

Salinas Valley Distributed Water Treatment Project

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Goals of the Salinas Valley Distributed Water Treatment Project

A reliable and affordable option for supplying safe drinking water to disadvantaged communities (DACs) where consolidation or alternate local well(s) are infeasible/impractical.

Issues:

- DACs do not have the expertise to operate water treatment facilities
- The operation of water treatment systems must be affordable

To demonstrate that geographically separate but virtually networked (autonomous but remotely monitored/operated) treatment systems can be operated in several communities with economies of scale at affordable operating costs.

Work with the Regional Board to:

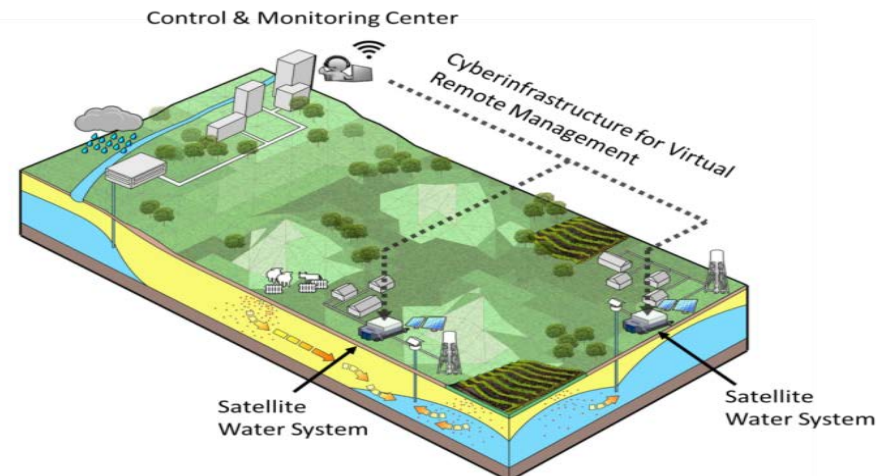
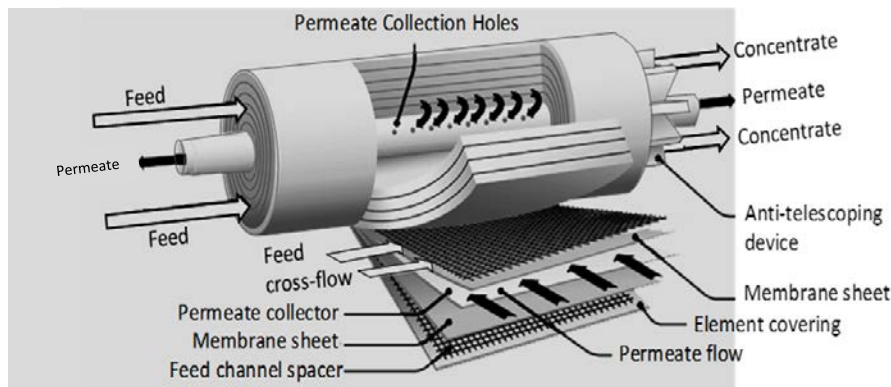
- Demonstrate septic tank suitability for residuals discharge from water treatment systems in small rural disadvantaged communities.

New Paradigm: Distributed Reverse Osmosis (RO) Membrane Treatment

RO Treatment technology is suitable for remote communities:

- Operational Simplicity
- Small foot print
- Removal of multiple contaminants (e.g., Nitrate, Cr(VI), etc.)
- Salinity reduction
- Compliance with water quality requirements (< MCL) at high recovery operation
- Suitable for self-adaptive/autonomous operation

