



Update on Recycled Water and Potable Reuse

BOARD OF DIRECTORS

March 19, 2024

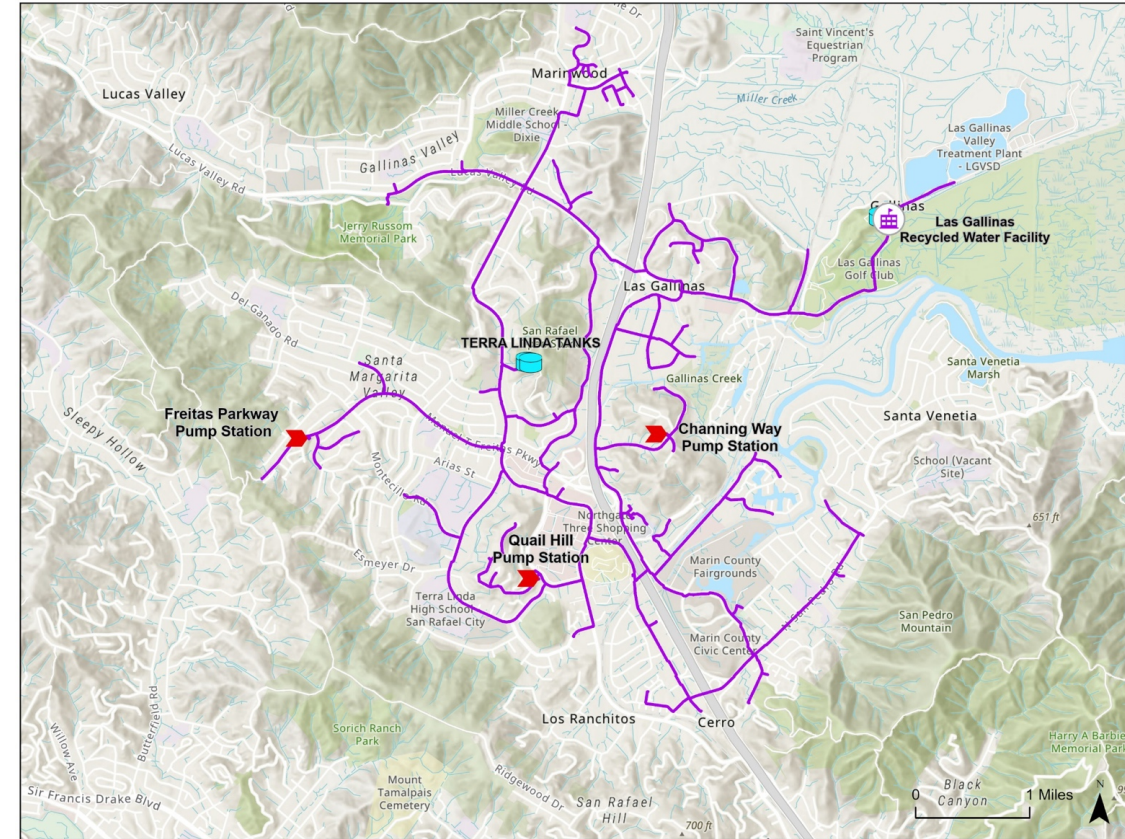


Overview

- Overview of Recycled Water System & Expansion Opportunities
- Potable Reuse
 - Opportunities within service area
 - Update on Regulations
- Next Steps

Recycled Water System

- Pilot treatment plant built in 1976 adjacent to LGVSD
- Current demand of 700 AF per year
- 358 customers – irrigation, toilet flushing, HVAC cooling, etc.
- Commercial truck hauling program for dust control/compaction, sewer cleaning, street cleaning, irrigation
- Separate infrastructure:
 - 25 miles of distribution pipelines
 - 3 pump stations
 - 2 storage tanks

