



Groundwater Replenishment Project Update

Joline Muñoz

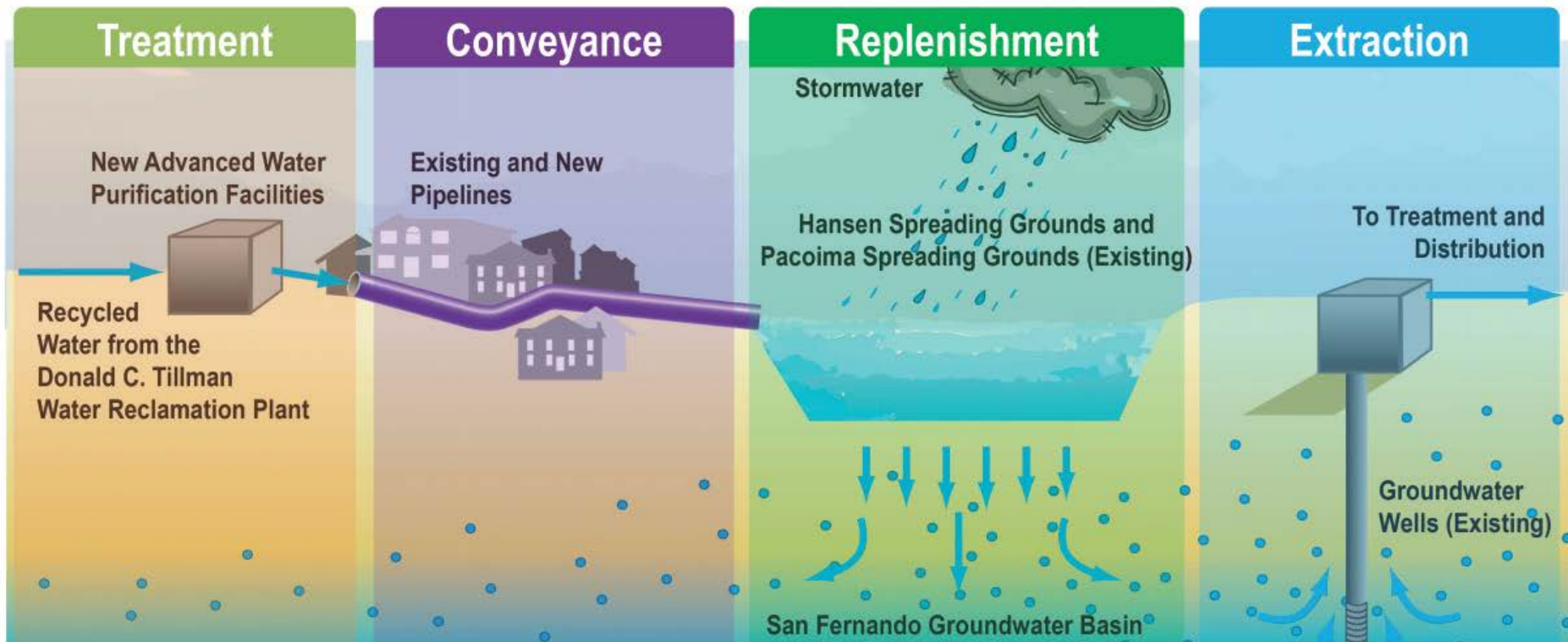
Los Angeles Bureau of Sanitation

Yoshiko Tsunehara

Los Angeles Department of Water and Power

October 10, 2017

Groundwater Replenishment: Original Project Overview



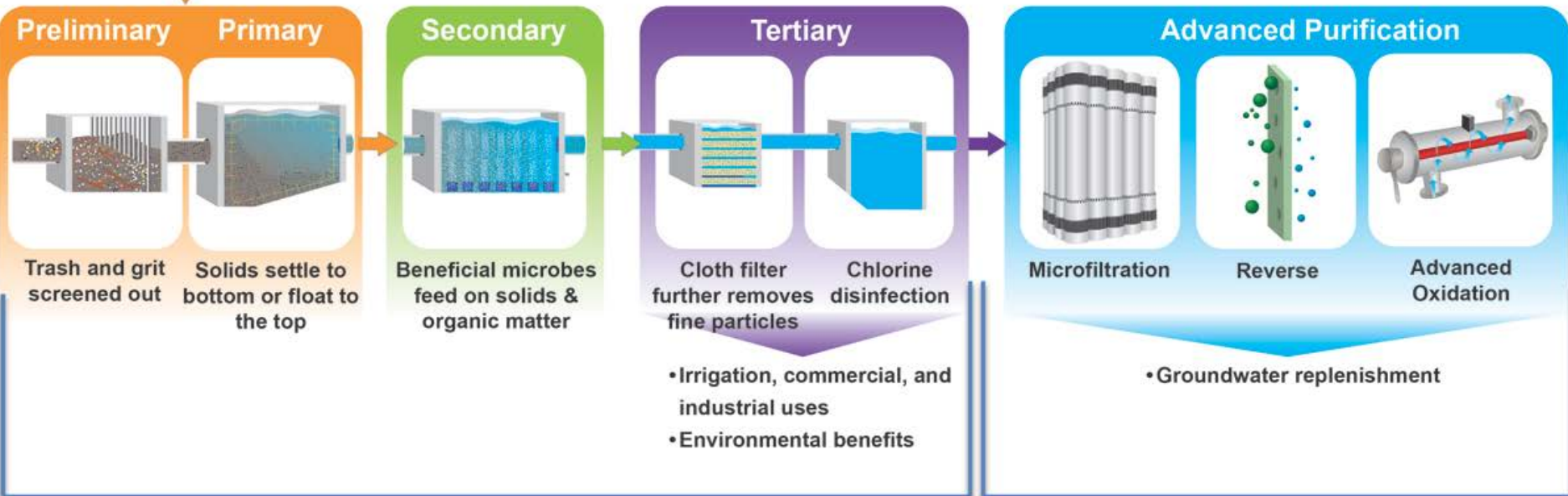
30,000 AFY

Groundwater Replenishment: Phase 1 Pilot Study



2010

Groundwater Replenishment: Original Project Overview



Existing Treatment Processes at DCTWRP

Proposed Advanced Purification Processes





The DCTWRP Project Timeline

➤ Phase 1: DCTWRP Pilot Testing ('09-'12)

- Part of 2012 Recycled Water Master Plan
- Recommended MF/RO/UV-H₂O₂ Train (FAT)

■ Since then....Groundwater Replenishment Reuse Regulations (GRRR, June 2014) - California State Water Board Division of Drinking Water