Spiral-wound Reverse Osmosis Membrane

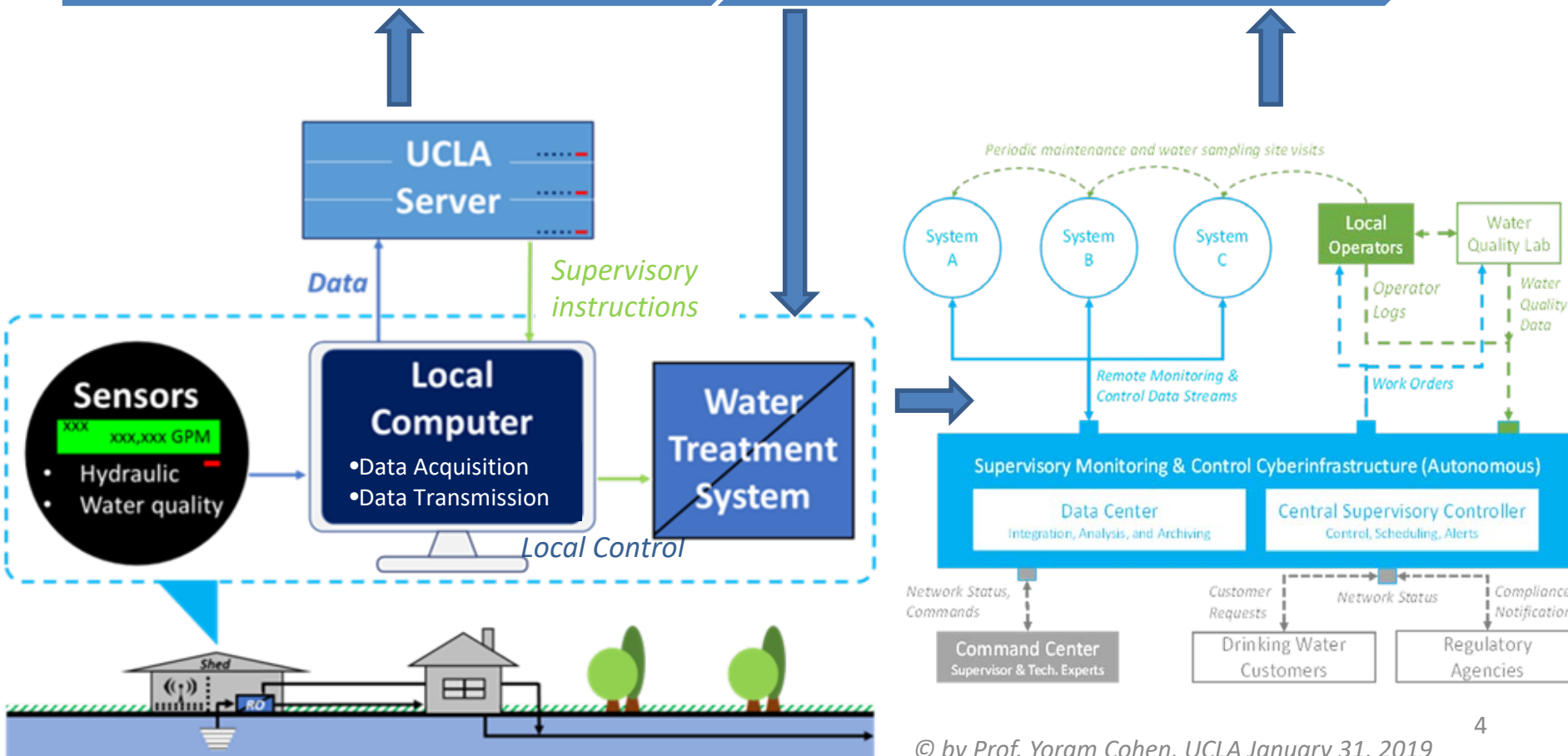


Distributed Water Treatment Systems 3

Virtual Consolidation

Network of Distributed Water Treatment Systems

Intelligent Remote Management of Satellite Systems



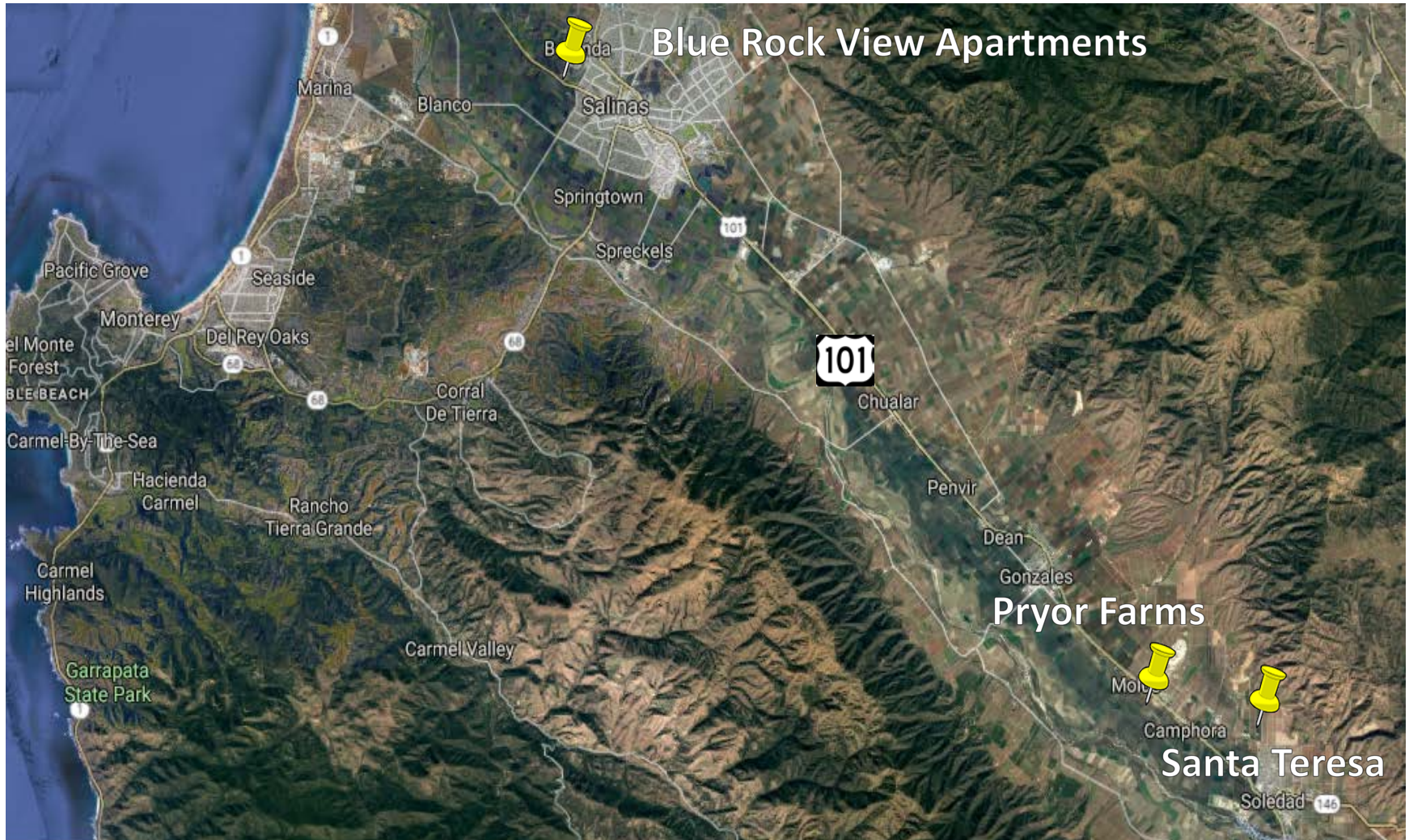
Why We Chose the Salinas Valley for this Pilot Project

Willing communities

Regional Board and Monterey County proactive on providing solutions for DACs

Both the Regional Board Leadership and County Departmental Leadership are supportive of the project

The Salinas Valley Pilot Communities



Pilot Project: Distributed membrane-based water treatment in disadvantaged communities

Community	No. Single Family Units	Population	Ave/Max Water Consumption (gal/day)	Proximity to nearest centralized water delivery and sewer infrastructure (km)	Septic Tank Capacity, Gallons (Retention time, days)
Site A	11	16	1013/1996	2.2 km ^(a)	4,500 (2.3 - 4.44)
Site B	8	36	2520/3597	4.4 km ^(b)	5,000 (1.4 - 2)
Site C	10	34	1246/2826	4.1 km ^(b)	5,000 (1.8 - 4)

^(a) distance from nearest Water treatment plant, and ^(b) distance from Soledad sewage treatment plant.