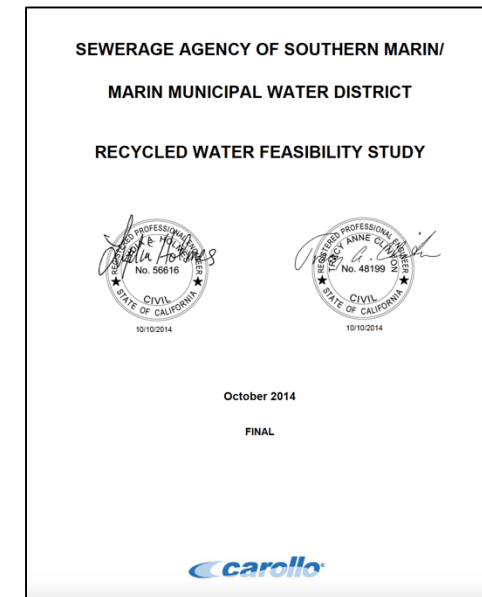
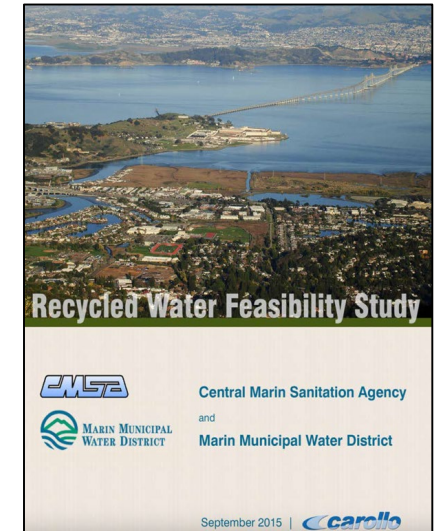
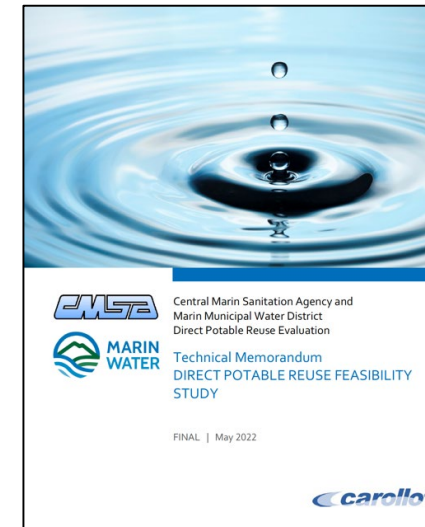


Expansion Opportunities to Increase Recycled Water Use

- Infill -- add new customers within existing recycled water system
- Expand existing recycled water system – phased or project-based approach
- Add a new recycled water system
 - Central Marin Sanitation Agency (CMSA), San Rafael
 - Sewage Agency of Southern Marin (SASM), Mill Valley

