



Water Reuse: The National, State and Local Recycled Water Revolution

Los Angeles Chapter – WaterReuse California

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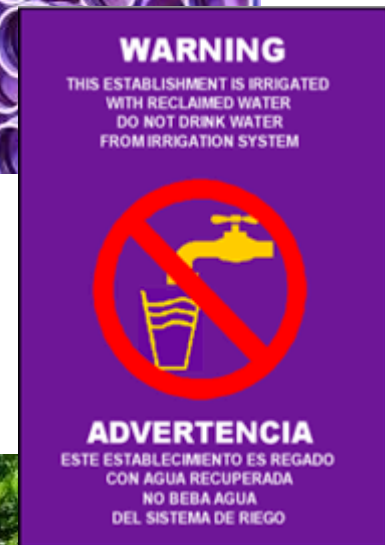
Today's Presentation

- The national water reuse paradigm shift
- Drivers and attitudes - a holistic “One Water” focus
- National trends
- California - potential and future for reuse
- Still leading the way - new and innovative California projects
- EMWD's recycled water evolution
- Conclusions

The National Water Reuse Paradigm Shift

Past Recycling

- Largely conducted in arid states - southwest
- Water supply augmentation primarily for irrigation purposes
- Disposal “option”
- Purple pipe systems - centralized treatment and distribution
- Minimum recycling in other parts of country:
 - Collect wastewater, move it quickly downstream, treat it to acceptable standards, and dispose/discharge without harming the environment



The Water Reuse Paradigm Shift

Trend/Future

- Holistic “One Water” approach to water management
- All waters are now viewed as a fungible resource
- Arid west is becoming more arid - climate variability and need for base loaded supplies on the rise
- Rapid advances in reuse regulations
 - technology, research/science, advocacy
- Unprecedented interest in other parts of the country with unique drivers:
 - More stringent receiving water TMDLs (nutrients)
 - Corporate sustainability/economics



Drivers and attitudes - a holistic “One Water” focus

One Water defined:

One Water is an integrated planning and implementation approach for managing finite water resources for long-term resilience and reliability, meeting both community and ecosystem needs



The “One Water” approach.....and Recycling

- Institutional regional barriers softening
- Integrated policies and projects
- Traditional “waste” disposal concepts challenged
- Multi-use and multi-benefit

Water recycling in many forms

- Traditional centralized
- On-site treatment and reuse
- Decentralized treatment
- “Fit for Purpose” treatment technologies

Water recycling from any source

- Sewage
- Nuisance flow/storm water
- Industrial discharge
- Brackish or impaired waters
- Graywater

Water recycling for all uses

- Irrigation
- Habitat/environmental
- Groundwater replenishment
- Surface water augmentation
- Industrial and commercial
- Drinking (Potable Reuse)

