

# BUILDING A WORLD OF DIFFERENCE

8 October 2013

## WATEREUSE LA CHAPTER MEETING - INITIAL EXPANSION OF OCWD GWRS

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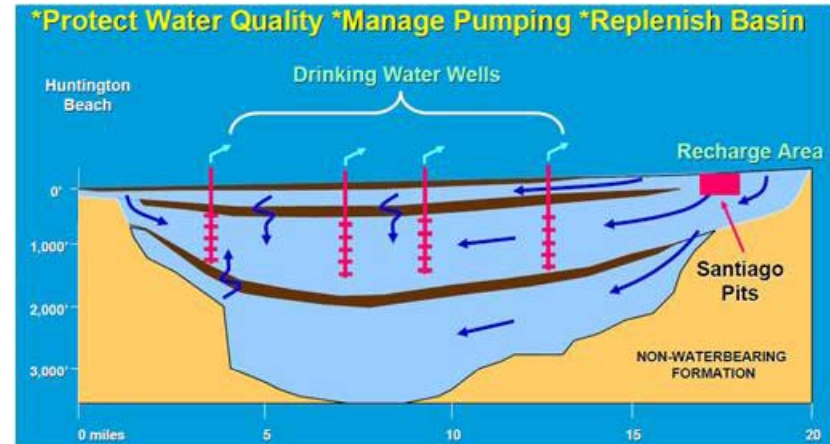
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# **INITIAL EXPANSION OF ORANGE COUNTY WATER DISTRICT'S GROUNDWATER REPLENISHMENT SYSTEM**

# OCWD GWRS PROJECT OBJECTIVES

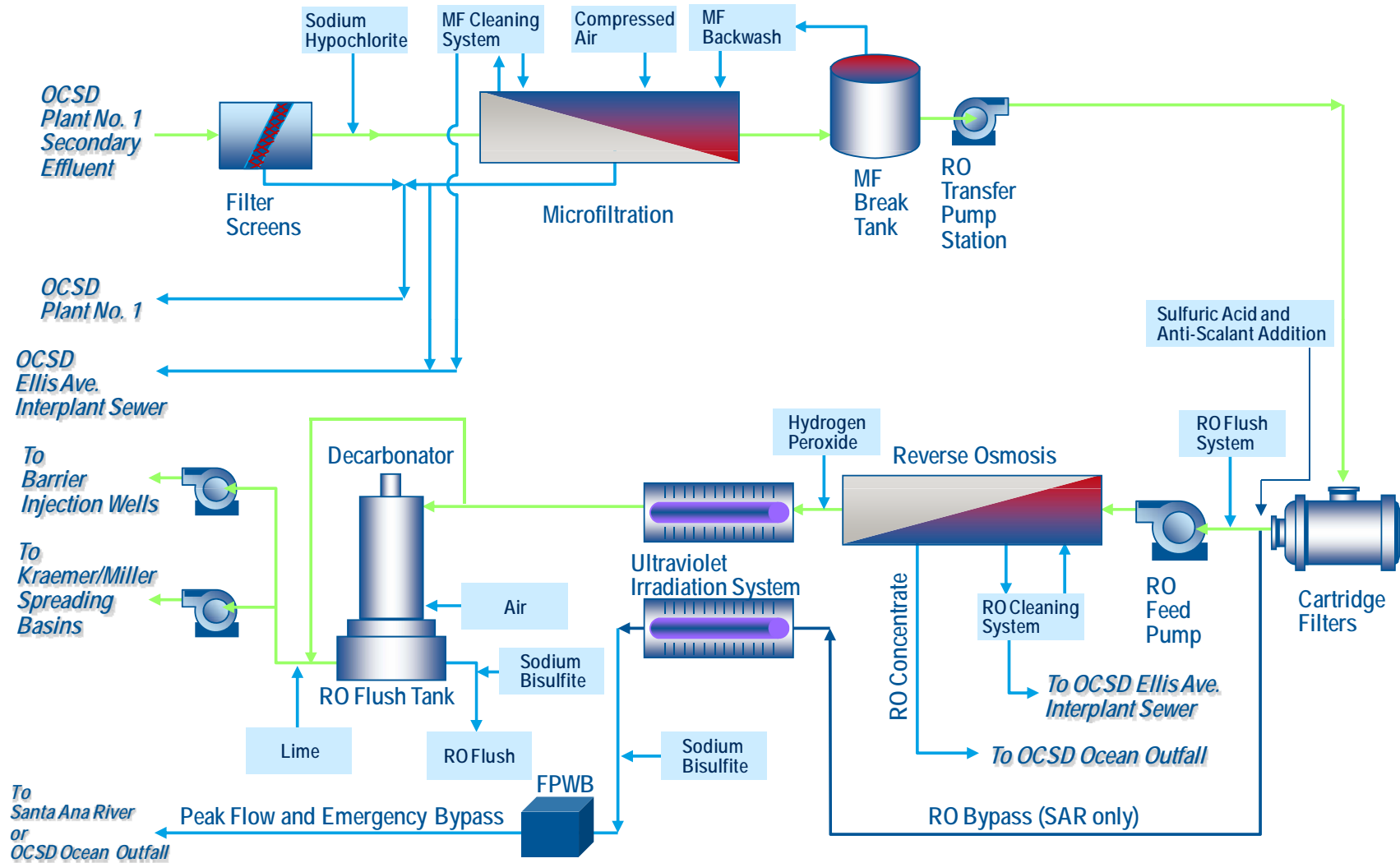
- Protect groundwater basins from seawater intrusion
- Replenish local groundwater supplies
- Provide multi-barrier treatment system to meet drinking water requirements



