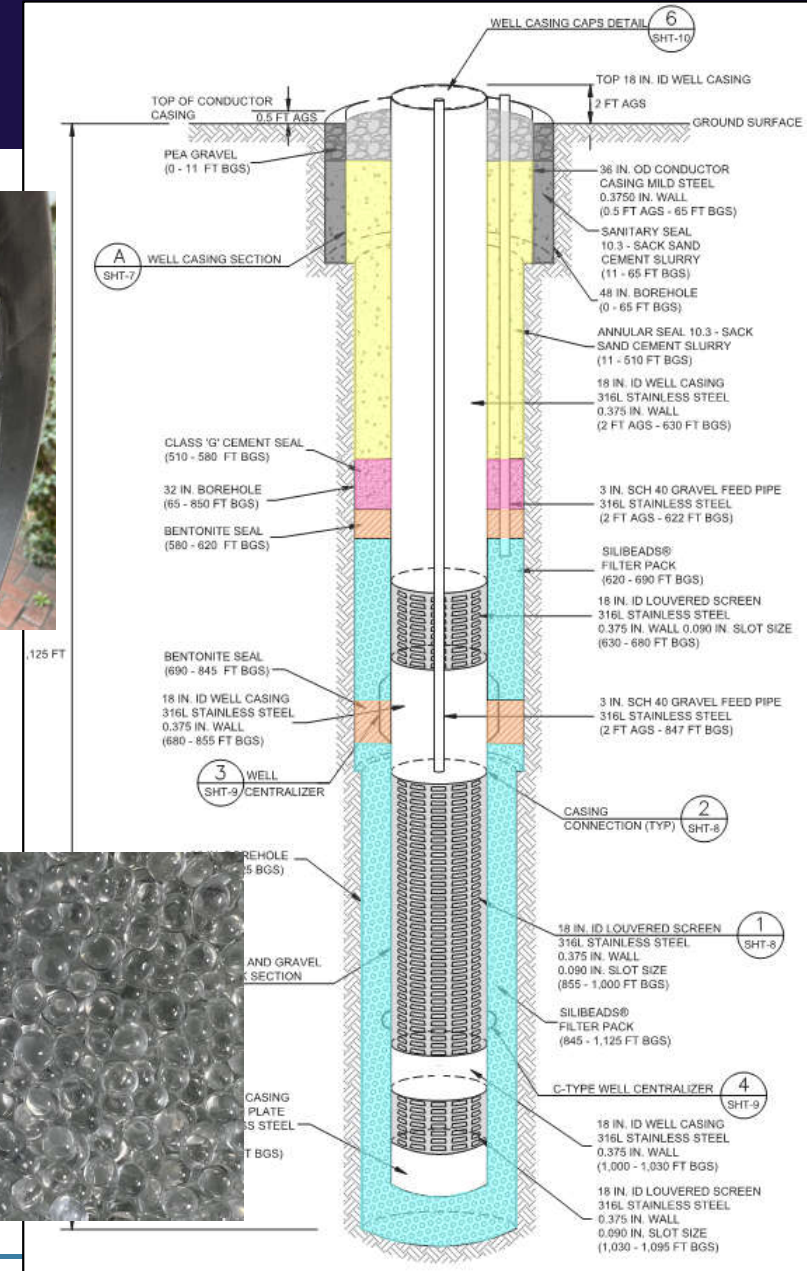
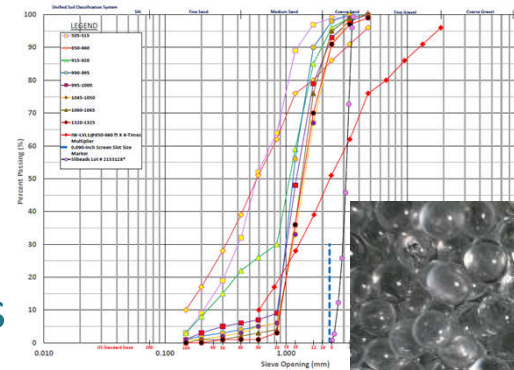
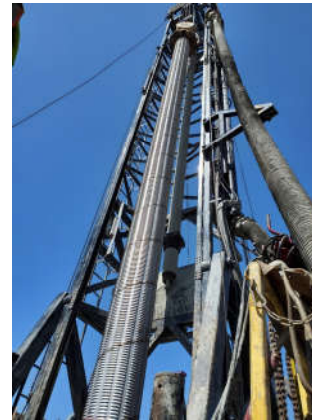
- Lithologic & GP logging indicated the best zones to injection into were the Lynwood & Silverado Aquifers
- Based on the presence low permeability zones and the results from zone testing, multiple screen intervals would be needed to maximize injection
- In June 2022, three screen intervals were proposed.