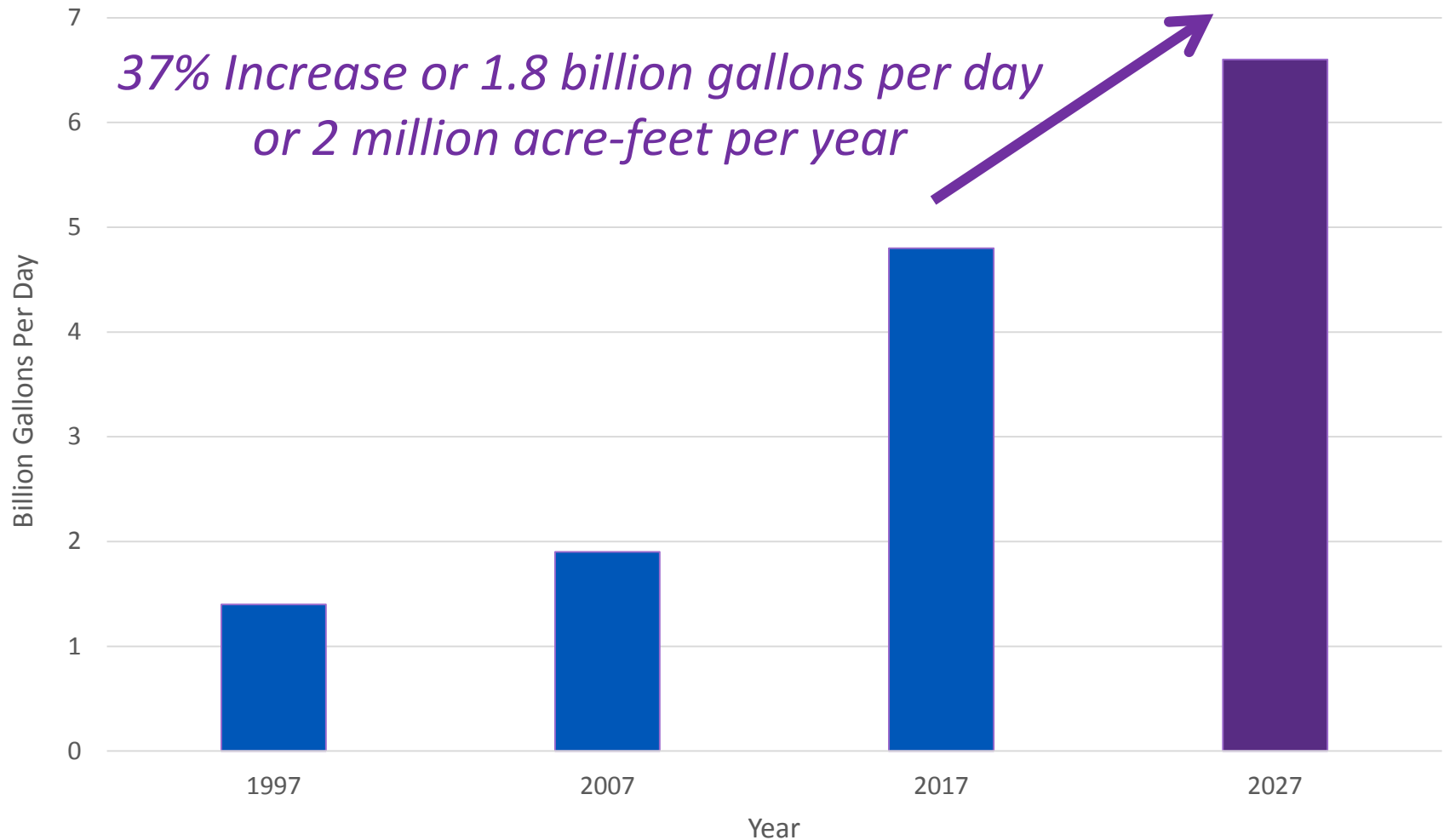


National trends





The Growth of Water Reuse in the United States



Source: USGS, EPA, Bluefield Research

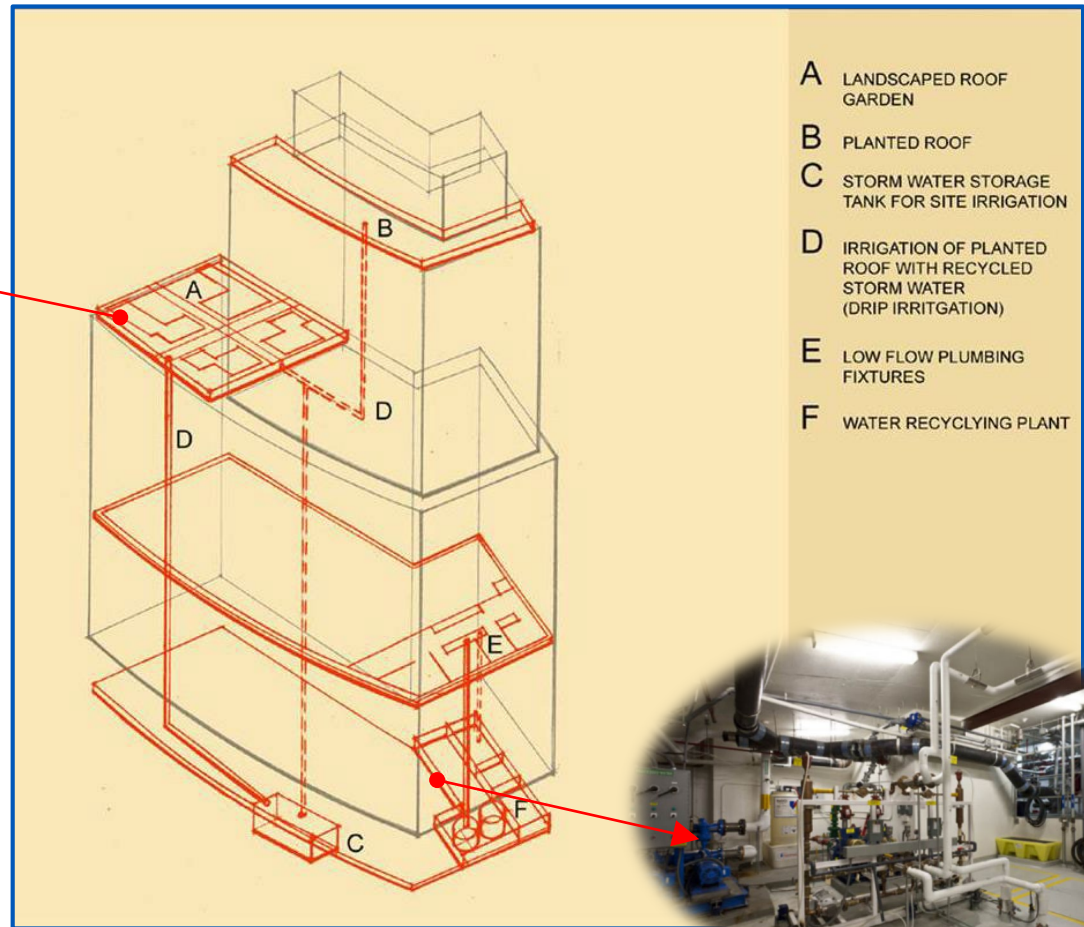
Onsite Reuse - Residential/Commercial

Solaire Apartments, Battery Park, New York



Reuse Applications:

- Toilet Flushing
- Cooling Tower Make-Up Water
- Landscape Irrigation
- Laundry

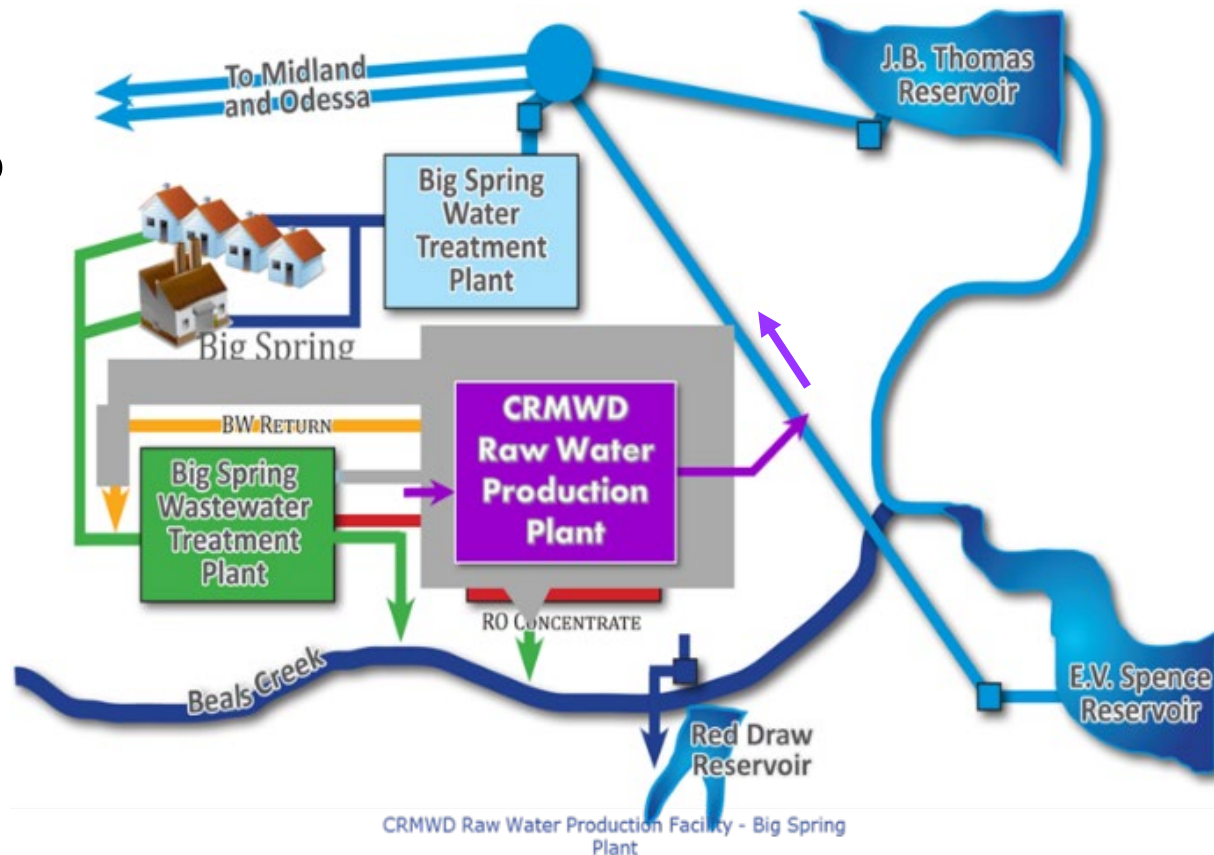


Reduces water use by 55% and discharges to sewer by 60%

Direct Potable Reuse — Raw Water Augmentation

Big Spring, Texas

- Blends advanced treated recycled water with lakes to produce a high-quality drinking water
- 16 MGD with microfiltration, reverse osmosis, and ultraviolet disinfection
- Blends advanced treated water with 21 MGD of traditional sources