- Specify Requirements for GWR Project = *Does not require Full Advanced Treatment (FAT) for Surface Spreading*
- New technologies and treatment approaches have been developed and implemented

➤ Phase 2: DCTWRP AWPf Pilot Testing ('15-'17)

- Alternative Advanced Treatment Train
- Incorporate latest industry knowledge, technology, and treatment approaches



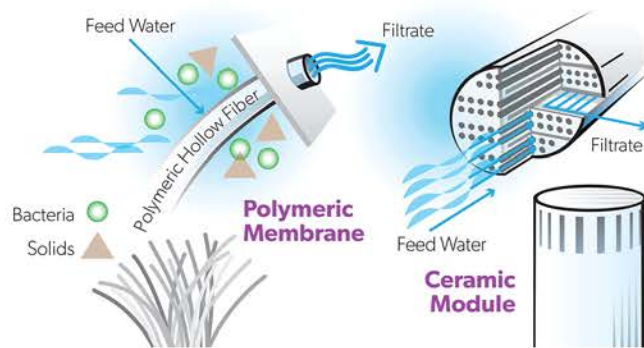
Regulatory Guidelines/Potable Reuse in California

Surface Spreading:

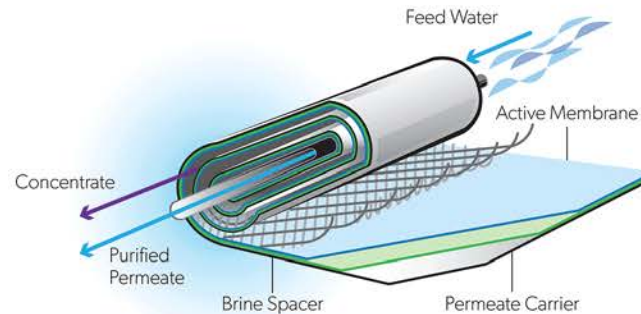
- Defined in GRRR (June 2014)
- Minimum requirement is tertiary treated, disinfected water
- TOC Requirement
- Meet all regulated contaminant limits including NDMA, DBPs and CECs
- Meet Basin Plan objectives (i.e. chlorides)

