Recycled Water Seasonal Storage Facility Plan of Action

Comprehensive Water Resource Strategy

Recycled Water Seasonal Storage Facility Plan of Action

Not an engineering or design study, but a facilitated exercise in

communication and thought leadership

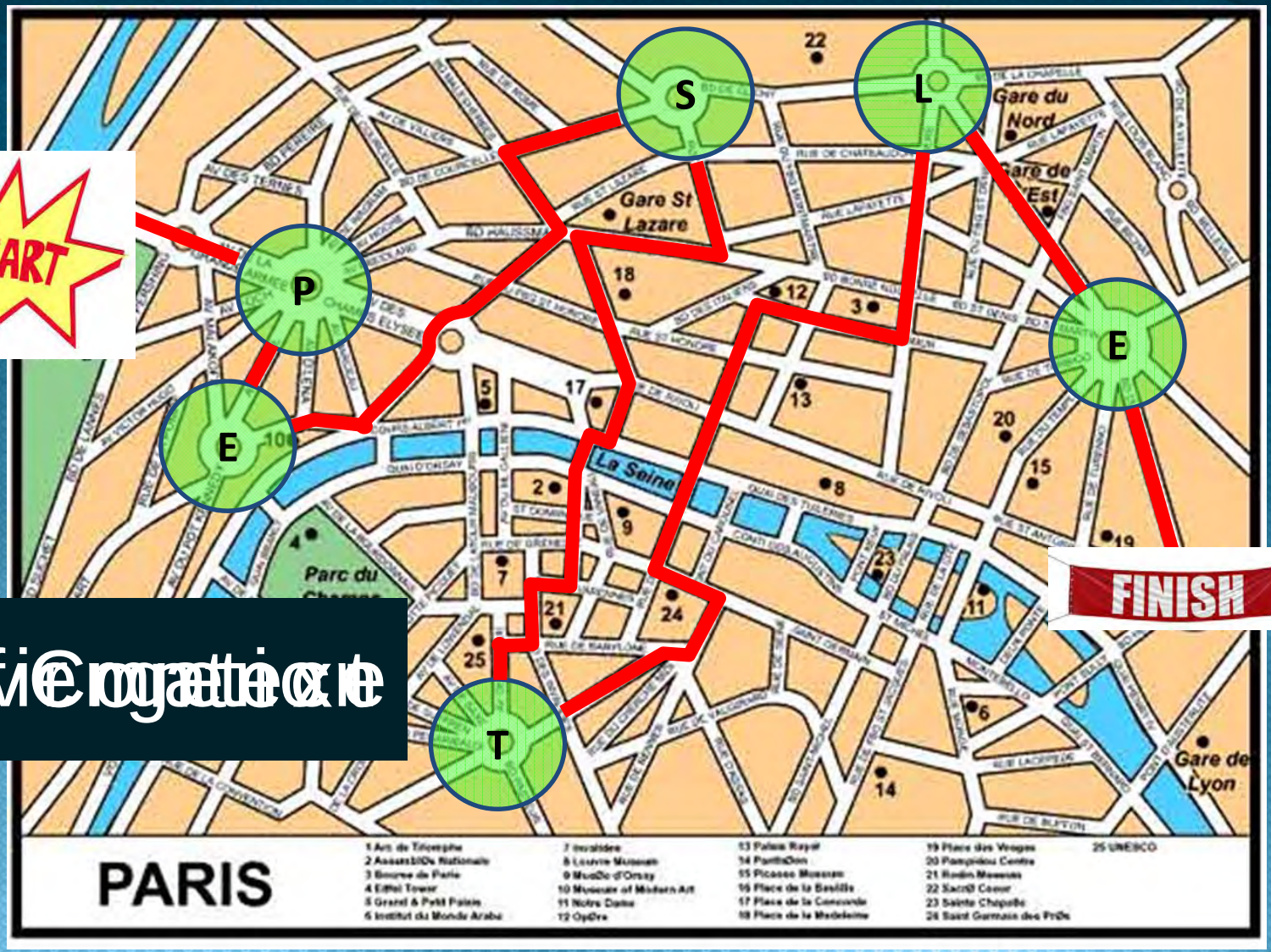
MWH

There are a wide variety of paths to choose from…

…the correct path for your project may not always be the obvious one.