Site Investigation: Community Groundwater Quality

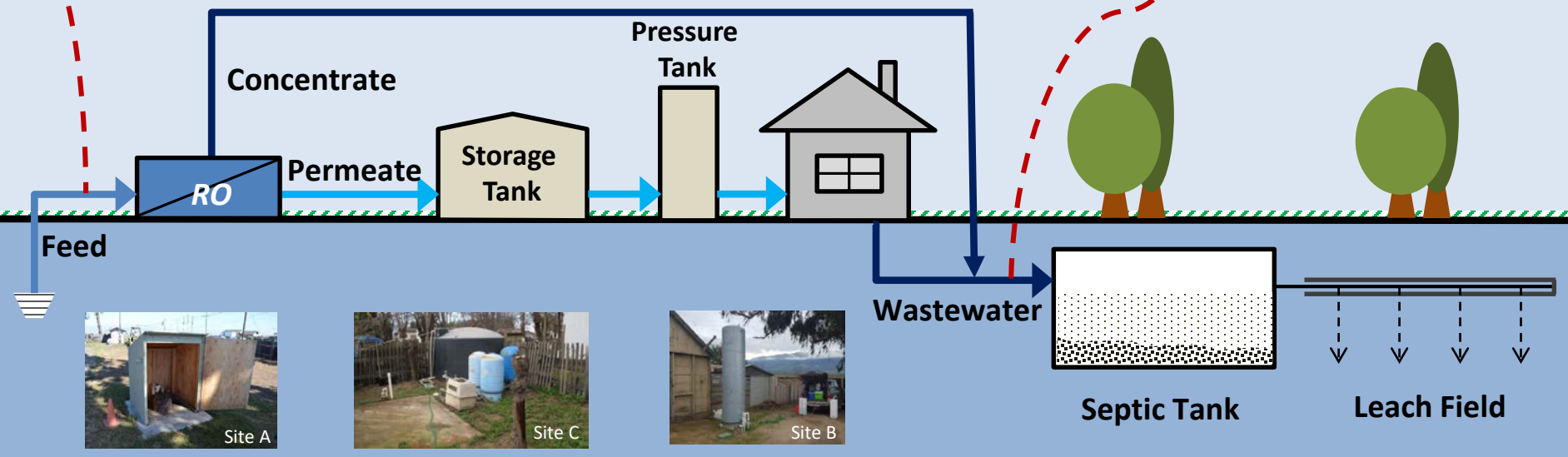
	Well Source Water		
	Site A	Site B	Site C
Turbidity (NTU)	0.15	0.15	3.2
Total dissolved solids (mg/L)	1126 - 1500	1091- 2020	554 - 594
Nitrate (mg/L as N ⁻)	26.4 – 39.6	20.2 – 21.3	10.1 – 10.8
pH	7.3	7.6	7.4
	Tap Water ^(a)		
	Site A	Site B	Site C
Lead (µg/L)	ND	ND	ND
Copper (µg/L)	75.1	624	21.8

^(a) kitchen tap water was collected based on the “Lead and Copper Rule”