Groundwater Replenishment: Phase 2 Pilot Study

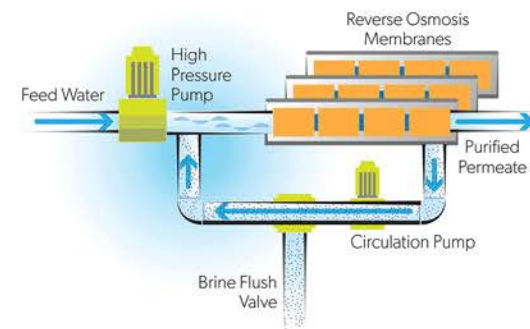
Microfiltration | Ultrafiltration



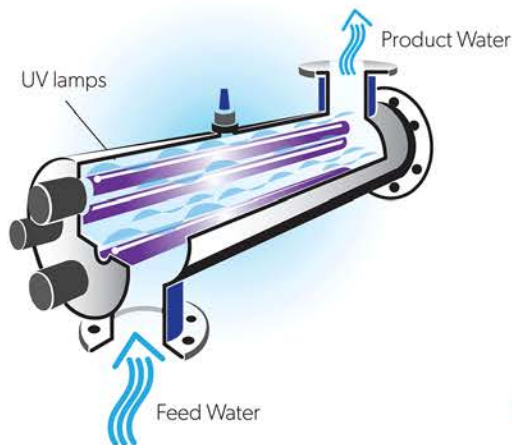
Reverse Osmosis



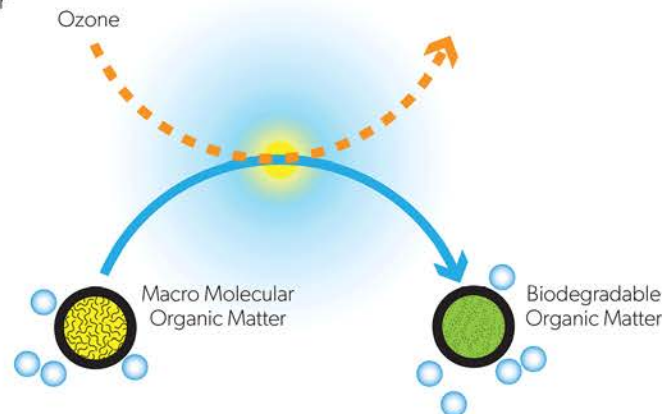
Closed Circuit Desalination