Industrial Water Reuse — Frito-Lay Snack Food Plant, Casa Grande, AZ

- Facility uses renewable energy and recycled water while producing nearly zero waste
- Wastewater treated onsite:
 - Membrane bioreactors
 - Granular activated carbon
 - Reverse osmosis
 - Ultraviolet light disinfection
- Water meets EPA primary and secondary drinking water standards for food contact
- Up to 75% of the plant's process water is recycled
- Recycles 270,000 GPD



Changing Minds – One Glass at a Time

- Recycled water used in beer brewing
- Start a conversation about reuse and the nature of water
- Demystify water purification and the urban water cycle
- Showcase innovative treatment technologies and safety



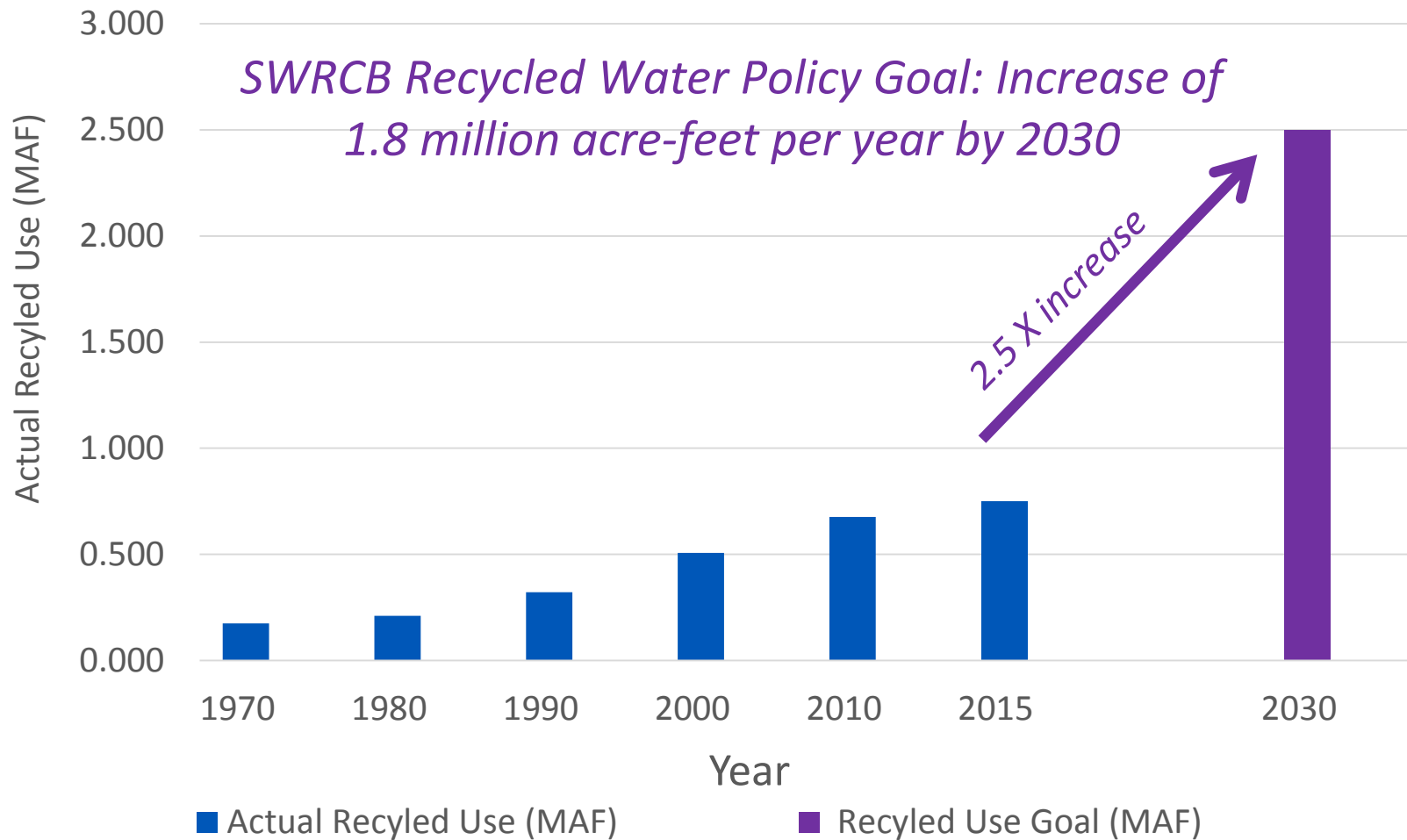


California - potential and future for reuse





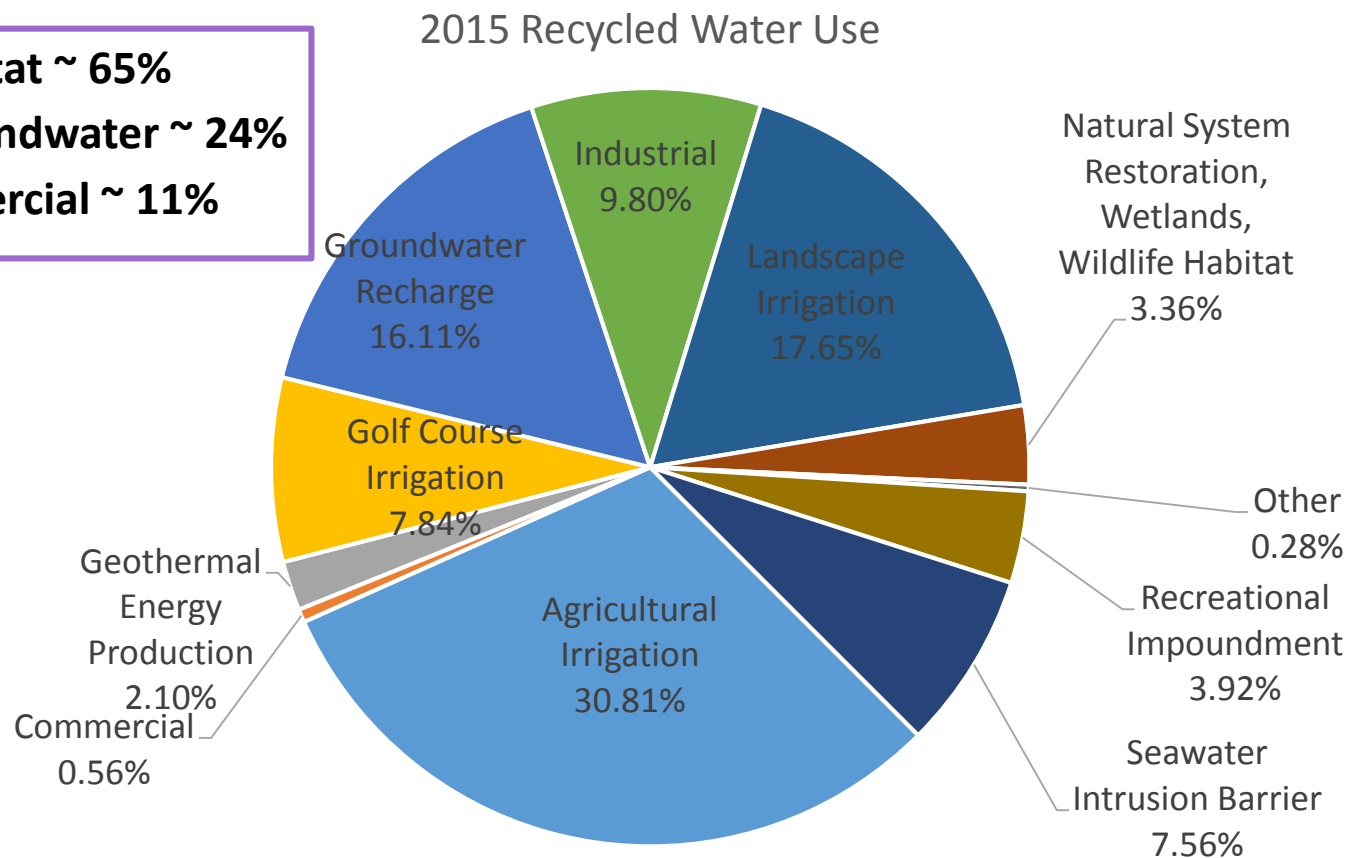
The Growth of Water Reuse in California



Source: SWRCB 2013 Recycled Water Policy Update

Uses of Recycled Water In California

Irrigation/Habitat ~ 65%
Potable Reuse - Groundwater ~ 24%