Project Implementation- Drilling

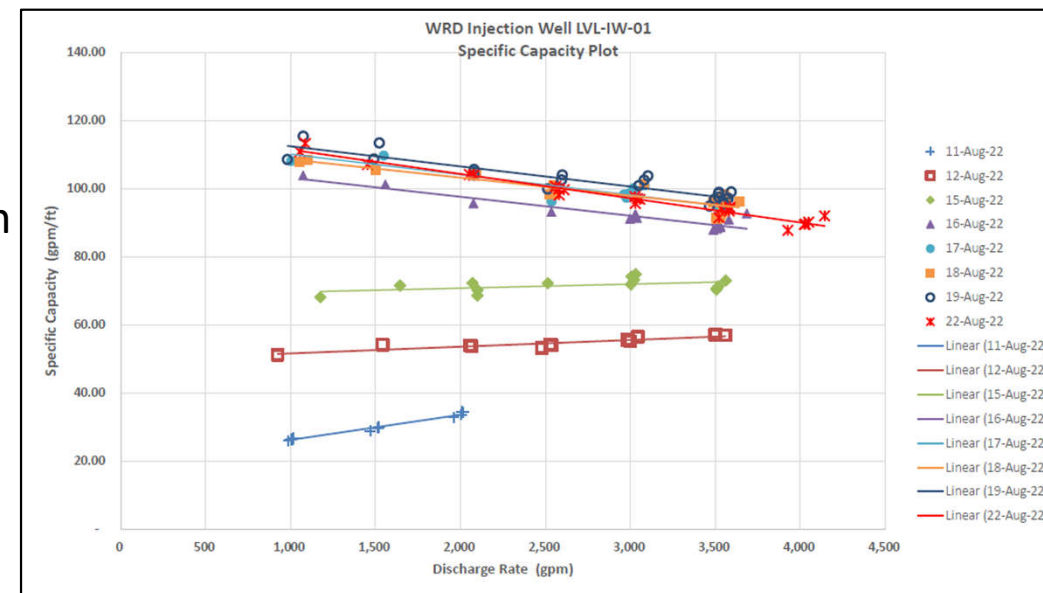
Well Construction

- Injection Well TD = 1,125 feet
 - 36" conductor casing; 0'-60'
 - 32" borehole; 60'-850'
 - 28" borehole; 850'-1,125'
 - 316L SS blank casing
 - 316L SS RoscoeMoss FulFlo louvered screen (0.85" slot)
- Screened at three separate intervals to target two regional aquifers
- Sigmund Lindner (SiLi) glass beads
 - Type S, 2.5-3.5 mm
- Bentonite pellets; ~40' & ~150' intervals
- Class 'G' cement (Halliburton); ~150'
- 10.3-sack sand-cement slurry; ~420'
- Pea gravel; ~10'



Project Implementation- Drilling

- Well Development & Testing
 - Used a high NaOCl dosing (1,500 ppm) to break up residual drilling mud.
 - Over 100 hours spent on mechanical & chemical development
 - 8 phases of pump development were used ranging from 900 gpm to 4,200 gpm
 - Rossum Sand Tester was used to monitor sand production throughout pump development
 - Sand production was minimized with pumping <3,000 gpm
- Final aquifer testing on this injection well was completed in Sept. 2022; SC = 100 gpm/ft
- Goal design for injection up to 3 MGD (2,080 gpm)
 - Short term weekly backflushing at 3,000 gpm