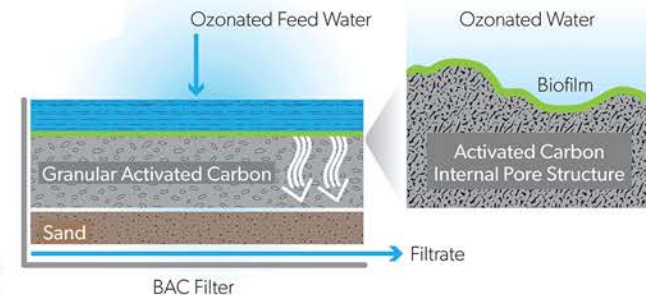
Advanced Oxidation Process



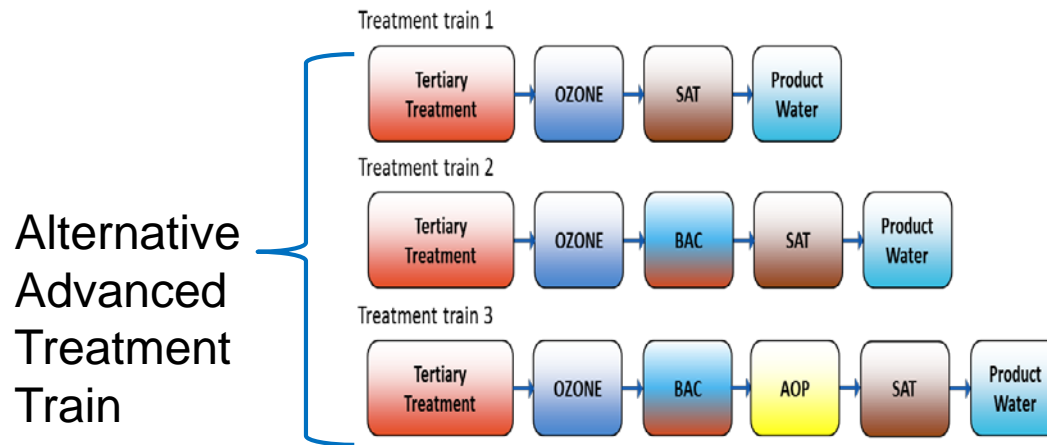
Ozone



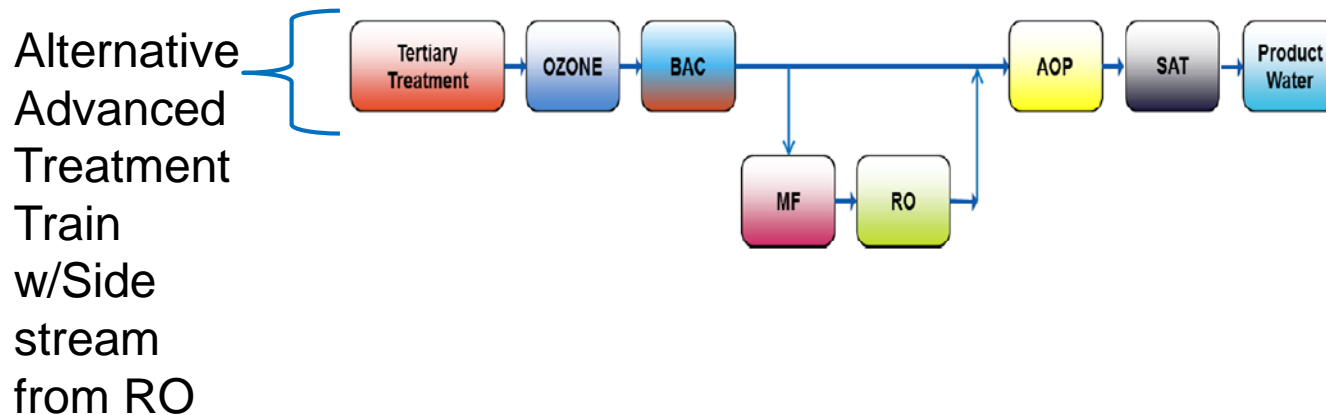
Biologically Active Carbon



Alternative Advanced Treatment Trains for Pilot Evaluation