Schematics and Photos Courtesy of OCWD



# OCWD GWRS PROCESS FLOW DIAGRAM



# MULTI BARRIER TREATMENT SYSTEM



- **MF Pretreatment**

- Hollow fiber PVDF membranes, 0.2 um pore size
- Removes bacteria, protozoa, and suspended solids



- **RO Membranes**

- Removes dissolved solids, viruses, organic compounds (including pharmaceuticals), etc.
- Concentrate blended with WWTP effluent and discharged to ocean



- **Advanced Oxidation – UV/H<sub>2</sub>O<sub>2</sub>**

- Low pressure, high output system
- Destroys trace organics
- Removes NDMA and 1,4 Dioxane



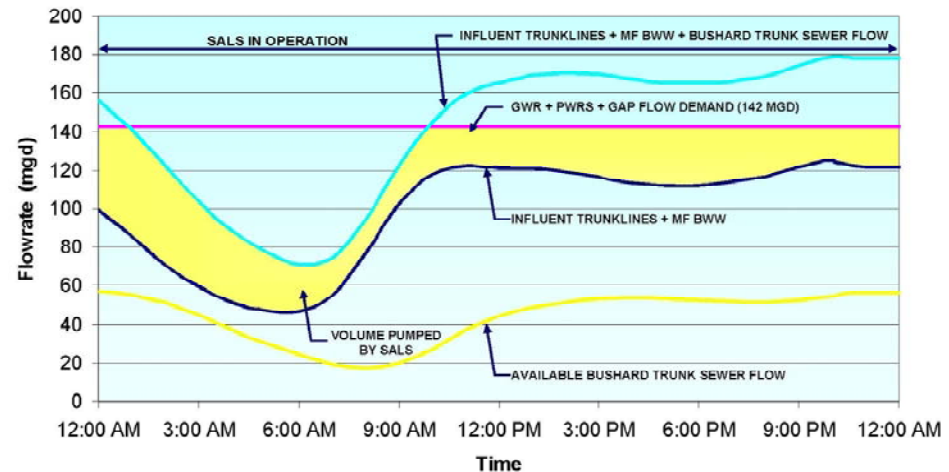