Industrial/Commercial ~ 11%



Potable Reuse has the potential to provide an additional 1.1 million acre-feet of drinking water supplies

Sources: 2015 State of California recycled water survey, Water Environment & Reuse Foundation, 2014

Legislative and Regulatory Breakthroughs

- **2017 - AB 574 (Quirk)**

- Co-sponsored by WaterReuse California
- Statutorily defined four types of Potable Reuse
- Requires SWRCB to adopt uniform recycling criteria for “raw water augmentation” or upstream of conventional treatment plant by 2023:
 - 18 month extension allowed if research cannot be completed
 - SWRCB expert panel report to legislature with recommendations if can’t meet deadline

- **2019 - AB 292 (Quirk)**

- Removes terms: “Indirect Potable Reuse (IPR)” and “Direct Potable Reuse (DPR)” for groundwater replenishment



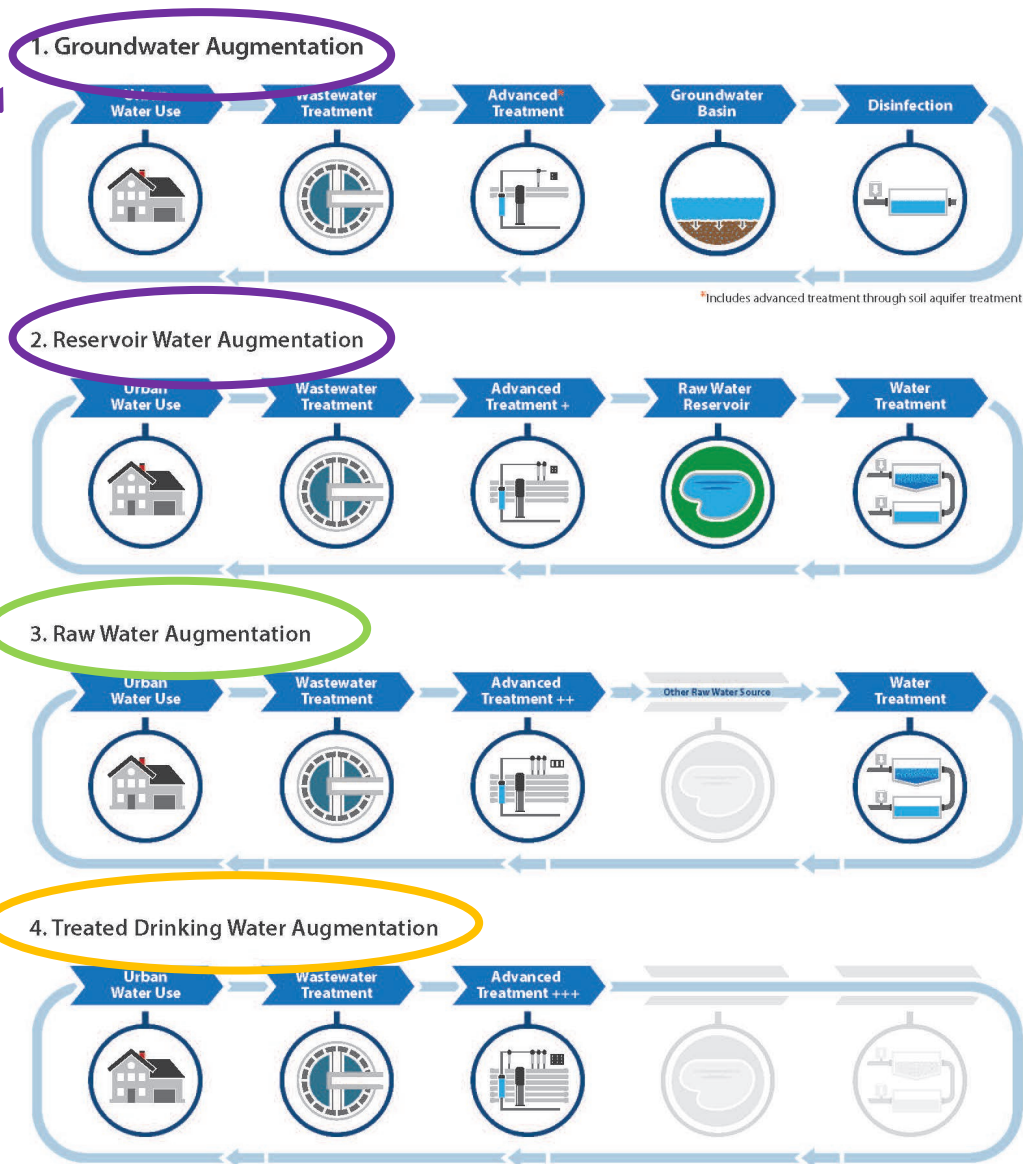
AB 574 (Quirk) - Potable Reuse Statutorily Defined

Potable Reuse Statutory Definitions

Regulations Approved Per SB 918

Target 2023 per AB 574 (and AB 292)

2025 to 2028 ?