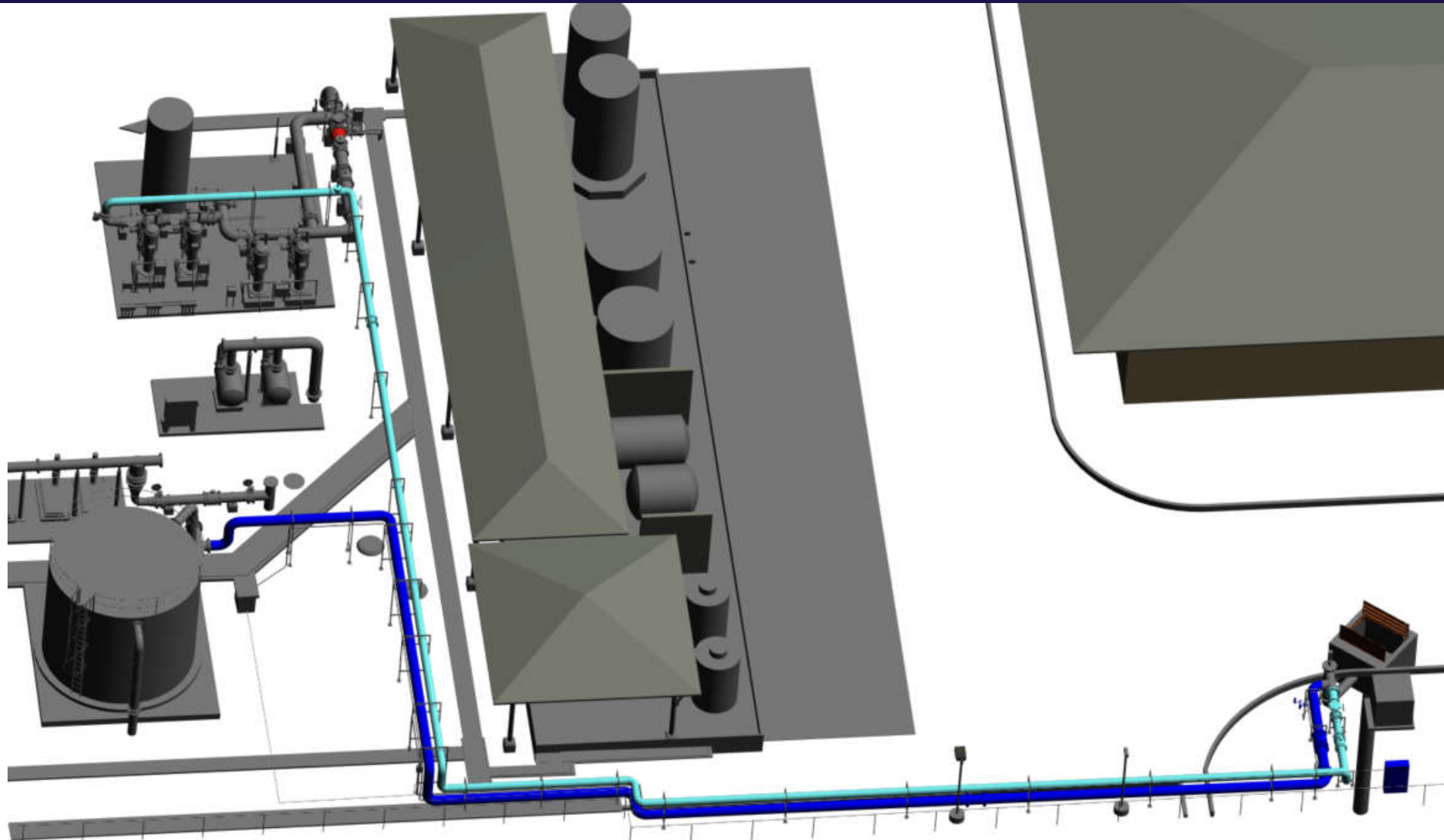


Project Implementation- Engineering

- PWPS to Injection Well
 - 280-linear feet of 12-inch diameter stainless steel pipeline
- Backflush System
 - 225-linear feet of 16-inch diameter stainless steel pipeline
 - Water quality analyzers
 - Well backflush submersible pump
- Well Components
 - 3R injection control valve
 - Wellhead connections
 - Well vault
- Electrical Improvements
- Programming