MWH

There are many ways to navigate your way through the challenges



Artificial Intelligence

MWH

JPA

Individual — Orientation — Interviews

Small Group — Workshop #1 (Context) — PESTLE

"The Team" — Workshop #2 (Convergence) — BPAT

MWH — Analysis

"The Team" — Workshop #3 (Affirmation) — Elements of the Roadmap

Implementation ("Road Map")

GO TIME

MWH

Workshop 1 - Agenda

Time	Item
4:00 - 4:30	Introduction to Workshop, presented by Dr. Steve Weber
4:30 - 5:00	Water Reuse Presentation Part 1, presented by Dr. Joseph Jacangelo
5:00 - 5:15	Break, Dinner is served
5:15 - 5:45	Water Reuse Presentation Part 2, presented by James Borchardt
5:45 - 6:00	Break
6:00 - 7:45	PESTLE Exercise, by Dr. Steve Weber and Bob Armstrong
7:45 - 8:00	Closing and Next Steps, presented by Dave Pedersen

JPA Board Member Interview Results

- **Key Words and Phrases**
  - Customers
  - Cost Effectiveness
  - Using the most of existing resources
  - Malibu Creek
  - Expanding recycled water use
  - Innovative forms of reuse
  - Outreach

EXERCISE

Water Reuse Presentation
Part 1

Dr. Joseph G. Jacangelo
MWH
The Johns Hopkins Univ. Bloomberg School of Public Health

What is Water Reuse?

The reclamation and treatment of impaired waters for the purpose of beneficial reuse.

Approximately 90% of Water Reuse Occurs in Four States

Adapted from Miller, 2013

Largest Water Reuse Programs in the US

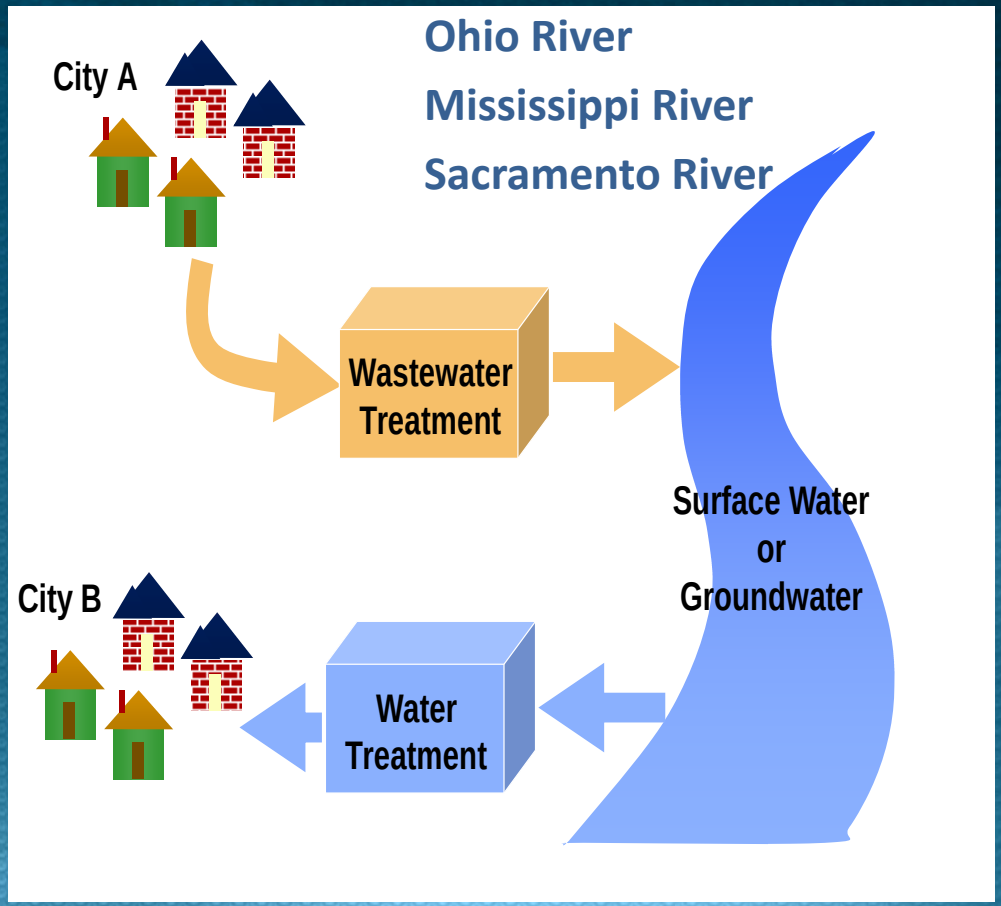
- OCWD/OCSD
- Central/West Basin
- MWD
- San Jose
- LACSD
- San Diego County
- Irvine Ranch
- Dublin San Ramon
- EBMUD
- Orlando
- Scottsdale
- Phoenix
- San Antonio
- El Paso
- Tarrant Regional
- St. Petersburg
- Pinellas County
- King County (WA)
- Austin
- Santa Rosa
- Las Virgenes-Triunfo JPA
- SNWA/LVVWD