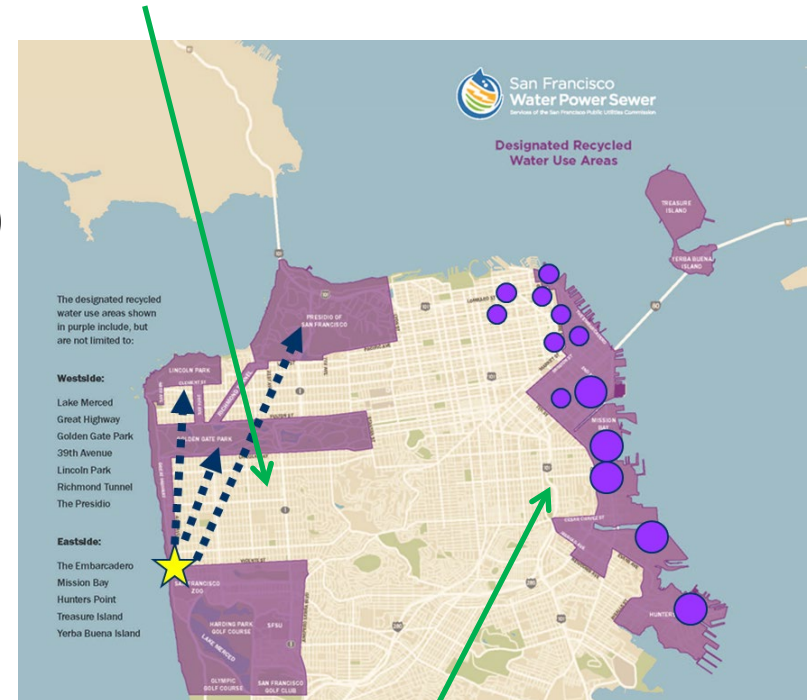


Still leading the
way - new and
innovative
California projects

Westside – Outdoor irrigation (purple pipe)

Irrigation Projects:

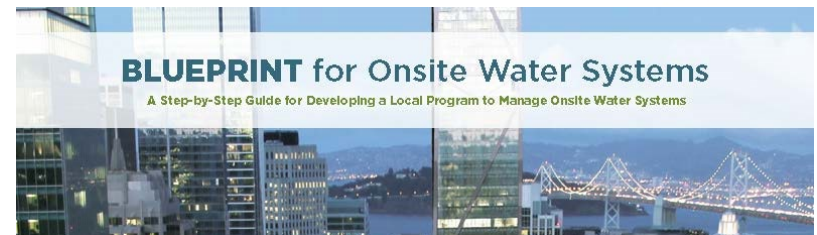
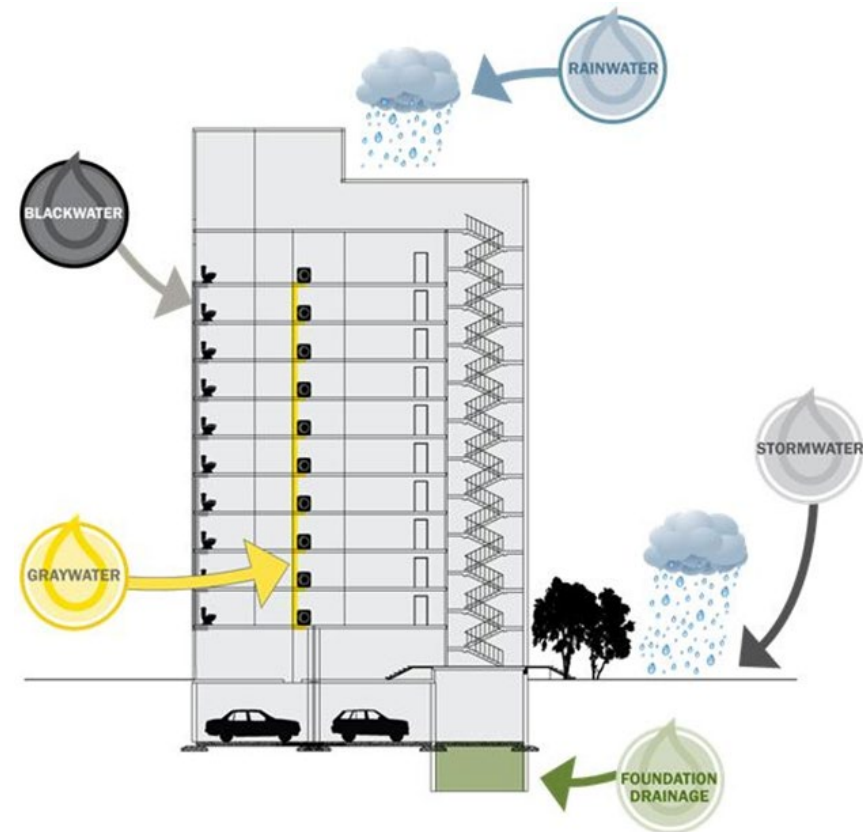
- Harding Park Recycled Water Project (2012)
- Pacifica Recycled Water Project (2014)
- Westside Enhanced Water Recycling Project (2021)
- Facilities include:
 - Centralized treatment facility
 - 12 miles distribution pipelines
 - 1.9 million gallons of storage
 - Three pump stations
- Gleneagles Non-Potable Feasibility Study ongoing
- Current irrigation demand approx. 2 MGD



Eastside – Onsite non-potable water systems

SFPUC Non-potable Water Program

- **2012 – Adopted Non-potable Water Ordinance**
 - Alternative sources and end uses
 - Commercial, mixed-use and multi-family buildings
- **2015 – Article 12C became mandatory**
 - Projects (250,000 sf or greater) to meet their own non-potable demands for toilet flushing and irrigation on-site
- **80 projects** in various stages of design, permitting, construction (**18 in operation**)