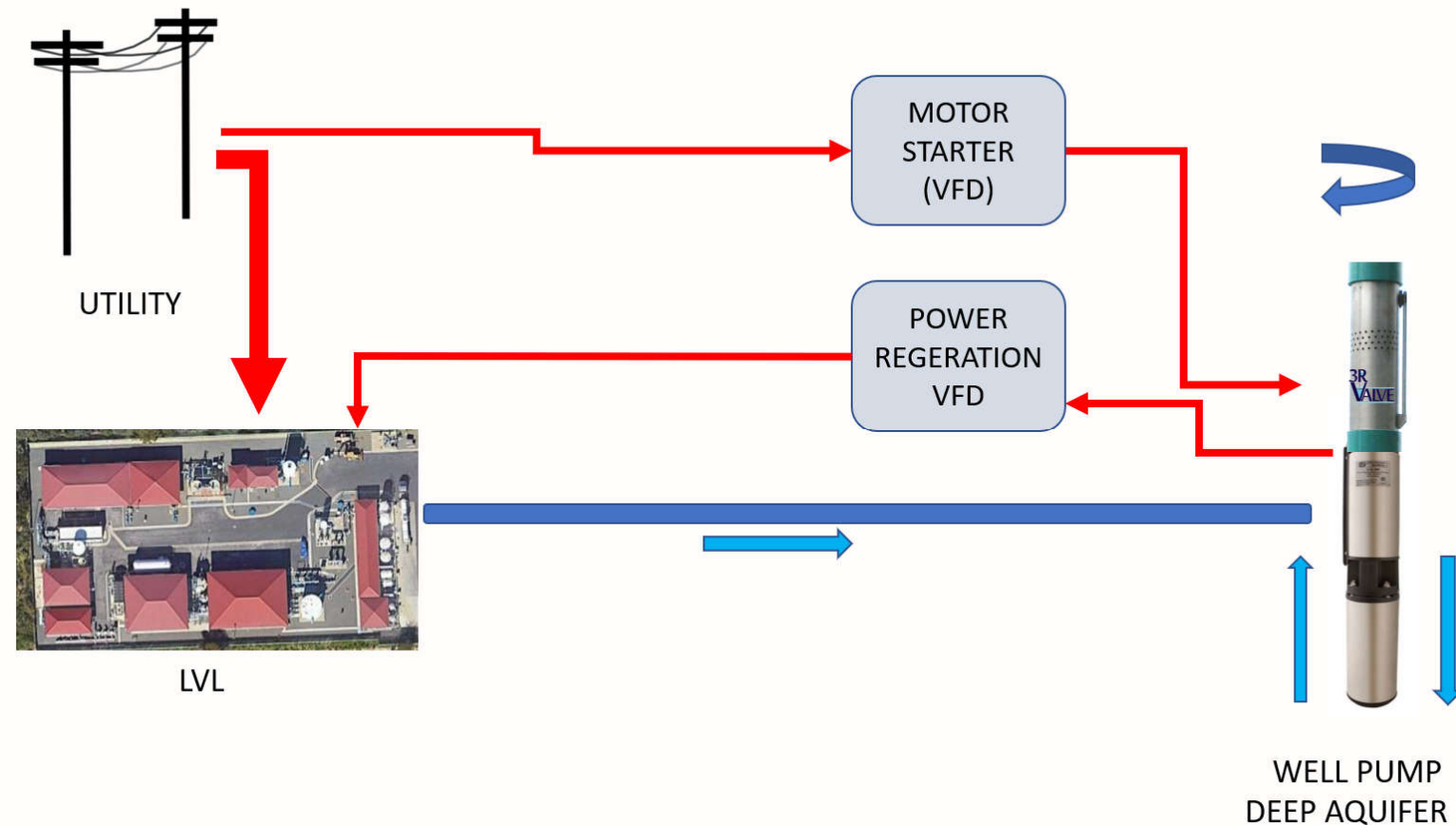


Project Implementation- Engineering



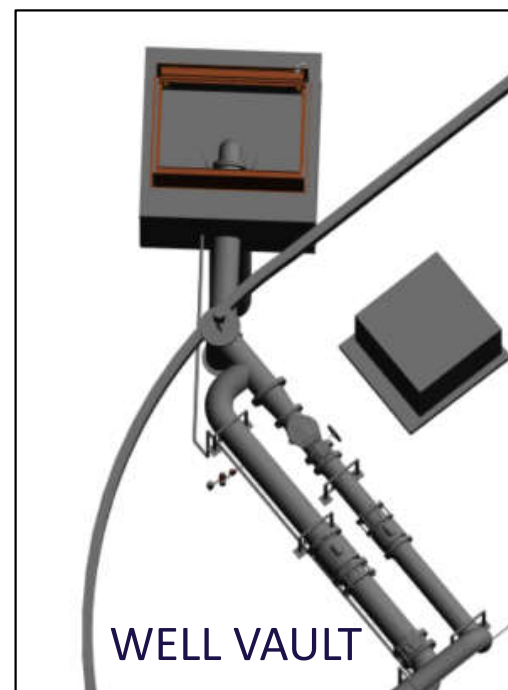
Project Implementation- Engineering

- Downhole components
 - Submersible Pump
 - 3R Valve
- Energy recovery
 - Small modifications to Pump
 - Add a Power Regeneration Drive
- Power will be added to the onsite power grid
 - Estimated at up to 10% of electricity demand



Lessons Learned

- Construction (Drilling)
- Development
- Equipping work is more complicated than initially budgeted or scheduled
 - Backflush discharge location
 - Permanent NPDES Requirements



Next Steps

- Regulatory approval for the use of this injection well – Q1 2024
- Injection well feed piping/backflush equipment installed – Q1 2024
- Final well development – prepare well for injection – Q1 2024
 - Radial Injection Surge Development (RISD)
- Tracer Study & Injection Cycle Testing – complete Q3/Q4 2024

High-capacity injection well will help to maximize recycled water usage and increase local groundwater resiliency



THANK YOU



@WRDsocal



4040 Paramount Blvd.
Lakewood, CA 90712



www.WRD.org



WaterReuse LA Chapter

June 13, 2023

Craig Justice, PERC Water

Area Operations Manager / CPO



perc water

DESIGN | BUILD | OPERATE

SUBSIDIARIES



- ✓ leading water infrastructure company that designs, builds, and operates water infrastructure throughout the U.S.
- ✓ CWCO Acquired remaining interest in January 2023



- ✓ OEM & service provider of a wide range of products and services applicable to water treatment
- ✓ CWCO Acquired remaining interest in January 2020



CWCO installed their first desalination plant in 1989 in Grand Cayman

- ✓ **Established in 1973 & obtained first public utility license in 1979**
- ✓ **Provided water supply necessary to develop the famous 7-mile beach**

Largest sea water reverse osmosis plant in Bahamas

■ By BRENT DEAN

A NEW \$29 million reverse osmosis plant was officially commissioned yesterday at the Baillou Hill Road water plant.

The plant, which is the largest sea water reverse osmosis desalination facility in the Bahamas, has a production capacity of 7.2 million US gallons of drinking water per day, with a minimum production level of 6 million US gallons of potable water a day.

The plant is hurricane proof, with the capacity to withstand winds of up to 150 miles an hour, and is accompanied by a generator that will ensure the continuation of service in the event of prolonged power outages.

Works Minister Bradley Roberts stated that the addition of this plant, and the further expansion of the water works system in New Providence, will soon bring to an end the barging of water from Andros.

Mr Roberts also noted that the plant will increase overall output of the water system to 9.8 million imperial gallons per day, with an overall production capacity of 12 million imperial gallons per day.

New reverse osmosis plants are also in preparation for the northern, south-western and eastern portions of New Providence, according to Mr Roberts.

Mr Roberts noted that currently the water and sewerage

corporation serves 30 per cent of residents and hotels in New Providence. He advised those not connected to the water system to reconnect – to preserve the ground water system and to avoid health problems that may result from consumption of polluted groundwater sources.

The Prime Minister commended Mr Roberts for all of his efforts as the minister of works.

The Prime Minister also said that Mr Roberts will be demitting office at the end of this term, which officially ends speculation as to whether or not he will return to active politics.

Mr Christie said that the expanded water facility is an effort to invest in the future of the country and is a part of the planned transformation of the Bahamas by his government.

In addition to the construction of the plant, Consolidated Water has also provided technical expertise and equipment that has led to a reduction of water loss by 1.2 million gallons a day.

In addition to the Baillou Hill Road plant, the company also operates a 2.6 million US gallon per day plant at Windsor Field, along with a 115,000 US gallon per day plant in South Bimini.

Consolidated Water is a company that originated in the Cayman Islands, and is publicly listed on the NASDAQ and the BIST.



PERC's average site footprint reduction rate is 70%



- ✓ Small environmental footprint with some or all treatment underground
- ✓ Cost sensitive design features utilizing common wall construction
- ✓ Ability to use surplus land for alternative purposes



ALBERT ROBLES CENTER AWTF *PICO RIVERA, CA*



- ✓ ARC supports a locally sustainable water supply that **meets 50% of the water demand for over 4 million residents** in WRD's Los Angeles County service area
- ✓ purifies approximately **3.25 billion gallons of tertiary treated water annually to near-distilled levels**
- ✓ PERC was part of the DB Team & has operated the AWTF since completion
- ✓ **15 MGD**
- ✓ **Groundwater Recharge**
- ✓ **UF trains directly coupled to a RO system, & industry first UVAOP system utilizing sodium hypochlorite**

LEO J. VANDER LANS AWTF *LONG BEACH, CA*



- ✓ Built in 2003, Expanded in 2014, PERC took over operations in 2020
- ✓ Delivers advanced treated water to the Alamitos Barrier, **playing a vital role in the Central Groundwater Basin**