- **Post-Treatment Stabilization**

- Decarbonation to raise pH
- Lime addition to stabilize RO permeate

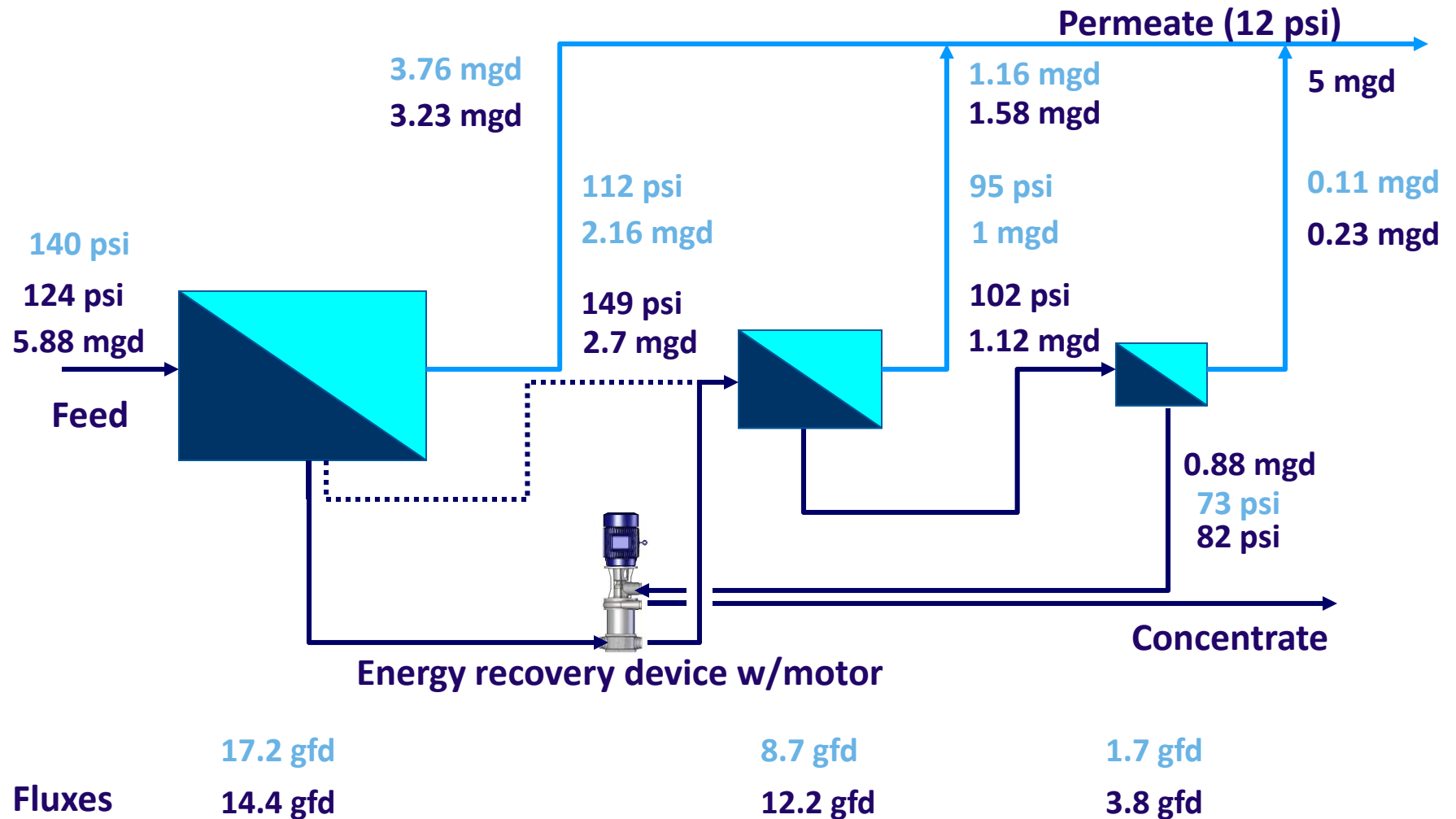
# EXPANSION PROVIDED AN OPPORTUNITY TO ENHANCE OPERATIONS AND RELIABILITY

- Secondary effluent flow equalization provided to minimize diurnal flow variations and maximize production
- Incorporated energy recovery devices (ERD) to new RO units to reduce energy consumption and prolong membrane life
- New RO building layout to improve accessibility to basement and pipe gallery
- Pilot tested and implemented new lime slurry system to enhance post-treatment reliability