Partnerships with Wastewater Agencies

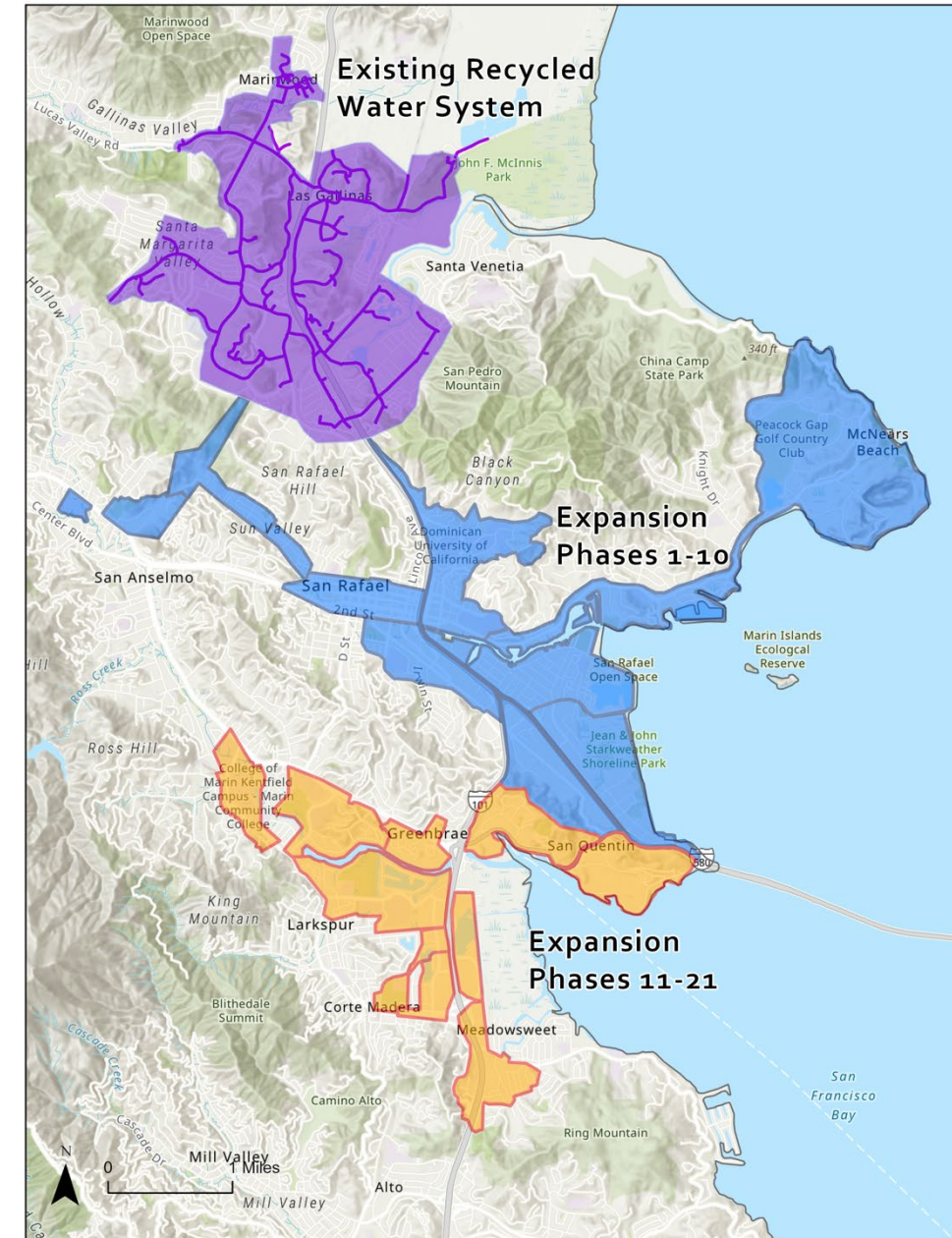
- Partnership with Las Gallinas Valley Sanitary District (LGVSD) since inception of pilot treatment plant
- Developed feasibility studies with Sewerage Agency of Southern Marin (SASM) in 2014 and Central Marin Sanitation Agency (CMSA) in 2015 & 2022
- Continue to evaluate opportunities to expand recycled water system by leveraging grants and partnerships



Increase Recycled Water Use: Phased Expansion of System

Evaluated phased approach to expanding recycled water system (2000 Recycled Water Feasibility Study) and updated demand offsets and costs since (*SF Bay Area CCI 2023*)

	Demand (acre-feet)	Pipe Length (miles)	Est. Capital Cost	Annual Cost/AF
Existing System	706	25		
Expansion Phases 1-10 <i>(San Rafael, Peacock Gap, Canal Area)</i>	345	24.0	\$60.6M	\$10,945
Expansion Phases 11-21 <i>(San Quentin, Corte Madera, Larkspur/Greenbrae)</i>	602	17.0	\$64.7M	\$7,126



Increase Recycled Water Use: Project-based Expansion of System

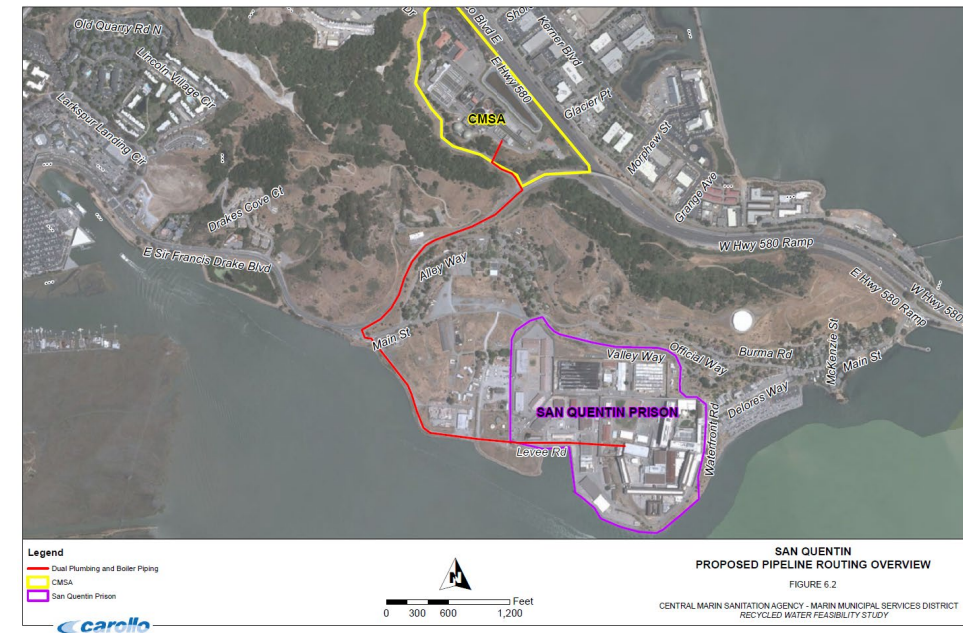
- Project-based expansions of recycled water system also evaluated for feasibility
- Expansion projects are typically adjacent to existing recycled water system
- Potable offset demands and costs are monitored and updated (*SF Bay Area CCI 2023*)