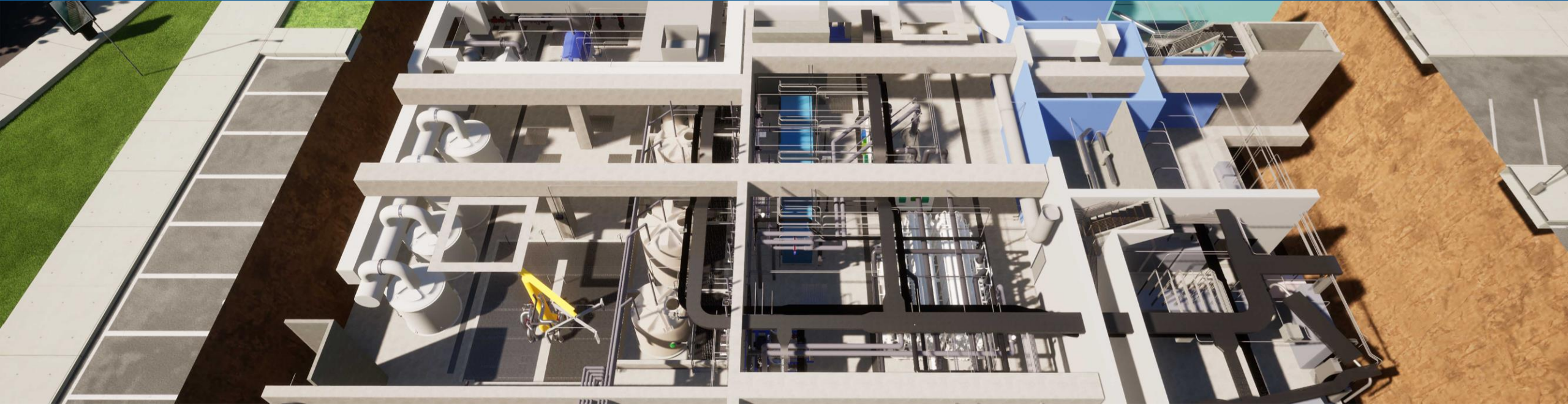
- ✓ *8 MGD MF/RO*
- ✓ *Groundwater Replenishment*
- ✓ *Disinfection with Advanced Oxidation*

SUSTAINABLE WATER INFRASTRUCTURE PROJECT SANTA MONICA, CA



- ✓ 'SWIP' helps secure Santa Monica's water future by **leveraging existing infrastructure & linking together new reuse elements**
- ✓ SWIP comprised of 1 MGD AWTF, 1.5 MG Stormwater Tank & Upgrades to Santa Monica Urban Runoff Recycling Facility
- ✓ RO/UVAOP Treatment Processes
- ✓ PERC led PDB Design Team and will operate the facility upon completion

SUSTAINABLE WATER INFRASTRUCTURE PROJECT *SANTA MONICA, CA*



INDUSTRY FIRSTS ACCOMPLISHED BY THE SWIP

- ✓ 1st facility to combine treatment for stormwater and wastewater for groundwater recharge
- ✓ 1st stormwater treatment system for direct groundwater injection
- ✓ 1st completely underground advanced treatment facility
- ✓ 1st advanced treatment facility to get pathogen credits for the MBR and cartridge filters

SARIVAL WRF *GOODYEAR, AZ*



- ✓ Liberty Utilities partnered with PERC Water to design and build the new Sarival Water Reclamation Facility
- ✓ Broke ground in Summer 2022. The Facility is scheduled to begin operations in 2024

- ✓ *4.0 MGD Capacity*
- ✓ *Membrane Bioreactor (MBR)*
- ✓ *ADEQ Title 18 Class A+ Effluent*
- ✓ *Groundwater replenishment*

PACIFIC GROVE WRF *PACIFIC GROVE, CA*



- ✓ Design, Built and Operated by PERC Water
- ✓ Eliminated potable water dependency for golf course and other irrigation

- ✓ *CA SRF Loan*
- ✓ *Noise & odor controls with architectural design, reducing visual impact*

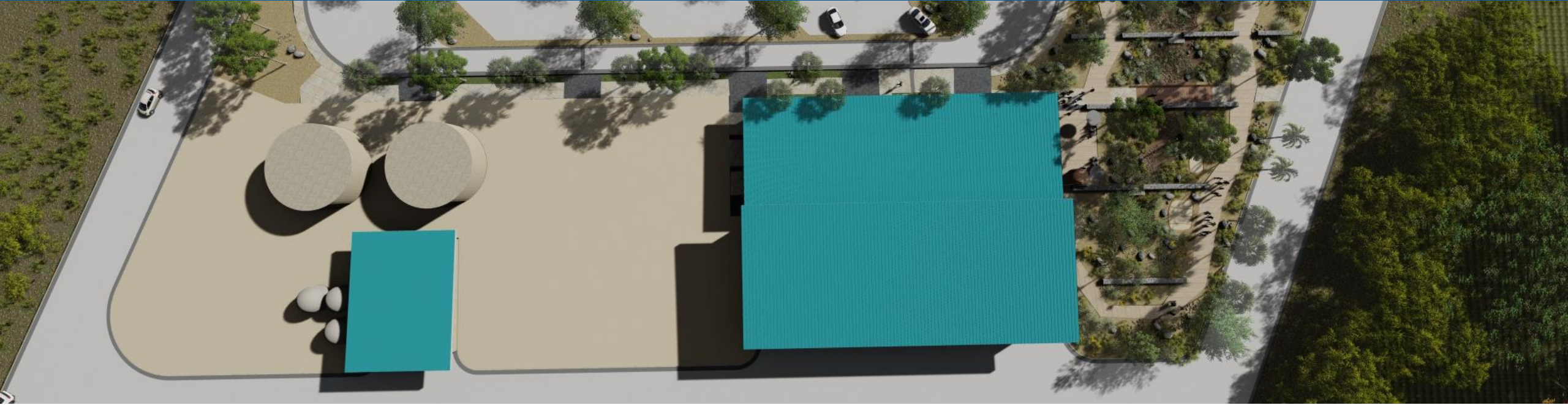
LAKE PARK WATER TREATMENT SYSTEM *LOS ANGELES, CA*



- ✓ System consists of multiple packaged treatment processes
- ✓ Removes ammonia and further treats recycled water received from West Basin Water District