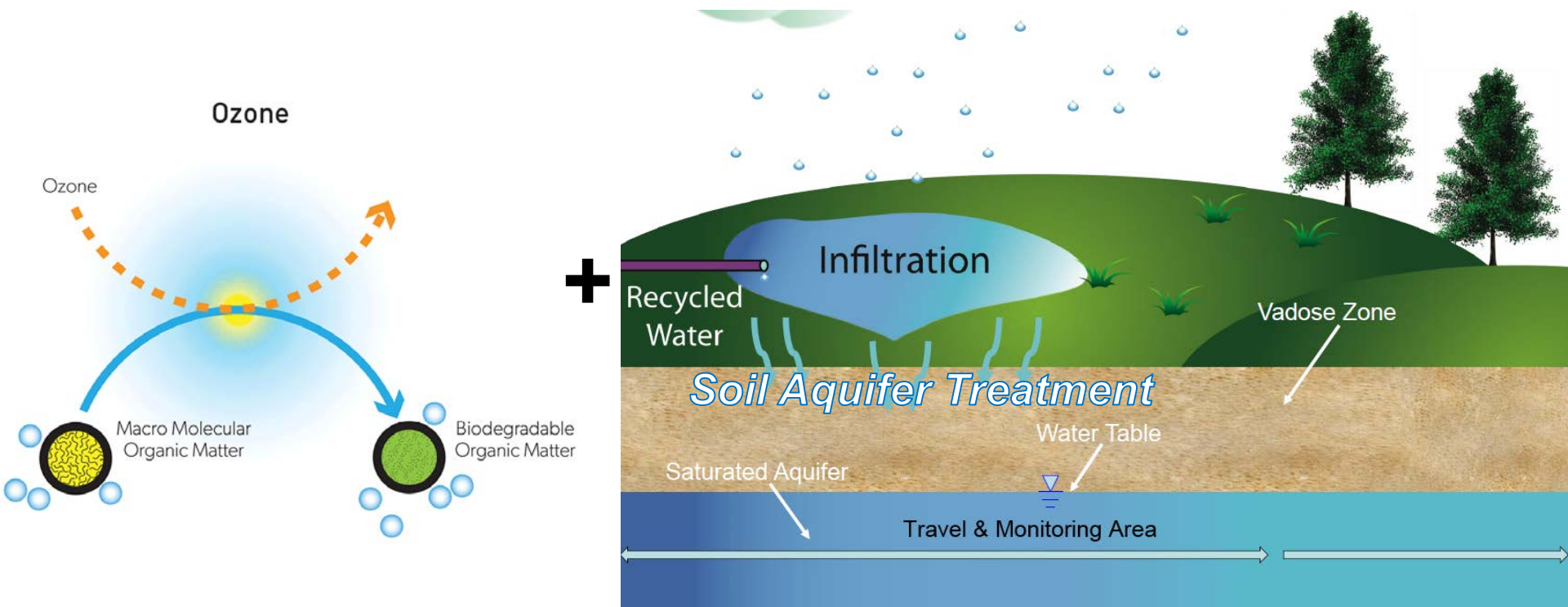


Limited side stream treatment from RO evaluated for the scenario where it is deemed necessary for meeting TDS or chloride limits:



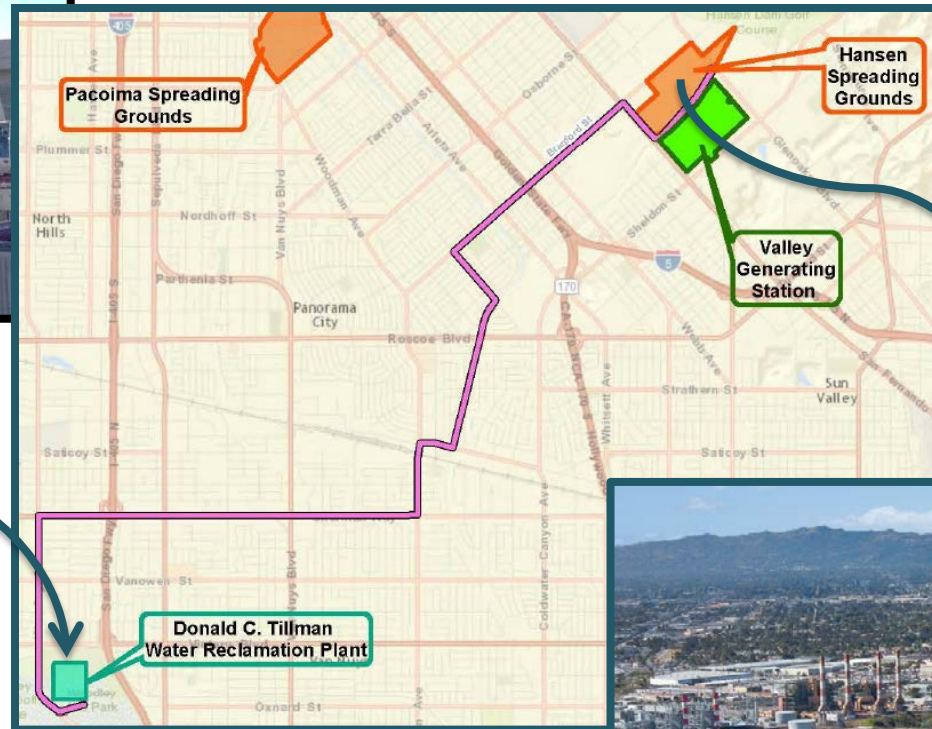
Groundwater Replenishment: Evolution to a Phased Approach