Nitrate Removal from Impaired Groundwater via RO Membrane Treatment

Temporal variability of Source Water Quality & Water Demand

Discharge of RO concentrate (residual) stream in community septic tank

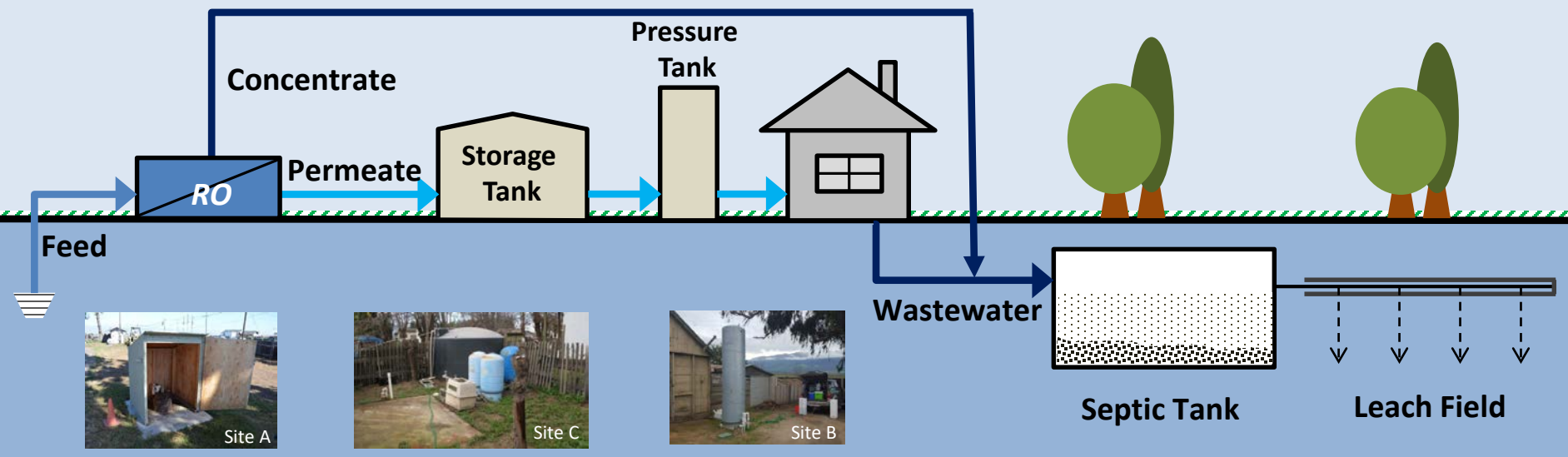


Nitrate Removal from Impaired Groundwater via RO Membrane Treatment

- ✓ RO system design and operational attributes:
 - ❑ Satisfy water quality requirements
 - ❑ High recovery operation
 - ❑ Self-adaptive operation
 - ❑ Remotely monitored/controlled



- RO water treatment system includes:**
- RO membrane unit
 - Pre-/Post-treatment
 - Product water and feedwater storage tanks
 - Residuals storage tank & beneficial reuse
 - Local and remote monitoring/control/management
 - Emergency plan
 - Web-accessible information/data