- ✓ *System Commissioning and Startup*
- ✓ *Operations & Maintenance*

KALAELOA SEWATER DESALINATION FACILITY *KAPOLEI, HI*



- ✓ Awarded contract in 2023 to design, pilot test, permit, construct, start-up, test, and operate and maintain the Project for 20 years
- ✓ Provides drought-proof, high quality local water supply that is environmentally sustainable

- ✓ *1.7 MGD, expandable to 5*
- ✓ *Seawater Reverse Osmosis*

Contact PERC Water Corporation



Eric Gonzales

Director of Operations

PERC Water Corporation

17520 Newhope Street, Suite 180

Fountain Valley, California 92708

c. 714.745.6827

egonzales@percwater.com

www.percwater.com

WateReuse California LA Chapter Meeting



June 13, 2023

Legislation & Regulation Update

Raymond Jay
Metropolitan Water District of Southern California
(213) 217-5777 or rjay@mwdh2o.com

2023 California Legislative Calendar

- Jan. 1 Statutes take effect
- Jan. 4 Legislature reconvenes
- Jan. 10 Governor submits budget to Legislature
- Feb. 17 Last day for bills to be introduced
- Apr. 28 Last day policy comm. to report fiscal bills
- May 5 Last day fiscal comm. to report fiscal bills
- June 2 Last day for bills to pass house of origin
- June 15 Last day to pass budget
- Sept. 14 Last day for any bill to be passed
- Oct. 14 Last day for Governor to sign or veto bills
- See: <http://assembly.ca.gov/legislativedeadlines>

2023 Water Legislation Introduced

- SB 366 (Caballero): The California Water Plan: long-term supply targets; WRCA = Support
- SB 745 (Cortese) Drought Resistant Building Standards; WRCA = O/A
- AB 682 (Mathis): SWRCB: online search tool: funding applications; WRCA = Support
- AB 1572 (Friedman): Potable water: nonfunctional turf; WRCA = Watch
- AB 1573 (Friedman): Water Conservation: Landscape Design: model ordinances; WRCA = Watch
- <https://watereuse.org/sections/watereuse-california/legislativeregulatory-committee/>
- https://leginfo.legislature.ca.gov/faces/billSearchClient.xhtml?session_year=20232024&keyword=water%20recycling&house=Both&author=All&lawCode=All

California Budget

- Budget due by June 15th
- Estimated Budget deficit of ~\$9B for FY 23/24
- May Revise proposes to shift \$270 million in budget for recycled water to water bond(s)
- WRCA comment letter – request \$1.8B in Bonds
- Budget Trailer Bill with new RW fee

Regulatory Update

● Direct Potable Reuse Regulations

- SWRCB to adopt regulations by December 31, 2023
- Expect updated draft and Formal Rule making to begin in Summer 2023

https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/dpr-criteria-panel.html

● Water Use Efficiency Regulations

- Formal Rule making to begin in June 2023
- Includes potential Potable Reuse Bonus Incentive up to 15%

<https://water.ca.gov/Programs/Water-Use-And-Efficiency/2018-Water-Conservation-Legislation/Urban-Water-Use-Efficiency-Standards-Variances-and-Performance-Measures>

● On-Site Treatment & Reuse of Non-Potable Water

- SWRCB over due to adopt regulations by December 1, 2022
- SWRCB rulemaking process: Expected to begin in Summer 2023


https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/onsite_nonpotable_reuse_regulations.html

● Cross Connection Control Handbook

- Allows swivel ell as a change over device; Board Adoption Meeting: TBD

https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/cccp.html

Local, State and Federal Funding Opportunities

 Local, State and Federal Funding Opportunities ⁽¹⁾ APRIL 2023							
PROGRAM	Total allocation	Funding available this Round	Purpose	Eligible Projects	Status	Anticipated Timeline	Notes
MWD On-Site Retrofit Program (OSRP) * <i>*only MWD members are eligible for this funding</i>	\$2M per year	\$195/acre-foot over 10 years.	Provides financial incentives directly to customers	Public and private owners to convert potable water irrigation or industrial water systems to utilize recycled water.	SOLICITATION OPEN	First come first serve basis starting 7/1 through 6/30 or until funds are exhausted.	Contact: Jessica Arm, Associate Resource Specialist jarm@mwdh2o.com http://www.bewaterwise.com/on-site-retrofit-program.html
MWD Local Resource Program (LRP)* <i>*only MWD members are eligible for this funding</i>			Provides financial incentives for the development of water recycling, groundwater recovery, and seawater desalination projects.	Projects can include: <ul style="list-style-type: none"> • Water recycling • Groundwater recovery • Seawater desalination Three incentive payment options: <ul style="list-style-type: none"> • Sliding scale incentives up to \$340/AF over 25 years, • Sliding scale incentives up to \$475/AF over 15 years, or • Fixed incentive up to \$305/AF over 25 years. 	SOLICITATION OPEN	First come first serve basis starting 7/1 through 6/30 or until funds are exhausted.	Contact: Nadia Hardjadinata Resource Specialist nhardjadinata@mwdh2o.com http://www.mwdh2o.com/AboutYourWater/Planning/Funding-Programs/Local-Resource-Program-Funding
Water Savings Incentive Program			Open to all commercial, industrial, agricultural, institutional and large Landscape customers	Project examples: <ul style="list-style-type: none"> • Replacement of older, less water-efficient equipment, • Comprehensive changes to industrial processes that reduce water consumption, • Improvements to existing irrigation systems and landscaping to improve water use efficiency. 	SOLICITATION OPEN	Payment amount is up to \$0.60 per 1,000 gallons saved per year over the project live, up to a maximum of 10%. Incentives are limited to 50% of eligible project costs	