Categories of Reuse

- Unplanned or Incidental Reuse
- Non-Potable Reuse
  - Examples: irrigation and industrial reuse
- Indirect Potable Reuse
  - GWR OCWD/OCSD
  - West Basin MWD
- Direct Potable Reuse
  - Windhoek, Namibia
  - Big Spring, Texas

Unplanned / Incidental Reuse

- 25 DWTPs recently studied
- Unplanned reuse ranged from 7 to 100% under low stream flow conditions
- WW flows increased 68% between 1980 and 2008



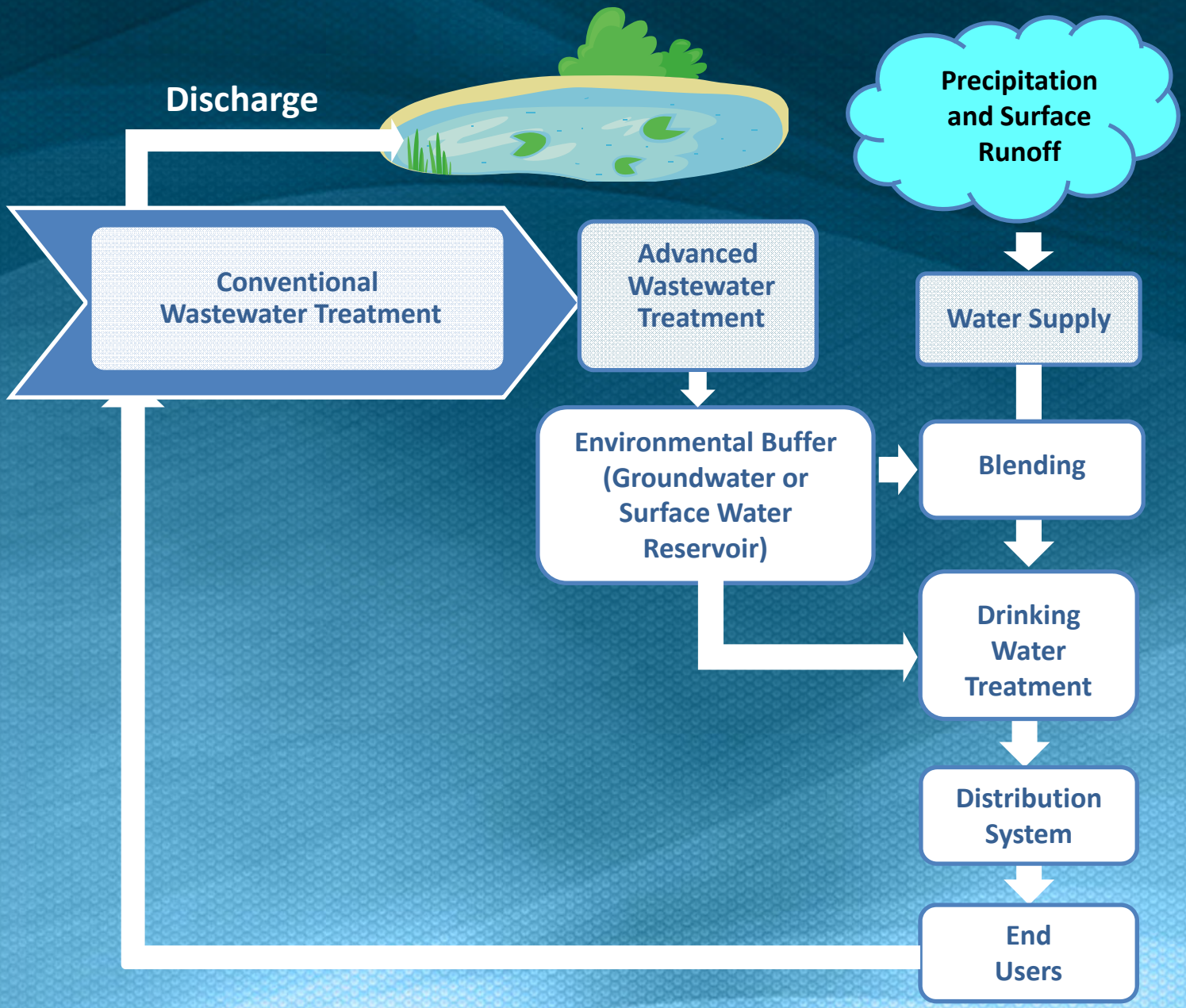
Non-Potable Reuse (Title 22)