Expansion Project Mode  
GWR System at 100 mgd

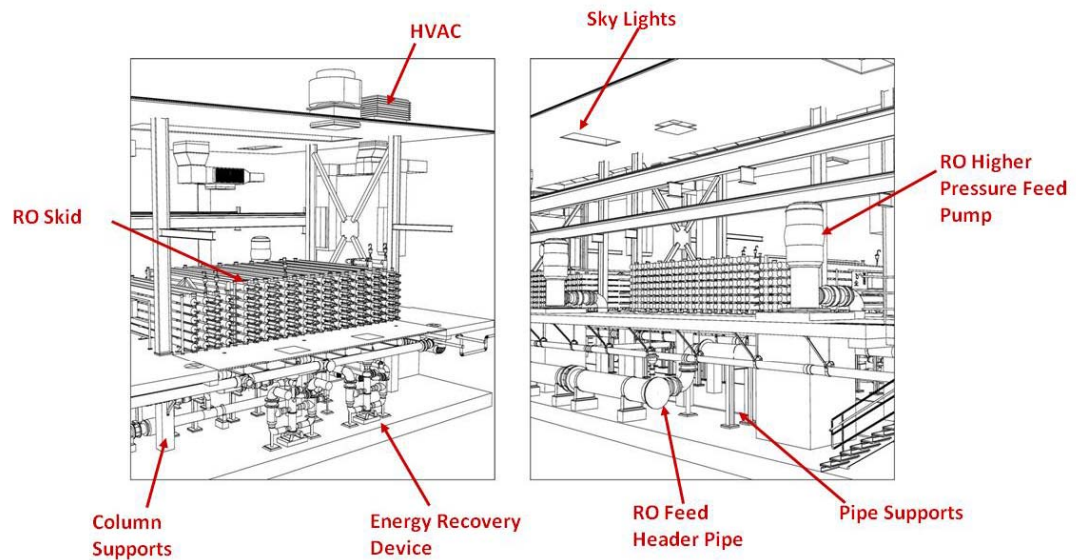
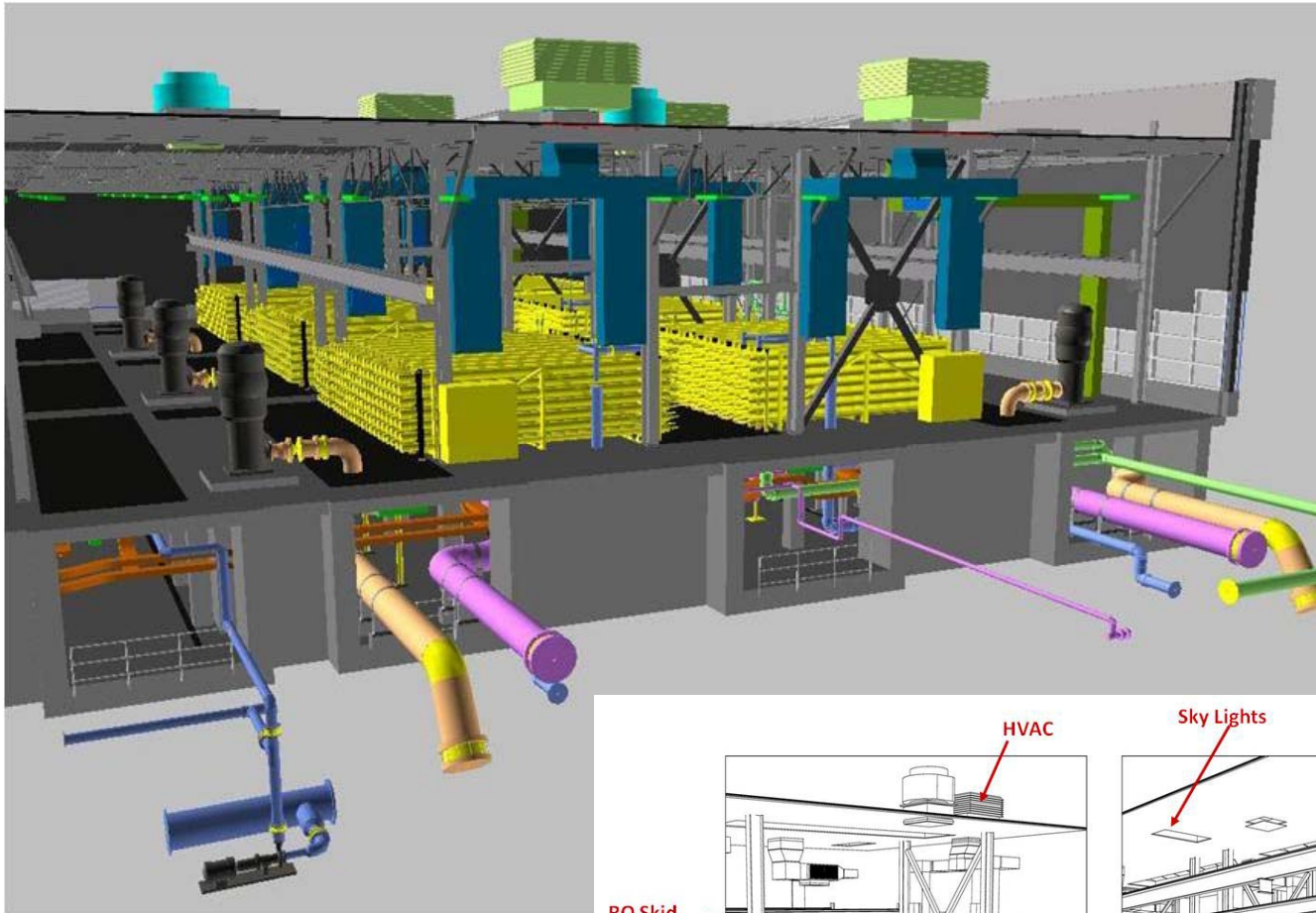