Project	Demand (acre-feet)	Est. Capital Cost	Annual Cost/AF
Lucas Valley Extension	21	\$3.3M	\$10,015
Mt. Tam Cemetery	18	\$3.0M	\$10,382
Circle Road	8.3	\$2.3M	\$16,449
Peacock Gap	285	\$26.7M	\$6,355

Increase Recycled Water Use: Add New Recycled Water System

Evaluated as part of 2015-16 Feasibility Studies with CMSA and SASM, and updated costs since (SF Bay Area CCI 2023)

Project	Demand (acre-feet)	Est. Capital Cost	Annual Cost/AF
San Quentin (CMSA)	150	\$11.4M	\$5,359
MMWD/SASM	81	\$4.3M	\$4,078



Summary: Recycled Water Expansion Opportunities

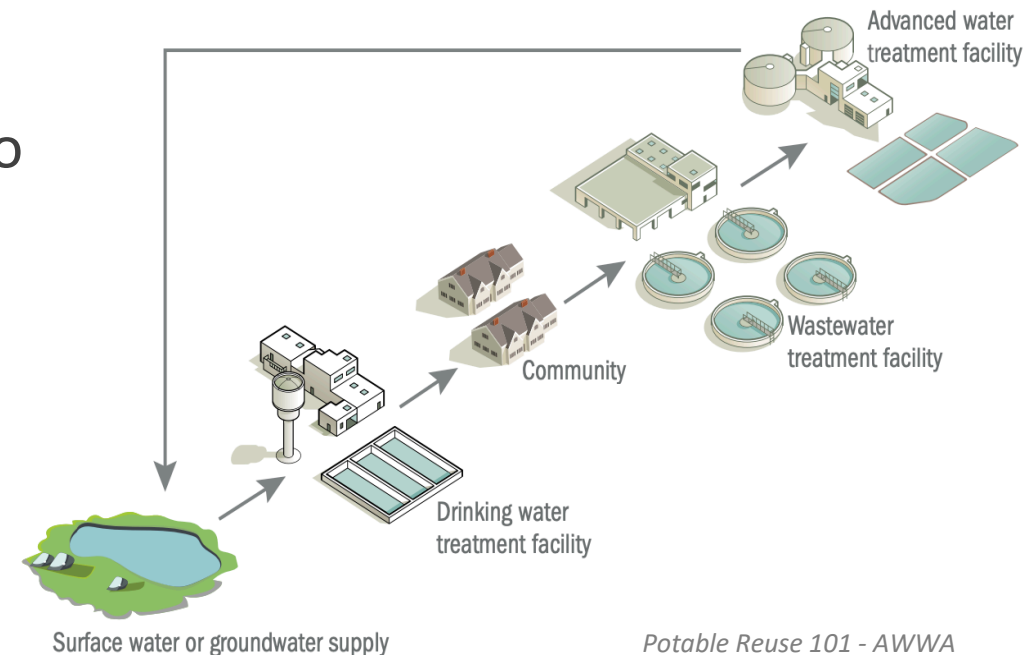
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**Peacock Gap is a sub-project of Phases 1-10 with majority of demand due to golf course*

Potable Reuse

Overview: Indirect Potable Reuse (IPR)

- Planned use of recycled (purified) water to replenish drinking water supplies with a suitable environmental barrier
- Two types of IPR:
 - **Groundwater recharge:** use recycled water to replenish groundwater basin as source of municipal water supply
 - **Surface water augmentation:** placement of recycled water into a surface water reservoir that is used as a source of domestic drinking water supply