Regulations and Guidelines Vary Depending on Type of Reuse

- Direct Potable Reuse
- Indirect Potable Reuse
- Agricultural Reuse on Food Crops
- Unrestricted Recreational Reuse
- Unrestricted Urban Irrigation Reuse
- Restricted Urban Irrigation Reuse
- Restricted Recreational Reuse
- Industrial Reuse
- Environmental Reuse
- Agricultural Reuse on Non-food Crops

Adapted from Miller, 2014

IPR Scenarios



The Value of the Environmental Buffer

- Detection/Response Time
- Contaminant Removal
  - Chemical
  - Microbial
- Dilution and Blending
- Perception

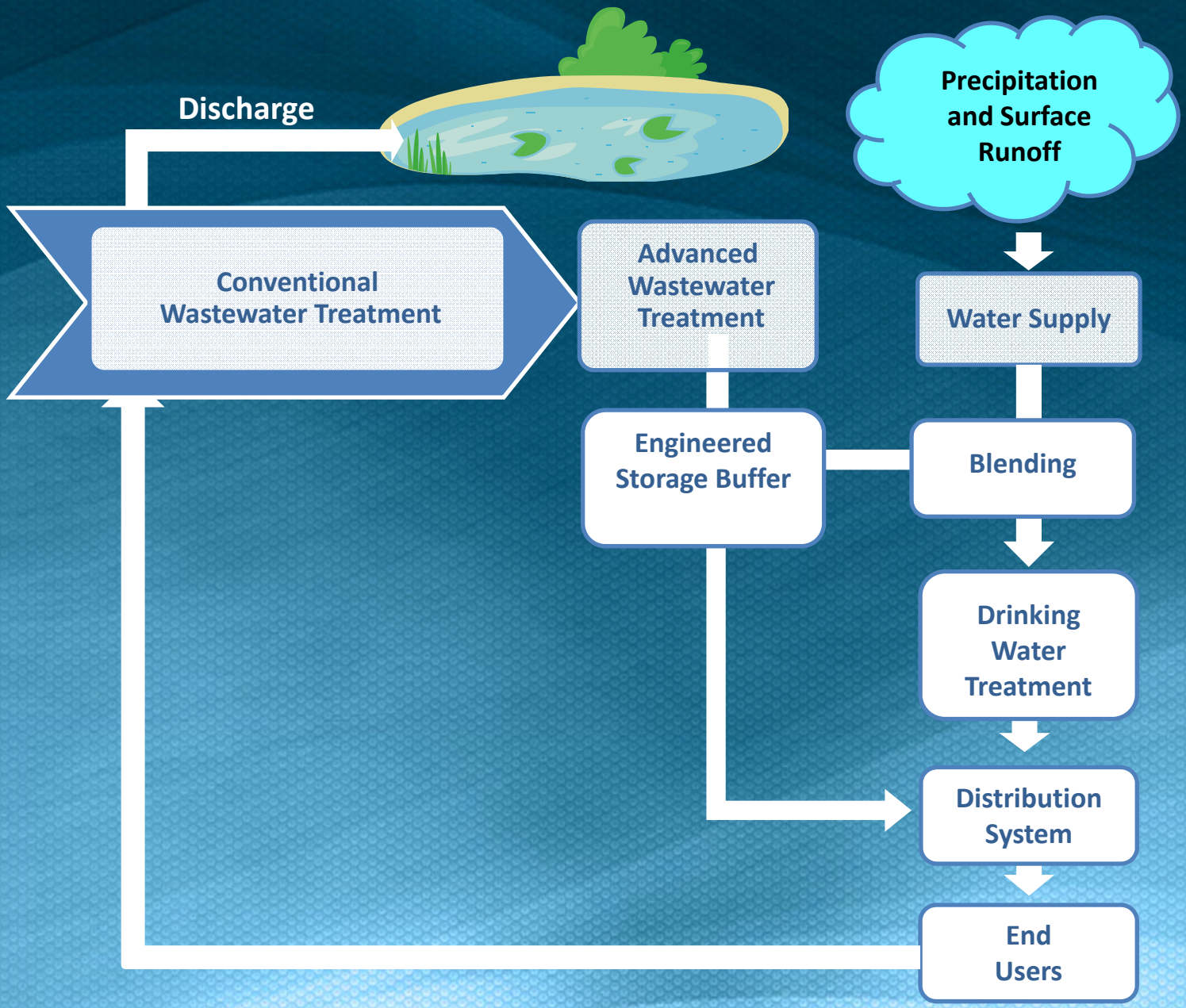
Adapted from Miller, 2014; Steinie Darling, 2014