Padre Dam Municipal Water District

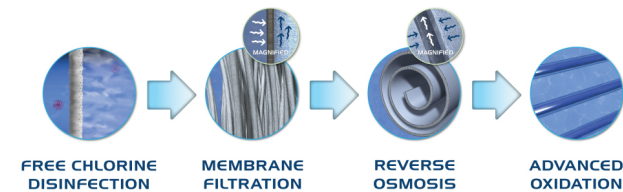
Recycling History

- Recycling since late 1950's - Santee Lakes 1961
- Community trust and engagement
 - 190-acre recreation park offering boating, camping, fishing, outdoor recreation and special events
- Currently serve 225 irrigation customers – 1,800 AF



Advanced Water Purification

- Reservoir augmentation – Lake Jennings
- Project facilities:
 - Water Reclamation Facility upgrade
 - Advanced Water Treatment Plant
 - Influent pump stations/force main
 - Purified water pipeline
- Full-scale project (10.5 MGD) online by 2025 - 30% of potable demands
- Ultimate buildout of 15.5 MGD of Advanced Water Treatment



Padre Dam - Driving Public Opinion and Support

Demonstration Project 100,000 gallons/day



- 7,500 samples taken March 2015-2016 for DDW approval of pathogen removal credits
- Operation continues for testing and public tours

Full Scale Project



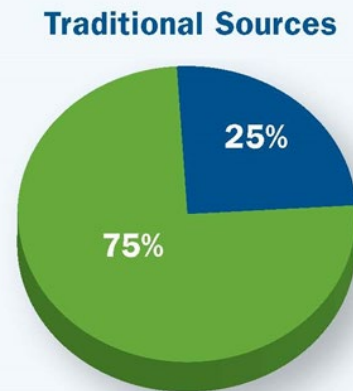
Public Engagement and Outreach



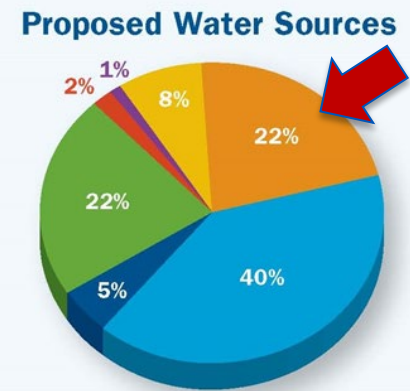


Monterey One Water

- Primary objective:
 - Replenish 3,500 AFY into Seaside Groundwater Basin to offset Carmel River diversions per State order
- Secondary objectives:
 - Provide additional source water to augment irrigation supply
 - Assist in preventing seawater intrusion in the Seaside Groundwater Basin
 - Assist in diversifying Monterey County's water supply portfolio



■ Seaside Basin
■ Carmel River



■ Groundwater Replenishment
■ Desalination
■ Seaside Basin
■ Carmel River
■ Sand City
■ Pacific Grove
■ Aquifer Storage Recovery

Increasing Supply for Pure Water Monterey

- Collection of new source waters to supplement wastewater (up to 5,900 AFY)
- Project facilities include:
 - Source water diversion and storage
 - Advanced water treatment plant
 - Product water conveyance and injection wells
- In construction – online September 2019



Secondary Treated Wastewater



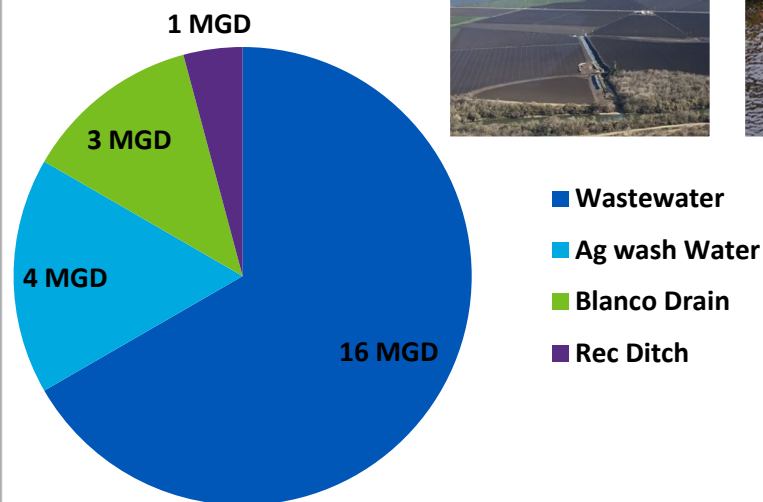
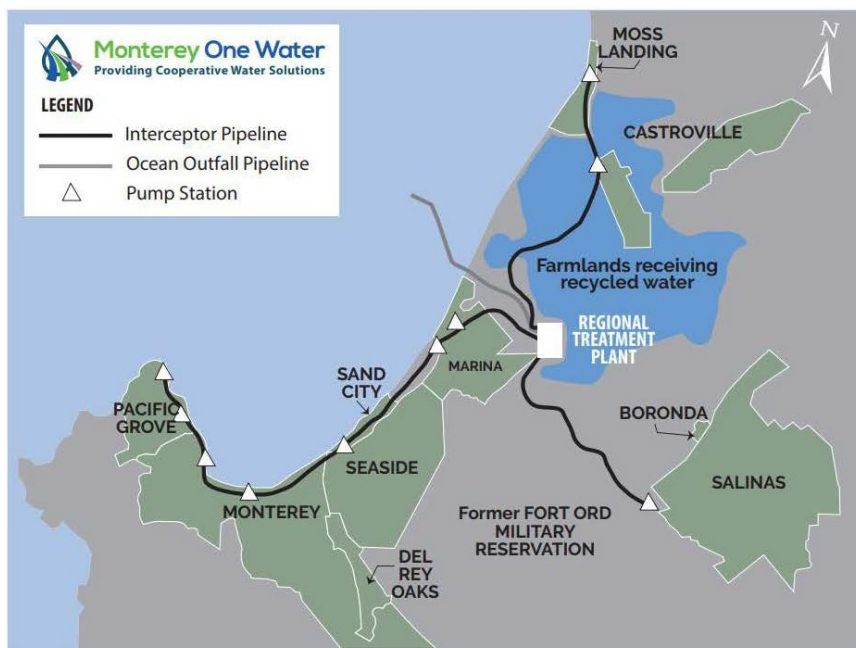
Agricultural Wash Water



Agricultural Drainage Water



Urban Storm Water Runoff





EMWD's recycled water evolution - sustainability and succession



**GROUNDWATER
RELIABILITY PLUS**
Securing Our Water Future

EMWD Recycled Water History

- History:

- **1960's:** *Treated effluent disposed through on-site percolation/evaporation ponds*
- **1966:** *Began marketing recycled water for local farmers for irrigation of feed and fodder crops*
- **1991:** *Received funding through the United States Bureau of Reclamation to develop a recycled water backbone transmission system*
- **2003:** *Complete system pressurization*

- Current non-potable uses:

- Common area landscape – parks, schools and streetscapes
- Recreational – sports fields
- Golf courses
- Industrial use (regional power plant)
- Wetlands and habitat (San Jacinto Wildlife Area – California DFW)
- Agricultural irrigation - 10,800 acres



Inland Empire Energy Center



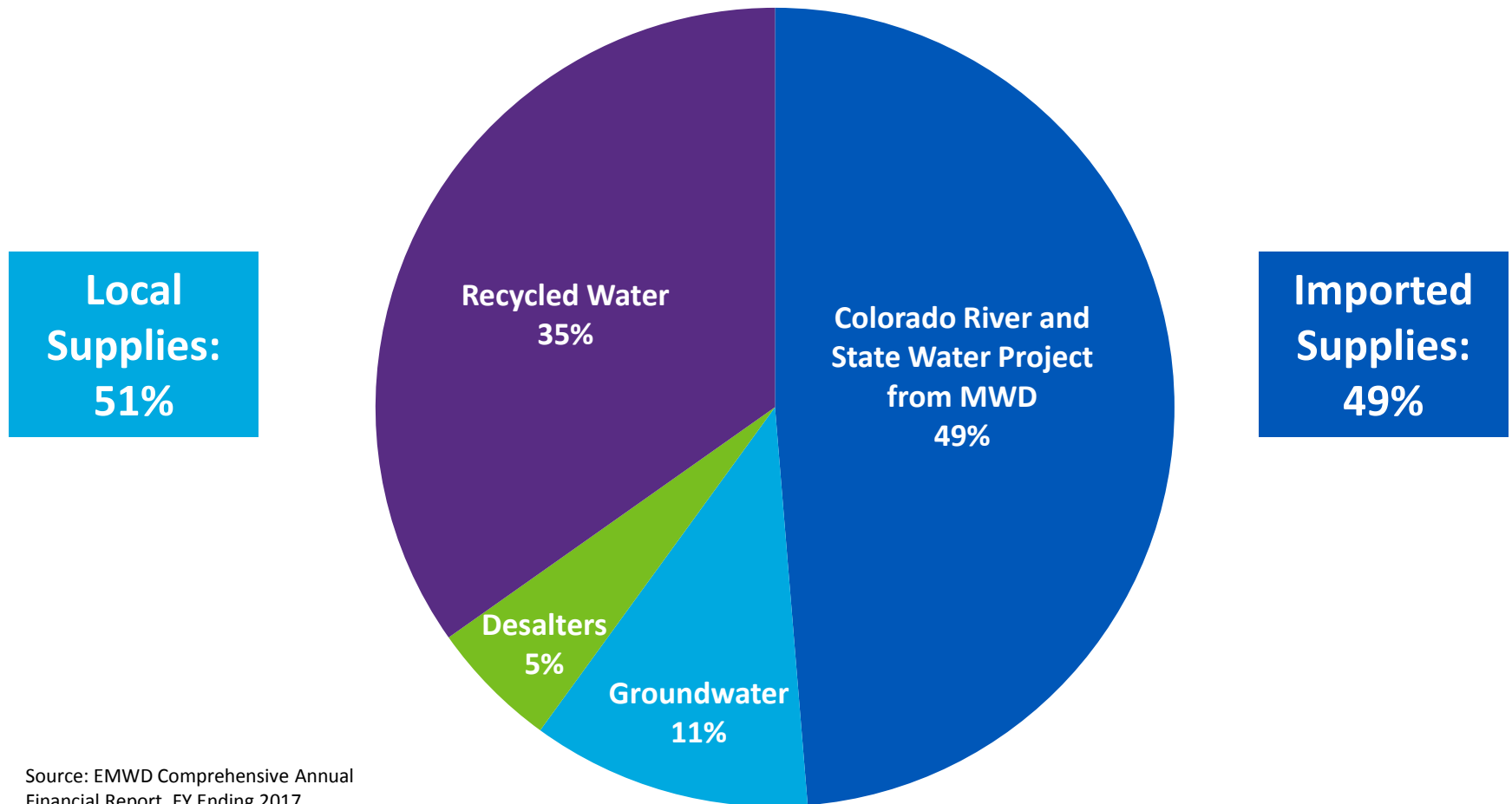
EMWD is at strategic milestone of 100 percent Recycled Water Utilization

35,617 AF sold in FY 17/18

Potable Reuse Succession Plan: Groundwater Augmentation

EMWD's Water Supply Portfolio

FY Ending 2017 – 133,505 AF



Source: EMWD Comprehensive Annual Financial Report, FY Ending 2017

Groundwater Reliability Plus



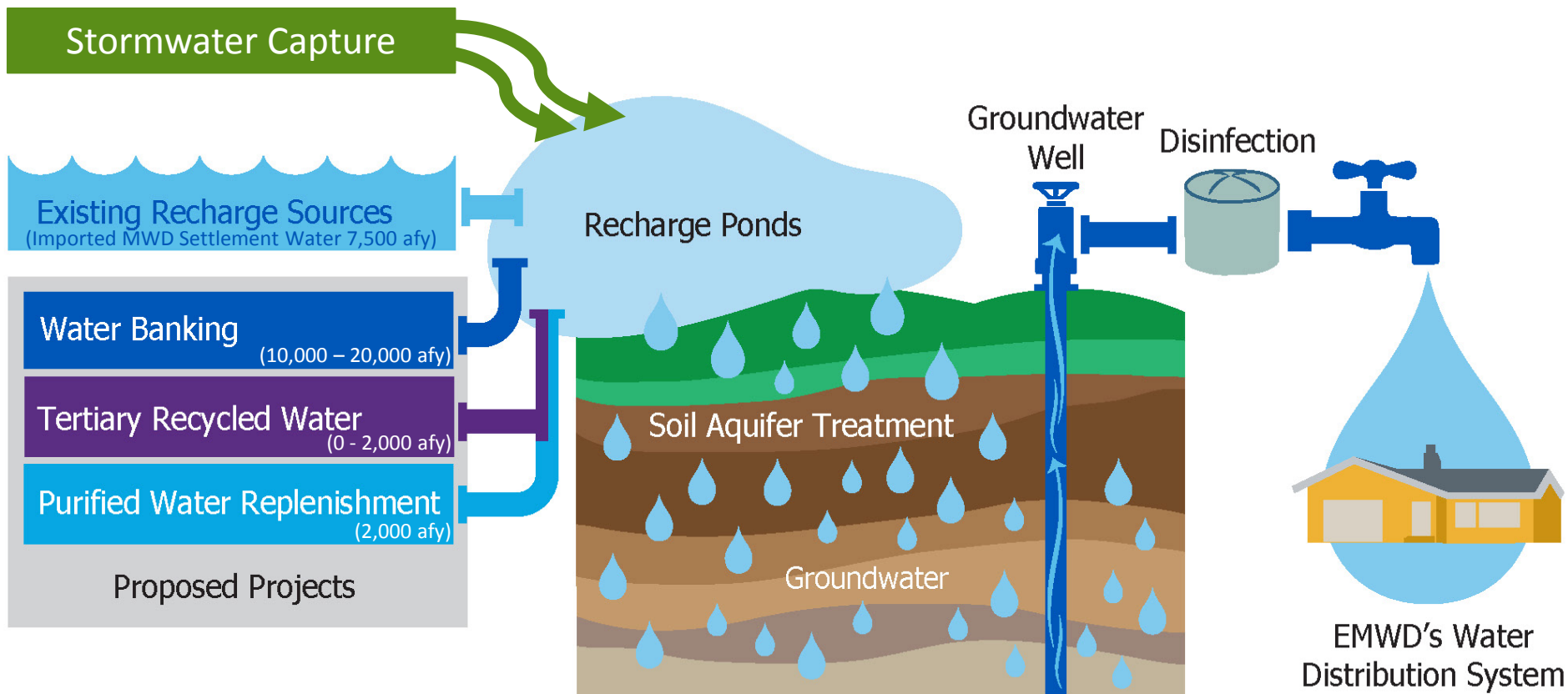
**GROUNDWATER
RELIABILITY PLUS**
Securing Our Water Future