*Potable Reuse 101 - AWWA
2016*

Groundwater augmentation IPR not feasible in Marin

Conceptual Project in Marin: Indirect Potable Reuse (IPR)

Marin Regional IPR Project (Surface Water Augmentation)

- Collect secondary effluent from LGVSD & SASM, convey to CMSA
- Construct Advanced Water Purification Facility to meet Surface Water Augmentation IPR: Ultrafiltration, Reverse Osmosis, UV-AOP, conditioning
- Convey purified water to Kent Lake through 28 miles of dedicated pipelines and 4 new pump stations
- Expected annual yield 7,840 AFY (7 mgd)



Project	Demand (acre-feet)	Est. Capital Cost	Operations	Annual Cost/AF
Marin Regional IPR (Surf. Water Augmentation)	7,840	\$452.0 M	Continuous	\$4,504
			Intermittent	\$13,512*

* Cost(\$)/AF assumes continuous operations. Cost/AF likely to increase 3x if operated intermittently.

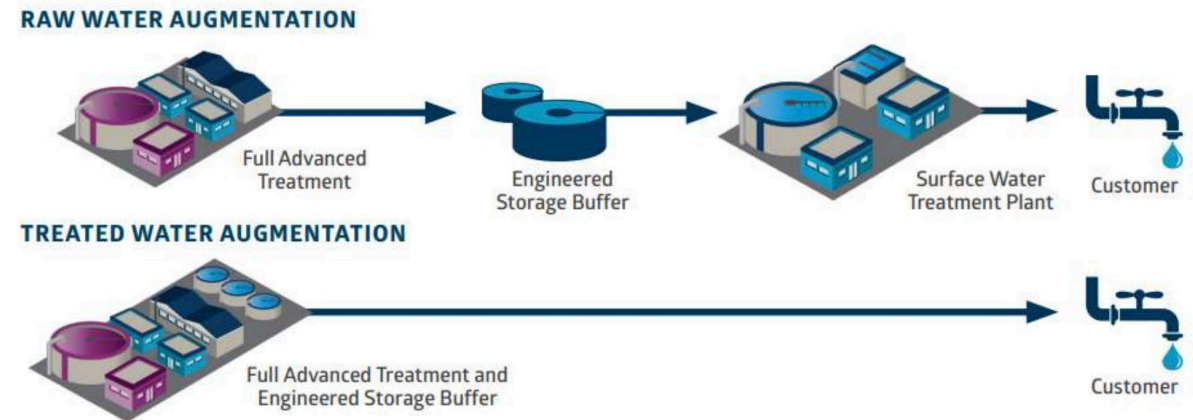
Overview: Direct Potable Reuse (DPR)

Planned introduction of purified recycled water either

➤ Raw water augmentation: into a raw water supply immediately upstream of a water treatment plant


OR

➤ Treated water Augmentation: directly into a public water system



California Regulatory Update: Direct Potable Reuse (DPR)

- California State Water Resources Control Board Adopted Potable Reuse Regulations: December 19, 2023
- Estimated effective date: 2nd Quarter 2024



Media Release

Board approves regulations for converting wastewater to high quality drinking water

Direct potable reuse will help address climate change impacts on water supplies

Dec. 19, 2023 Contact: Blair Robertson – [Information Officer](#)