What is Direct Potable Reuse?

Introduction of highly-treated reclaimed water directly into the raw water supply immediately upstream of a water treatment plant, or directly into the distribution system downstream of a water treatment plant.

Source: California Direct Potable Reuse Initiative Research Plan, 2014

DPR Scenarios

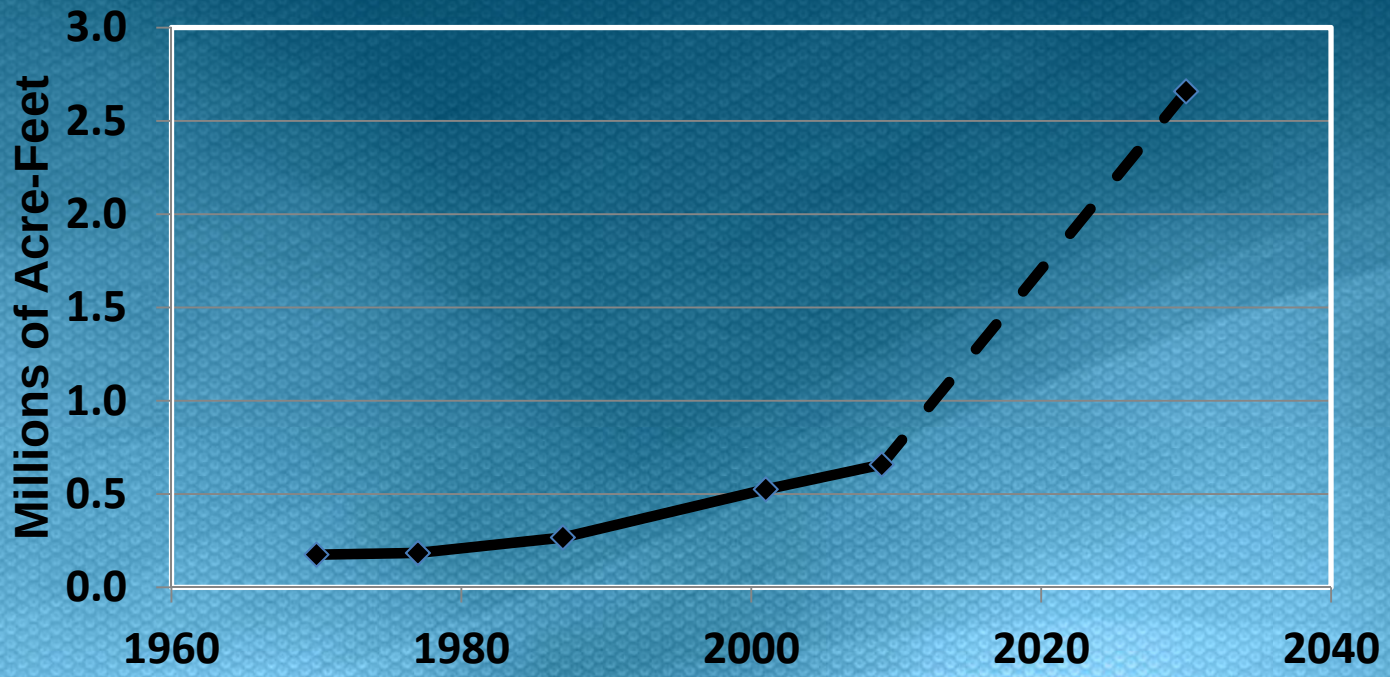


DPR vs. IPR

- Eliminates the need for an environmental buffer and greatly increases potential for reuse
- Decreases energy and costs and GHG emissions associated with pumping
- Eliminates many costs and disruption of pipe installation (digging up streets)
- Maintains very high water quality

California's Recycled Water Goals

California has adopted a goal of increasing the use of recycled water from approximately 0.65 MAF per year to 1.5 MAF/year by 2020 and then to 2.5 MAF/year by 2030 – approximately a four-fold increase over the next 16 years.



Adapted from Miller, 2014

From Miller, AWWA DPR Webcast, 2014

Impetus Behind the Current DPR Initiative

- Signed into law on September 30, 2010 (sponsored by State Senator Fran Pavley.)
- Requires DDW to adopt regulations for surface water augmentation by December 31, 2016, if an expert panel convened pursuant to the bill finds that the criteria would adequately protect public health.