• <https://watereuse.org/wp-content/uploads/2023/03/Summary-of-Funding-Opportunities-as-of-04-01-23.pdf>

• CWSRF/DWSRF Funding- IUP comments due before June 20, 2023

Federal Update

- FY23 Appropriations
- Large Scale Water Recycling program
 - Draft guidance on Feasibility Studies released
 - Funding for Feasibility Studies expected by Summer
- Alternative Water Supply program
 - Letter requesting additional funding
- BABAA Waivers
 - Request additional waivers
- PFAS
 - WRA submitted comment letter
 - EPA Public comments period extended

Questions?

If you have any questions, please contact:

Raymond Jay,



c/o Metropolitan Water District of Southern California
700 N Alameda Street
Los Angeles, CA 90054
(213) 217-5777
rjay@mwd.h2o.com



Chapter Trustee Updates

WATEREUSE LA Chapter – June 13, 2023



Last Board of Trustees Meeting: May 12, 2023



Funding Opportunities

- Able to maintain existing recycled water grant funding (\$270 Million), with the growing state budget deficit
 - WRCA developed coalition letter to support the budget funding request
- Climate bond measures – asking for \$1.5B for recycled water funding, both potable and nonpotable

Information from 5/12/23 Mtg

- Continuation of Water Recycling Funding Contract
- Report From Conference Committee – Venue discussion

Chapter Trustee Updates

WATEREUSE LA Chapter – June 13, 2023



Last Board of Trustees Meeting: May 12, 2023



California Validation Guidebook Project Contribution

- National Water Research Institute (NWRI) Facilitated Effort
 - Recommendation to increase contribution to \$10k, from \$5,k \$125k total cost
 - Effort to develop guide for project in the permitting phase on DDW's process for log removal credits
 - Motion to increase contribution to \$10k – Approved by Board
 - \$80k total contributions to date



Chapter Trustee Updates

WATEREUSE LA Chapter – June 13, 2023



- June 15th Registration (early bird)
- All reservations must be made by October 5th, 2023, to ensure the special conference room rate
- Conference volunteers needed to help staff event and update LA Chapter Poster for the 2023 conference in Indian Wells



2023 WATEREUSE
CALIFORNIA
CONFERENCE
INDIAN WELLS, CA • NOV. 5-7



Chapter Trustee Updates

WATEREUSE LA Chapter – June 13, 2023



Submit an Abstract Today!

- Present your project, research, or findings to an audience of California's leading water reuse practitioners
- If not a California-based topic, abstracts should include detail about how the topic relates to California reuse



INDIAN WELLS, CA • NOV. 5-7



2023 Call For Presentations

Chapter Trustee Updates

WATEREUSE LA Chapter – June 13, 2023



Reimagining Water Together

Schedule and Technical Program are currently being continually updated



REMOVING
BARRIERS,
ELEVATING
OPPORTUNITIES



LA Chapter Update

➤ Emerging Professionals Committee

- Chair: *Seto Cherchian*

Scherchian@BrwnCald.com

➤ Communications Lead

- Chair: *Oliver Slosser*

oslosser@lvmwd.com

➤ Awards Champion

- Chair: *Everett Ferguson*

eferguson@wrd.org

➤ Technical Topics Committee

- Chair: *Alex Franchi*

alex.franchi@aecom.com

➤ Call for Conference Volunteers

- Send email to Debbie Armstrong

darmstrong@watereuse.org



Submit an Award Nomination

Deadline: August 15, 2023

Each year, WaterReuse California recognizes agencies, customers, and individuals that have demonstrated exceptional leadership in advancing water recycling in California. The awards will be presented at the 2023 WaterReuse California Conference, November 5-7 in Indian Wells. We invite you to nominate leaders advancing the practice of water reuse in California!

The award categories are:

- Bahman Sheikh Award for Vision in Water Reuse
- Recycled Water Agency of the Year (Small, Medium, and Large)
- Recycled Water Outreach/Education Program of the Year
- Recycled Water Advocate of the Year
- Recycled Water Customer of the Year (North and South)
- Recycled Water Staff Person of the Year

Submit a Nomination!

Reminder: Abstracts due July 28, 2023

Submit your abstract today and present your project, research, or findings to an audience of California's leading water reuse practitioners! WaterReuse California encourages submissions from presenters which include a diversity of voices including water and wastewater utility representation, especially from small utilities, young professionals, and graduate students. If not a California-based topic, abstracts should include detail about how the topic relates to California reuse.