Initial Phase – Ozone Demonstration



Groundwater Replenishment: Initial Phase – Ozone Demonstration

Skid Mounted Ozone Units





Overview – Ozone Demonstration Project

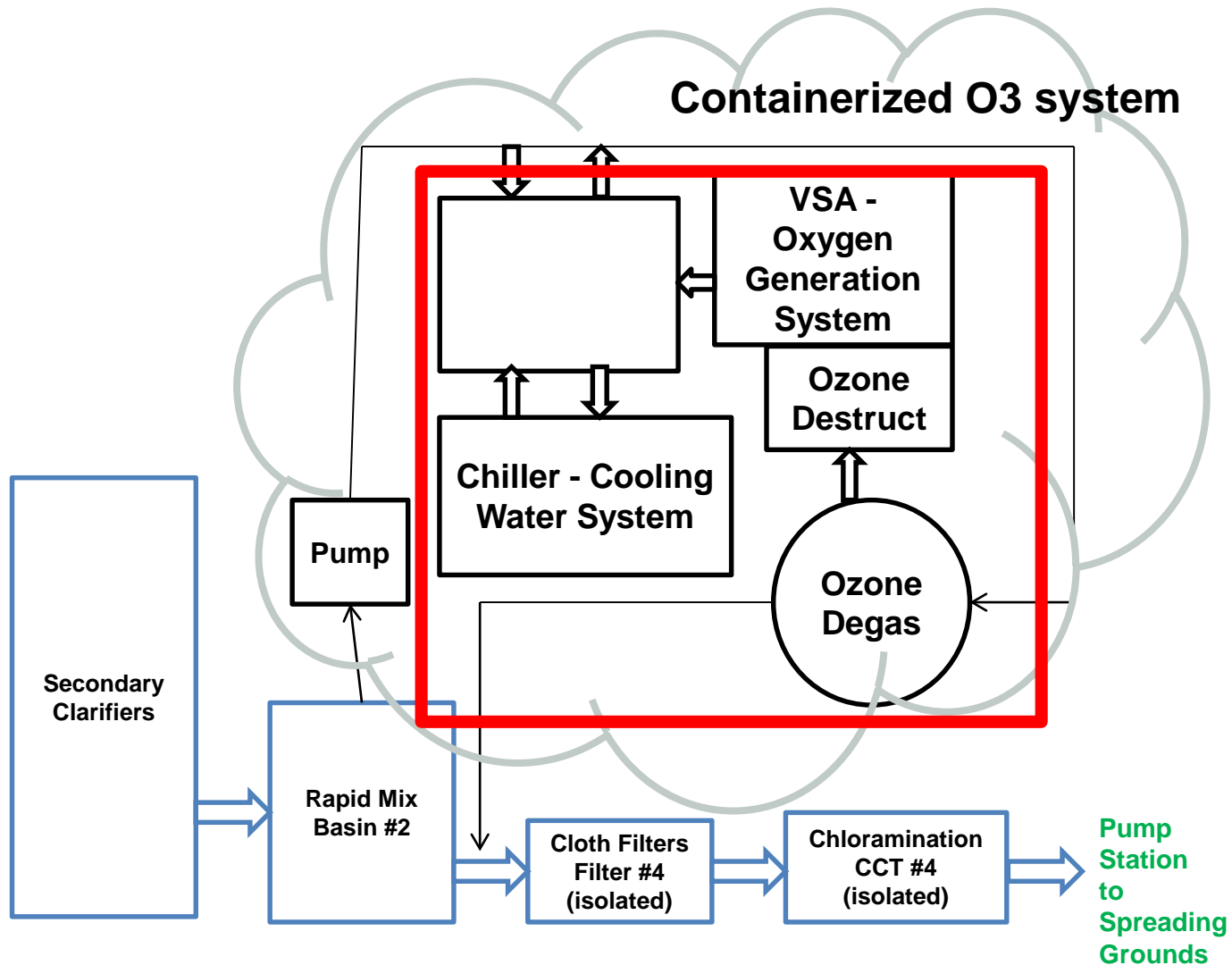
- **Enhance quality of existing Title 22 water**
 - Apply ozone to secondary effluent prior to tertiary filtration
 - Additional CEC removal (exceeding regulatory requirements)
 - Additional pathogen barrier (exceeding regulatory requirements)

- **Address near-term water resource needs**
 - Deliver up to 10 MGD to Hansen Spreading Grounds in 2018

- **Demonstrate value of ozonation and SAT**
 - Operate for 3 years
 - Provide data to demonstrate effectiveness of ozonation and SAT
 - Accelerate transition to full-scale alternative treatment design
 - Increase recycled water contribution for surface spreading
 - Increase public and regulatory acceptance