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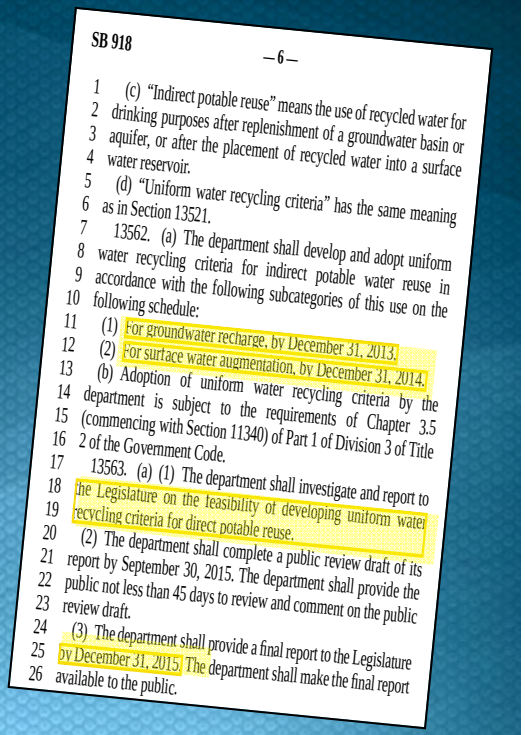
- Requires DDW to *investigate the feasibility of developing direct potable reuse* and to provide a final report to the legislature by December 31, 2016.



SB 918 — 6 —

(c) "Indirect potable reuse" means the use of recycled water for drinking purposes after replenishment of a groundwater basin or aquifer, or after the placement of recycled water into a surface water reservoir.

(d) "Uniform water recycling criteria" has the same meaning as in Section 13521.

13562. (a) The department shall develop and adopt uniform water recycling criteria for indirect potable water reuse in accordance with the following subcategories of this use on the following schedule:

(1) For groundwater recharge, by December 31, 2013.

(2) For surface water augmentation, by December 31, 2014.

(b) Adoption of uniform water recycling criteria by the department is subject to the requirements of Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code.

13563. (a) (1) The department shall investigate and report to the Legislature on the feasibility of developing uniform water recycling criteria for direct potable reuse.

(2) The department shall complete a public review draft of its report by September 30, 2015. The department shall provide the public not less than 45 days to review and comment on the public review draft.