Call for Abstracts

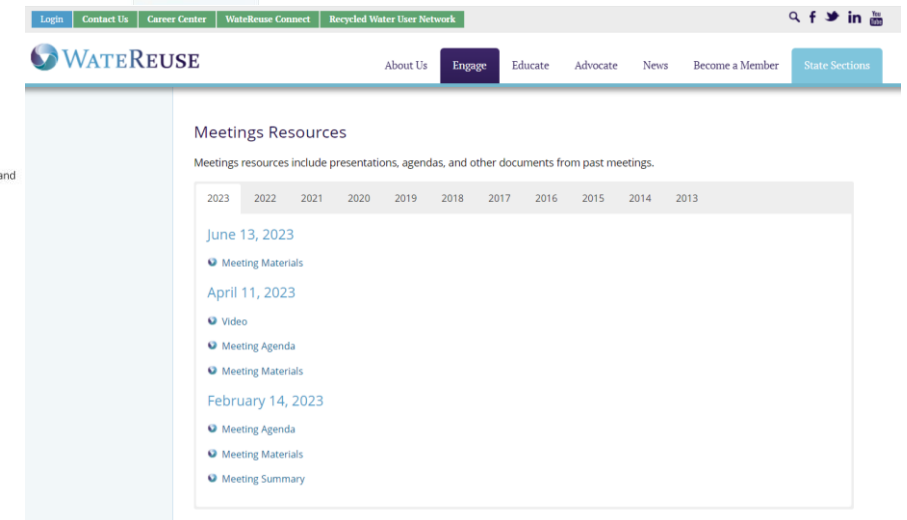
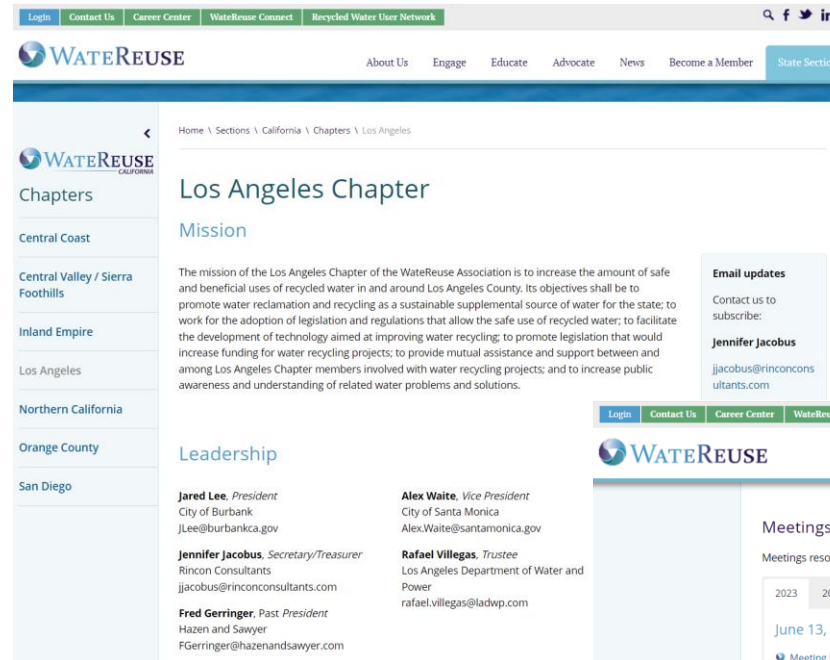
LA Chapter Update

➤ WateReuse LA Chapter Website

- Meeting Materials (Agenda, Presentation)
- Meeting Summaries and Zoom Video Recordings

➤ Meeting Summary - April 2023

- *Thank you Karina Gonzalez, LA Sanitation & Environment*



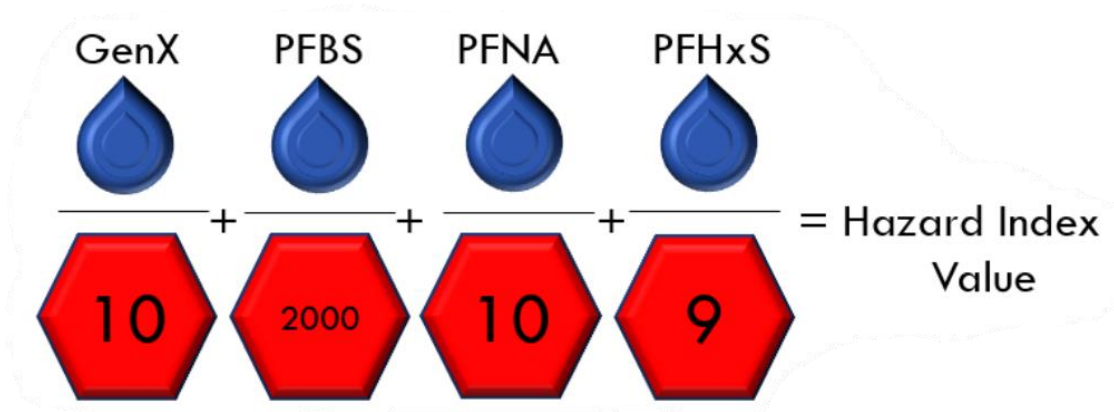
Membership Roundtable

EPA's Proposed Action for the PFAS NPDWR

Compound	Proposed MCLG	Proposed MCL (enforceable levels)
PFOA	0 ppt*	4.0 ppt*
PFOS	0 ppt*	4.0 ppt*
PFNA	1.0 (unitless) Hazard Index	1.0 (unitless) Hazard Index
PFHxS		
PFBS		
HFPO-DA (commonly referred to as GenX Chemicals)		

How does the proposed action affect your recycled water system?

What actions are you taking to mitigate PFAS contamination at the source and within the fenceline?



Next Meetings

- Tuesday, August 8, 2023:
 - Host: Las Virgenes Municipal Water District
 - Sponsor: Brown & Caldwell

- Tuesday, October 10, 2023:
 - Host opportunity
 - Sponsorship opportunity