Development of water treatment systems







Major stages in the development and deployment of RO treatment for Nitrate removal from impaired groundwater in Small Remote Communities:

- ✓ Obtain **site specific information** (e.g., water quality, water use patterns) over a representative time period
- ✓ Perform systematic **process analysis to assess treatment feasibility**
- ✓ Evaluate the technical feasibility of **handling nitrate-laden RO residual stream in the community septic tank**
- ✓ **Field testing to establish cost effectiveness and performance** of distributed RO treatment systems

Pilot Communities



Blue Rock Apartments

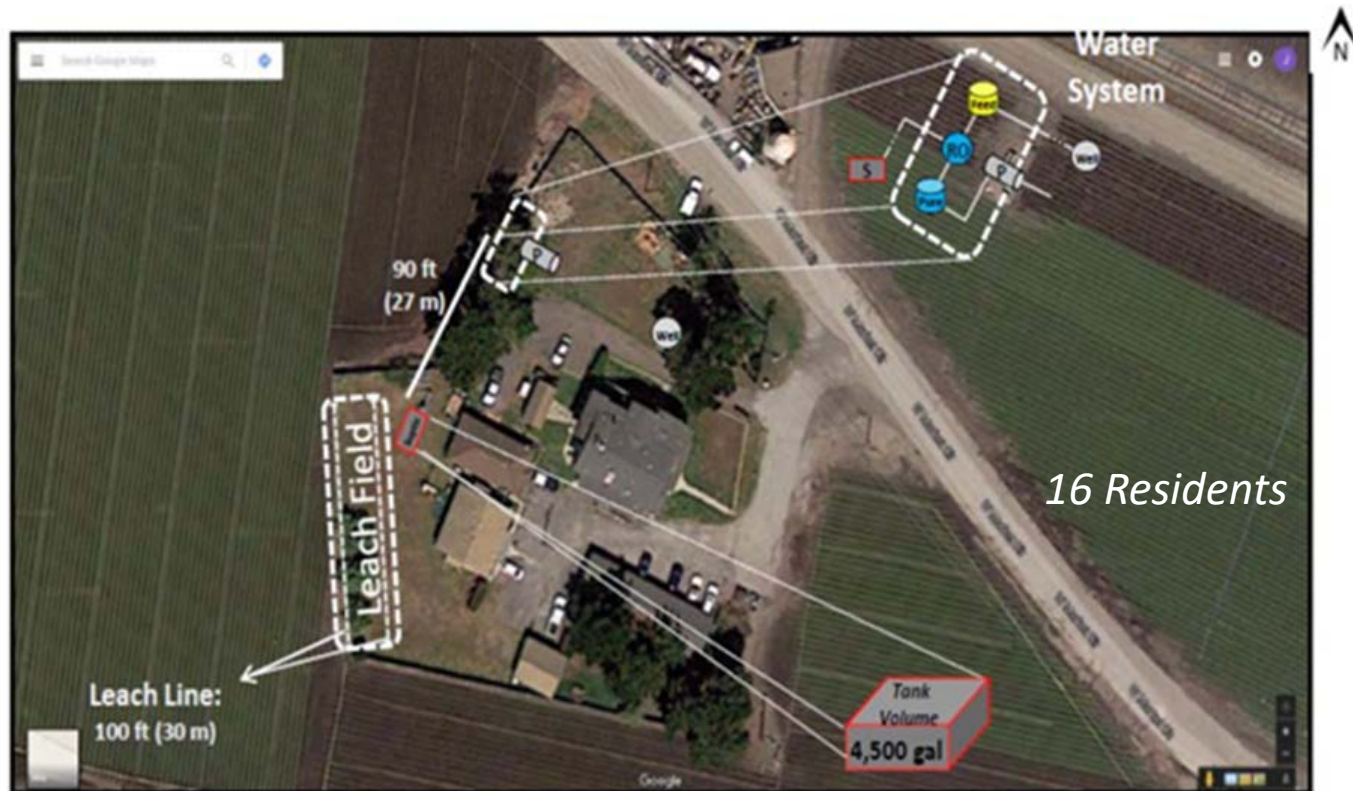
Existing Unit		Planned Unit	
Well		RO	
Pressure Tank		Feed Tank	
Septic Tank		Product Water Tank	