# INCORPORATE ENERGY RECOVERY DEVICES TO REDUCE ENERGY CONSUMPTION



- Annual energy savings of approximately \$17k per RO unit
- Payback period of ERDs is approximately 5 years

# IMPROVED OPERATION ACCESS IN NEW RO BUILDING





# ALTERNATIVE POST-TREATMENT TARGET TO IMPROVE STABILITY AND RELIABILITY IN WATER QUALITY

Parameter	Current Goal	Alternative Target
pH	8.5 to 8.8	7.6 to 7.9
Alkalinity, mg/L as CaCO <sub>3</sub>	40	40 to 50
Calcium, mg/L	3 to 4	10 to 13
Hardness, mg/L as CaCO <sub>3</sub>	7 to 10	25 to 33
Free Carbon Dioxide, mg/L	None	< 3
Buffer Intensity	None	0.100
CCPP, mg/L as CaCO <sub>3</sub>	None	-3

- Alternative target mimics rain water quality for groundwater replenishment
- Increased buffer intensity improves reliability
- Increased calcium content better protects cement mortar lined pipes
- Alternative target minimizes transport of metals within groundwater supply



# LIME SYSTEM IMPROVEMENTS

## Existing Lime Slurry System



- Existing system is a flow paced system that is ramped up and down based on flow conditions (inconsistent reaction times in slurry make-up tank)
- Dry lime transfer system is susceptible to plugging and is controlled by screw conveyor speed
- Unable to keep up with peak lime demands

## New Lime Slurry System (RDP Lime Slaker System)



- Lime slurry make-up is controlled by weight, providing a greater level of accuracy over the existing flow paced system
- Temperature controlled system to maintain optimum reaction conditions
- Dry lime transfer system is not susceptible to plugging

# PHOTOS OF RDP SLAKING SYSTEM PILOT TEST



**Lime Slaker Tank**



**Lime Slurry Aging Tank**



**Slurry Transfer and Feed Pump**



**Lime Slurry Feed Assembly**



# CONSTRUCTION PHOTOS





# CONSTRUCTION PHOTOS



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