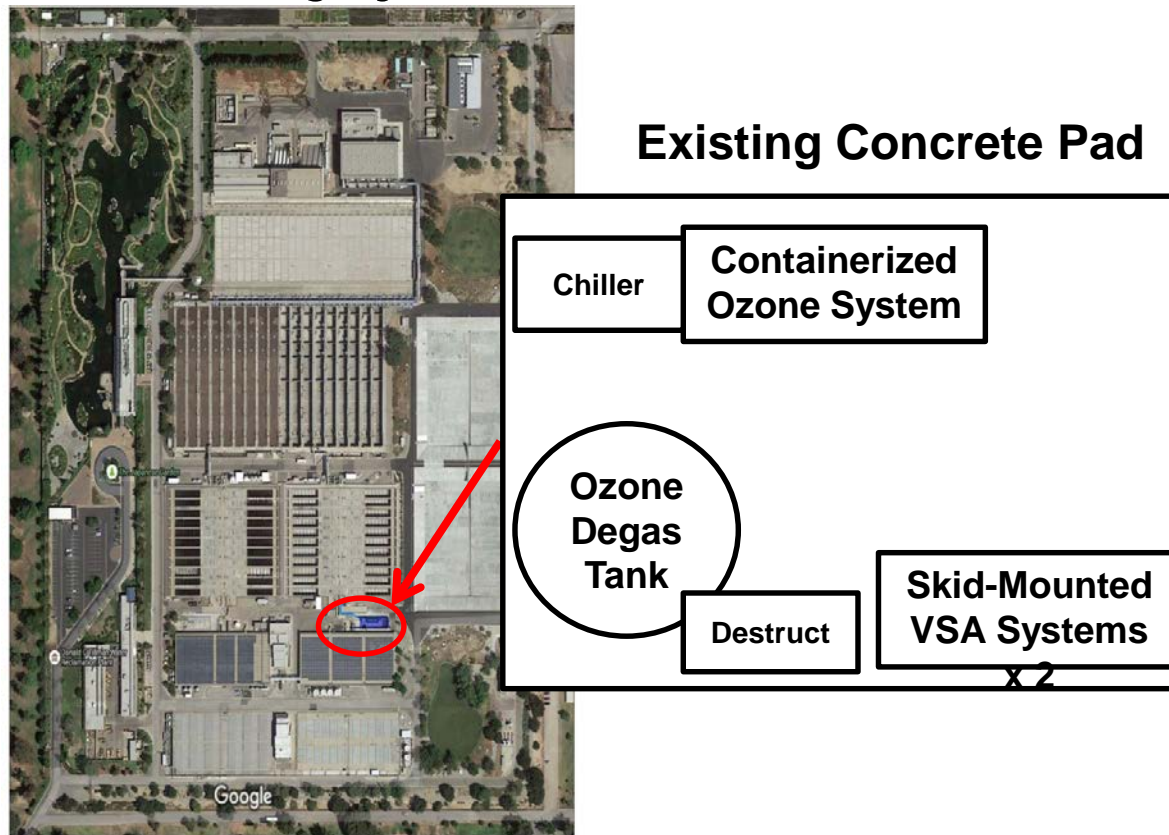
Flow Diagram – Ozone Demonstration Project





Implementation

- Use existing structures
- Turnkey ozone system
- Integrate with existing systems





Observations – Interim Ozone Demo Project

- **Optimal O₃:TOC Ratio is ≤ 0.60**
 - Max. ozone Dose of 4.2 to 6.6 mg/l (depending on TOC levels)
 - Control bromate formation
 - Significant reduction of CECs
- **No Significant Ozone Residual**
 - Dissolved ozone residual will be minimal
- **Use O₃:TOC Ratio as Primary Control Philosophy**
 - References indicate good correlation
 - Wide diurnal and seasonal variation of TOC levels at DCTWRP
- **Plan Additional Bench-Scale Test**
 - Evaluate NDMA-FP

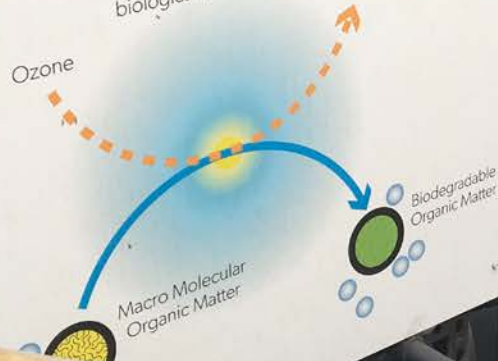
Groundwater Replenishment: Initial Phase – Ozone Demonstration

D.C. TILLMAN ADVANCED WATER PURIFICATION PILOT PROJECT

TREATMENT TECHNOLOGY

OZONE

Ozone, one of the strongest disinfecting and oxidizing agents used in water treatment, is added to **break down contaminants in the water, particularly organic compounds and microorganisms**. Ozone transforms organic materials to smaller molecules that are more readily removed through downstream treatment processes such as biological filters and soil aquifer treatment.