Straight Lines:

Aerial distance between shown units

Dotted Lines:

Water system site / Leach field






Note: Source water, treatment system product water & residual streams will be monitored as per established detailed regulatory monitoring plans regarding handling of residuals and operation of the water treatment systems. The treatment systems will include disinfection and re-mineralization units.

Pryor Farms

Existing Unit

Well	
Pressure Tank	
Septic Tank	

Planned Unit

RO	
Feed Tank	
Product Water Tank	

Straight Lines:

Aerial distance between shown units

Dotted Lines:

Water system site /
Leach field



Santa Teresa Village

Existing Unit

Well	
Pressure Tank	
Septic Tank	

Planned Unit

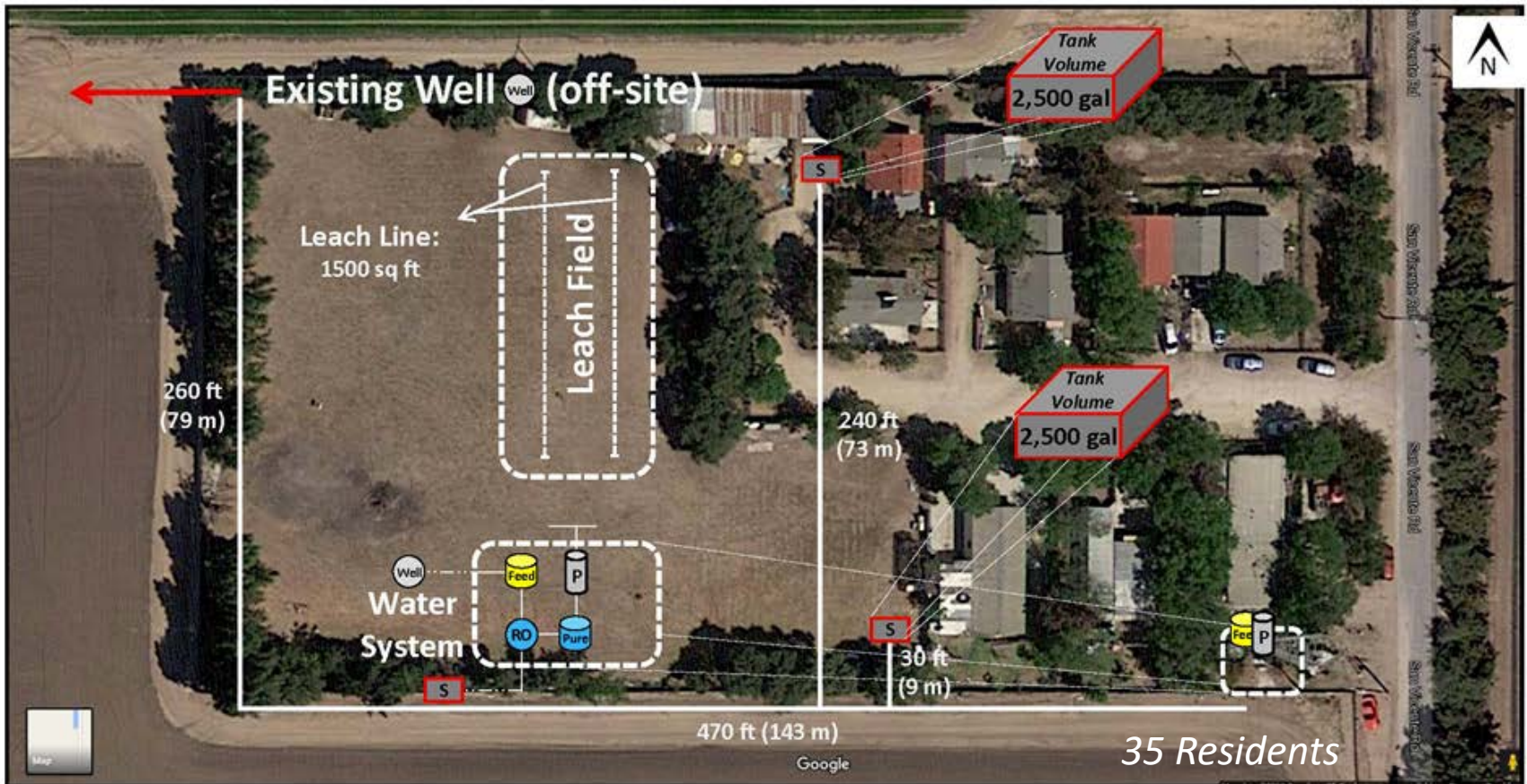
RO	
Feed Tank	
Product Water Tank	

Straight Lines:

Aerial distance between shown units

Dotted Lines:

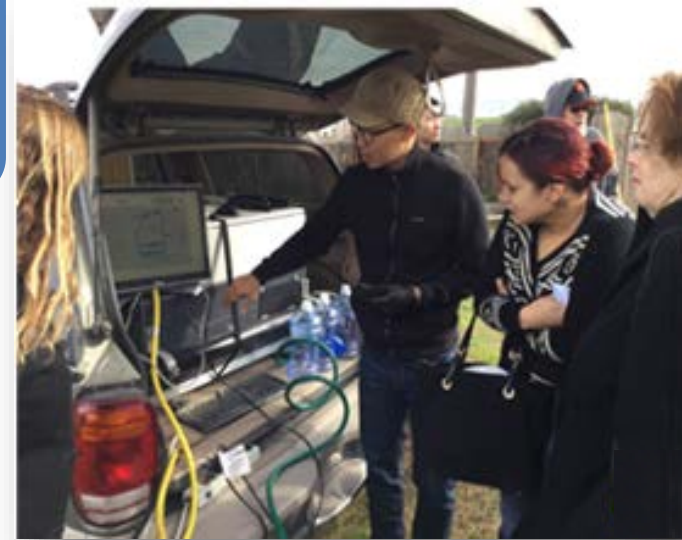
Water system site / Leach field



Onsite Testing of Nitrate Removal for Design and for other pollutants

Significant community outreach activities have been ongoing since the beginning of the project with the objectives of:

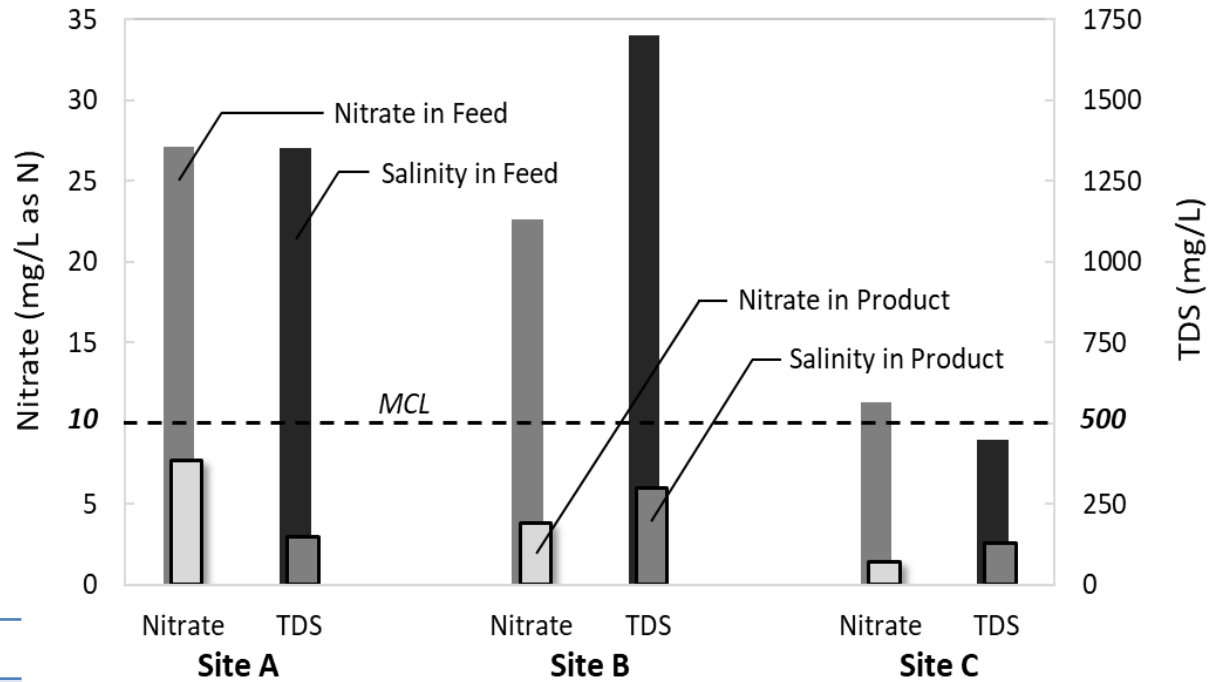
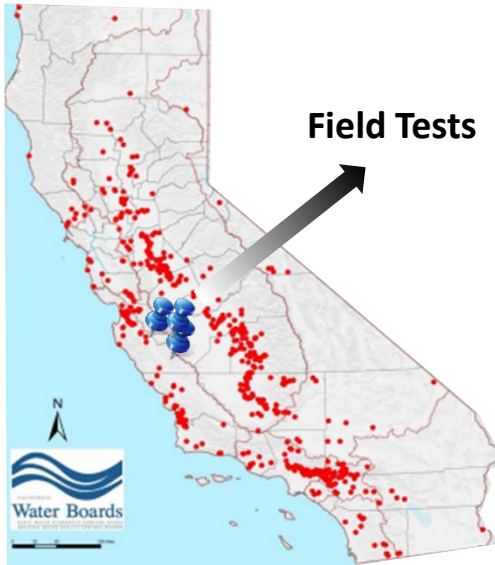
- Informing the residents of the basic treatment technology
- Demonstrating the water treatment technology
- Respond to questions by the residents
- Coordinate scheduling of site visits to carry out various elements of the project work
- Informing the residents and owners regarding the project status project along its various stages



Smart Water Meter installed at Santa Teresa

Community Source Water Purification and Salinity reduction

✓ High Recovery (90%) RO Operation enabling up to ~ 96% nitrate rejection



Parameter	Regulation
Nitrate (MCL)	10 mg/L as N
Salinity(guideline)¹	≤ 500 mg/L TDS

* USEPA: <https://www.epa.gov/dwregdev/drinking-water-regulations-and-contaminants#SecondaryList>



Project Status

The UCLA Project Team received informal approval from the Central Coast Regional Water Quality Control Board (CCRWQCB) for directing treatment residual stream to the community septic tank

- Approval was received along with the requirement for an extensive monitoring program
 - Monitoring of treatment system feed, concentrate and product water streams
 - Monitor septic tank inflow and outflow
- Monitoring data will serve to demonstrate nitrate denitrification under the septic tank anoxic environment. The data will provide the basis for a Regional Board streamlined general discharge permit or permit waiver to formally permit these and future water treatment systems for small DAC water systems.

Detailed water treatment systems technical and operational and maintenance (O&M) reports were prepared and submitted to both the State Board Division of Drinking Water and Monterey County

- Technical and O&M plans were refined based on extensive discussions and review by the Board

Detailed site infrastructure improvements plans which are necessary for water treatment installation/operation were finalized and submitted to both the SWRCB and the Monterey Department of Health, Drinking Water Program

Next Steps

Construction of RO treatment systems

- The UCLA Project Team is working with system integrator to finalize the working plans and procurement of components for construction of the RO system and its auxiliary units (e.g., pretreatment and post-treatment)

Implement an extensive monitoring program.

- The UCLA Project Team has made arrangements with a state Certified laboratories for the grab sampling part of the monitoring program for both RO residuals discharge handling and the drinking water permit.

Detailed operation of the treatment systems and commissioning plans were developed

Next Steps for the UCLA Project Team

Complete site preparations in advance of deployment of the water treatment systems

- Arrangements are underway with the owners and a sub-contractor regarding site preparations

Once the water treatment systems are commissioned and operating, the UCLA Project Team will:

- Demonstrate the operational efficiency of the water treatment systems
- Establish the operating and maintenance costs as well as capital costs
- Work to build community confidence in the water treatment systems

The UCLA Project Team will be working with the private and public sectors to develop a permanent arrangement for management of the network of treatment systems.

Questions?