Program Goal: *A comprehensive program to enhance potable supplies, provide dry-year storage and improve water quality in the San Jacinto Basin*

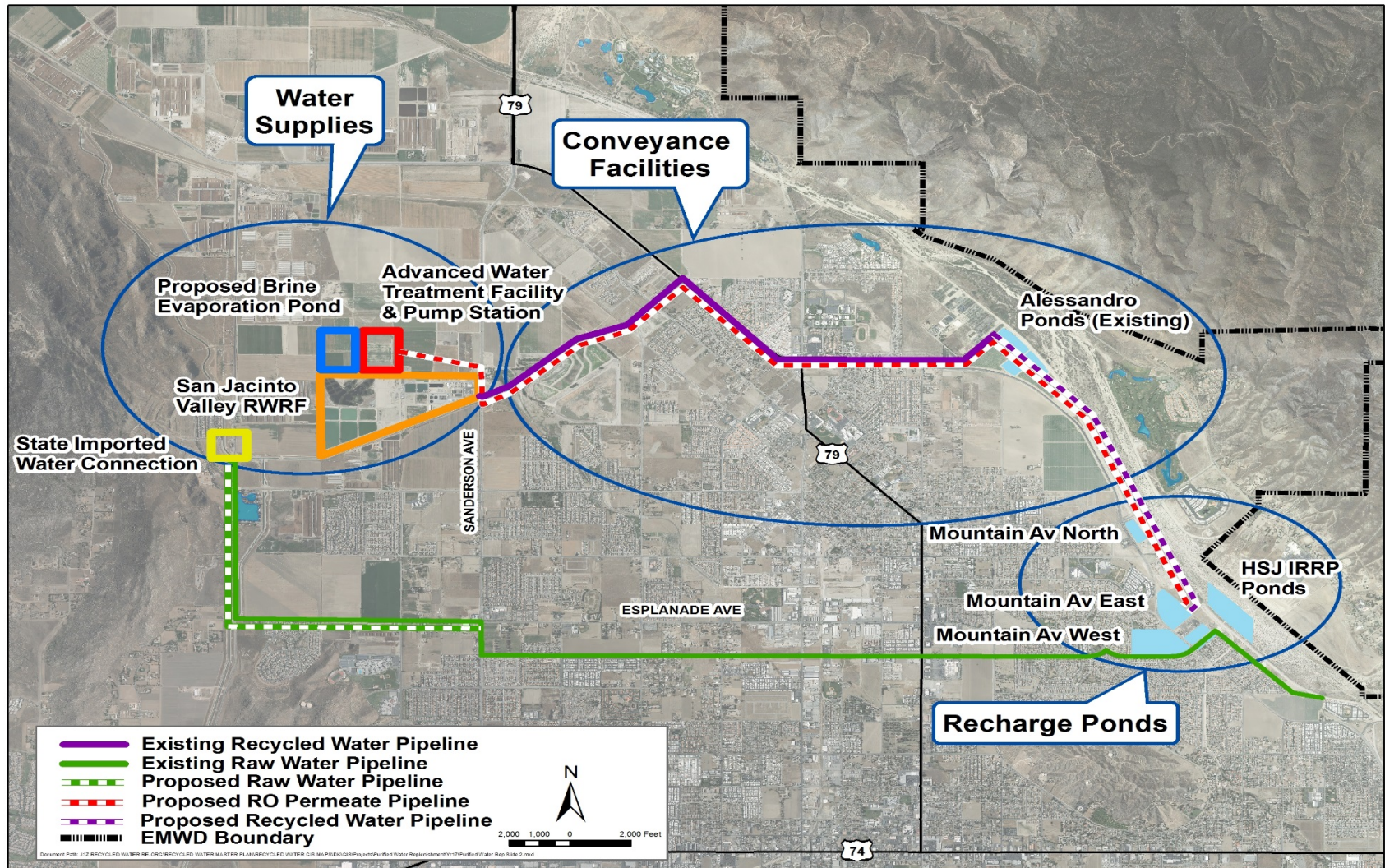
- Supply Augmentation for Replenishment:
 - Advanced treated purified recycled water (MF/RO/UV)
 - Title 22 “Purple Pipe” recycled water
 - Increased conveyance capacity for State Water Project water
- Groundwater Dry-year Storage:
 - Groundwater spreading and extraction facilities
 - Water banking program for dry-year yield
- Water Quality:
 - Lower projected salinity levels in groundwater basin



Current and Proposed Groundwater Reliability Plus Operations



Groundwater Reliability Plus - Proposed Facilities



Conclusions

- Water recycling is undergoing a significant positive paradigm shift nationally and in California
- Drivers include:
 - Holistic “One Water” focus
 - Significant technology, research and regulatory advances
 - Increased scarcity/climate variability
 - Unprecedented public acceptance
- California has challenging water recycling goals - but the sources and drivers are there
- The state still leads the way with new and innovative projects





Thank You

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