- Ozone Treatment
- 3,500+ AFY
- Operational by 2018
- Verify SAT & CEC Removal



Groundwater Replenishment: Environmental Analysis

Final Environmental Impact Report
SCH No. 2013091023

*Los Angeles Groundwater
Replenishment Project*



Prepared by:

Los Angeles Department of Water and Power
Environmental Affairs
111 North Hope Street, Room 1044
Los Angeles, California 90012

Technical assistance provided by:

AECOM

300 South Grand Avenue, 8th Floor
Los Angeles, CA 90071

October 2016

**Certified
December
2016**

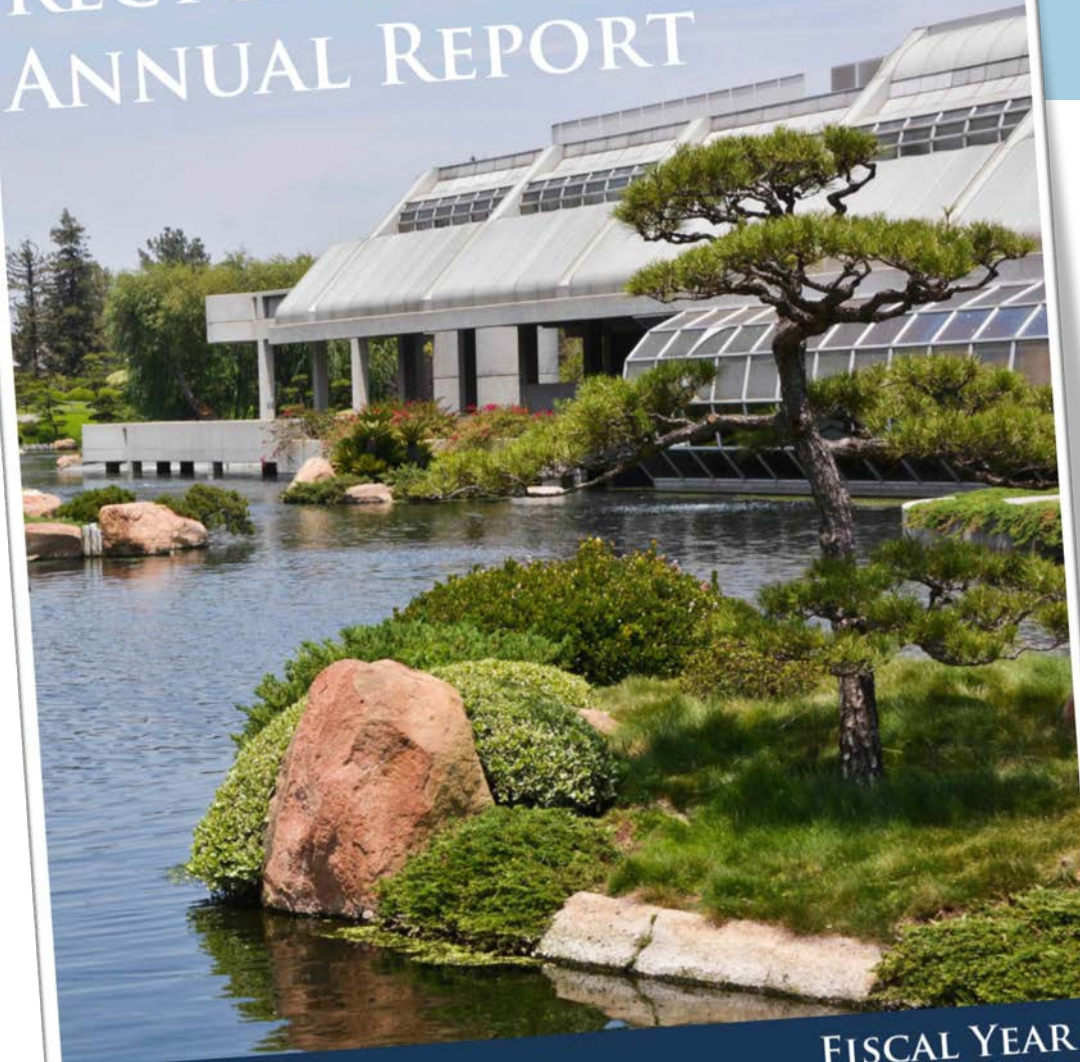
Partners



Groundwater Replenishment: Initial Phase – Ozone Demonstration



LOS ANGELES DEPARTMENT OF WATER & POWER
**RECYCLED WATER
ANNUAL REPORT**



Los Angeles
Department of
Water & Power



**FISCAL YEAR
2016-17**
SEPTEMBER 2017



THANK YOU

QUESTIONS?

Joline Muñoz

joline.munoz@lacity.org

Yoshiko Tsunehara

yoshiko.tsunehara@ladwp.com