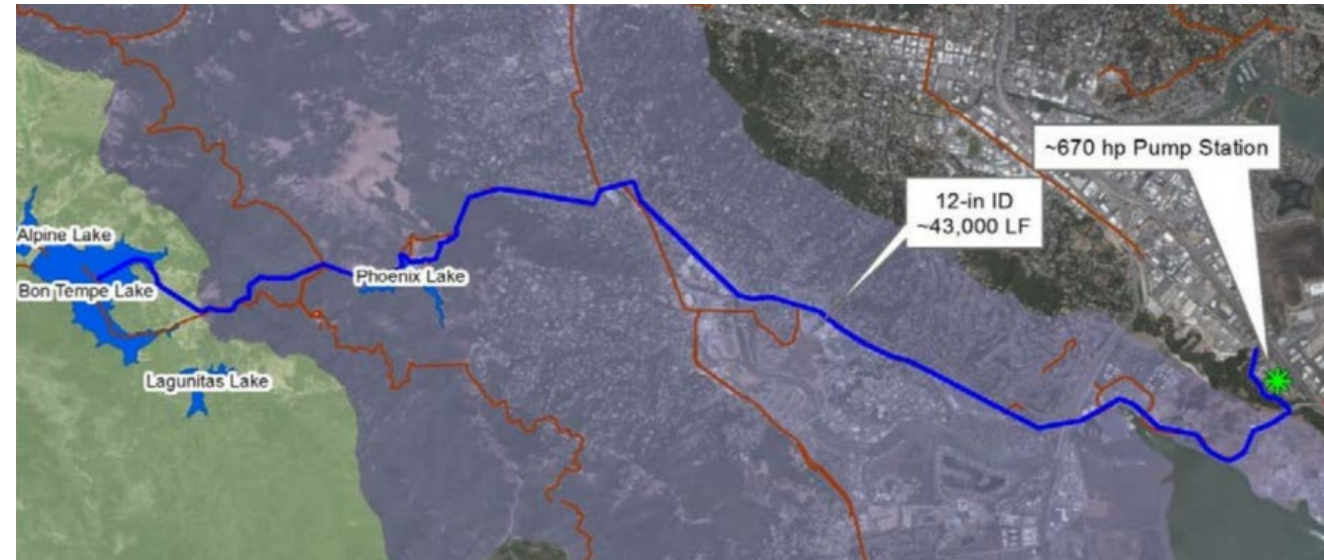
SACRAMENTO – Further advancing the Administration’s all-of-the-above [Water Supply Strategy](#) to make California more resilient to hotter, drier conditions, the State Water Resources Control Board approved [regulations](#) today that will allow water systems to develop treatment protocols to convert wastewater into high quality drinking water.

The board’s unanimous vote gives California the **most advanced standards in the nation** for treating wastewater to such an extent that the finished product meets or exceeds current drinking water standards. Known as [direct potable reuse](#), the process will enable water systems throughout the state to generate a **climate-resilient water source** while reducing the amount of wastewater discharged to rivers and the ocean. In fact, recycling water allows water systems to **add millions of gallons of additional drinking water** to their supplies over time while avoiding costlier and more energy intensive water supplies.

Conceptual Project in Marin: Raw Water Augmentation (DPR)

Marin Regional DPR Project (Raw Water Augmentation)

- Collect secondary effluent from LGVSD & SASM, convey to CMSA
- Construct Advanced Water Purification Facility to meet Raw Water Augmentation DPR: Ozone/BAC, Ultrafiltration, Reverse Osmosis, UV-AOP, chlorine contact, conditioning
- Convey purified water to Bon Tempe Lake through 22.6 miles of dedicated pipelines and 3 new pump stations
- Discharge RO reject to CMSA effluent outfall
- Expected annual yield 7,840 AFY (7 mgd)



Project	Demand (acre-feet)	Est. Capital Cost	Operations	Annual Cost/AF
Marin Regional DPR (Raw Water Augmentation)	7,840	\$433.8 M	Continuous	\$5,146
			Intermittent	\$15,438*

* Cost(\$)/AF assumes continuous operations. Cost/AF likely to increase 3x if operated intermittently.

Conceptual Project in Marin: Treated Water Augmentation (DPR)

MMWD-CMSA TWA (DPR) Project

- Advanced Water Purification Facility at CMSA, only treat CMSA effluent, connection to exiting distribution (treated water augmentation) up to 4 mgd
- Targeted to meet DRAFT DPR treatment requirements
- Treatment Trains include:
 - Ozone (O3)
 - Biological active carbon (BAC)
 - Ultrafiltration (UF)
 - Reverse Osmosis (RO)
 - Ultraviolet light advanced oxidation process (UV AOP) using free chlorine
 - Free chlorination
 - Additional UV disinfection
 - Stabilization and chloramination for distribution



Figure 5.1 Map of Proposed Infrastructure

Project	Demand (acre-feet)	Est. Capital Cost	Operations	Annual Cost/AF
MMWD-CMSA DPR (Treated Water Augmentation)	4,480	\$124.4 M	Continuous	\$3,562
			Intermittent	\$10,686*

* Cost(\$)/AF assumes continuous operations. Cost/AF likely to increase 3x if operated intermittently.

Next Steps

- Expansion of purple pipe/recycled water in District service area is capital intensive with limited supply opportunities
- Potable reuse (IPR & DPR) opportunities are cost-intensive and extremely complex
- Continue to monitor regulations and larger agencies as industry evolves