(3) The department shall provide a final report to the Legislature by December 31, 2015. The department shall make the final report available to the public.

Adapted from Miller, 2014

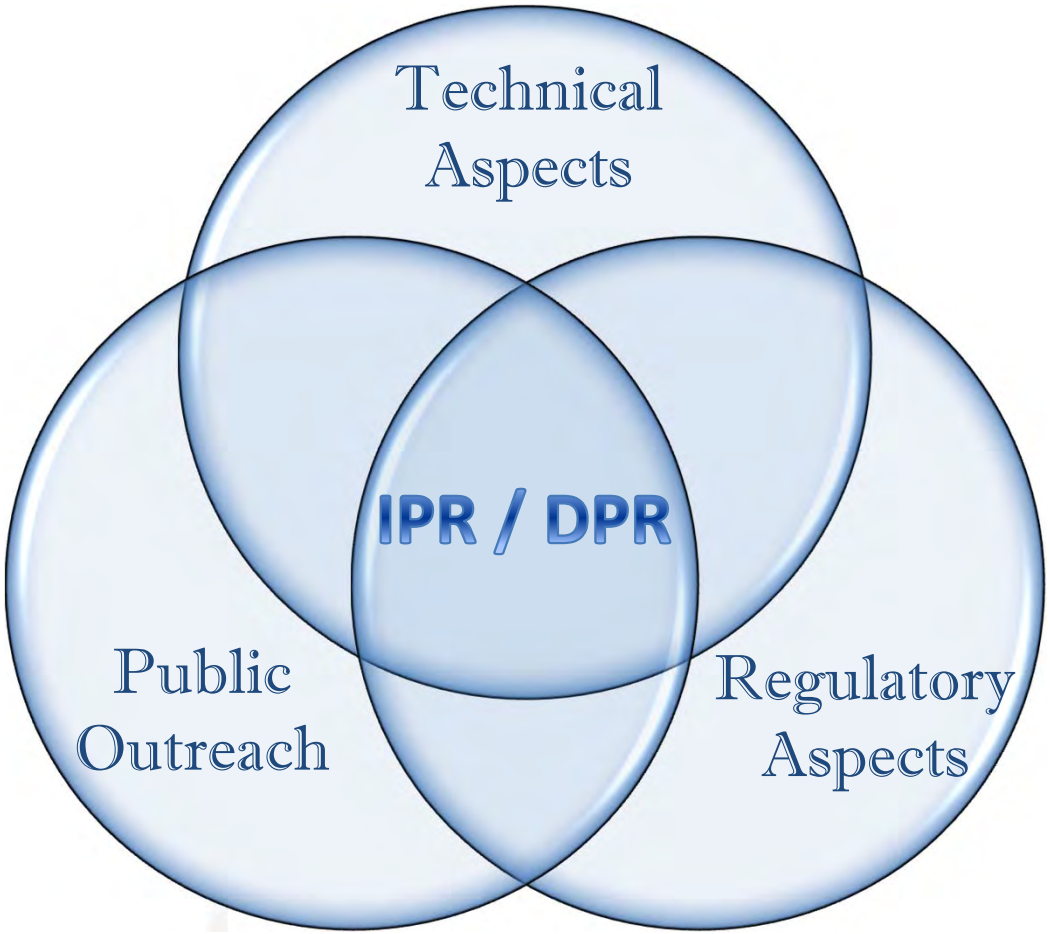
Direct Potable Reuse Initiative

- DPR became rallying cry for the entire water and water reuse community.
- Approximately 50 contributors.
- Approximately $6 M raised (cash).
- Additional $2.1 M granted by State of California for DBP demonstration project.

Current Research in Water Reuse

- Development of the "Engineered Buffer" concept
- Regulatory support concepts for microorganisms and chemicals
- Required safety factors to protect public health
- New sensors and monitoring technologies of water quality
- Brine disposal technologies
- Non-membrane treatment approaches
- Public outreach and communication

Elements of a IPR / DPR Program



Questions?

BREAK

Water Reuse Presentation
Part 2

Jim Borchardt
MWH

Non-Potable Reuse

Discharge

Precipitation and Surface Runoff

Conventional Wastewater Treatment

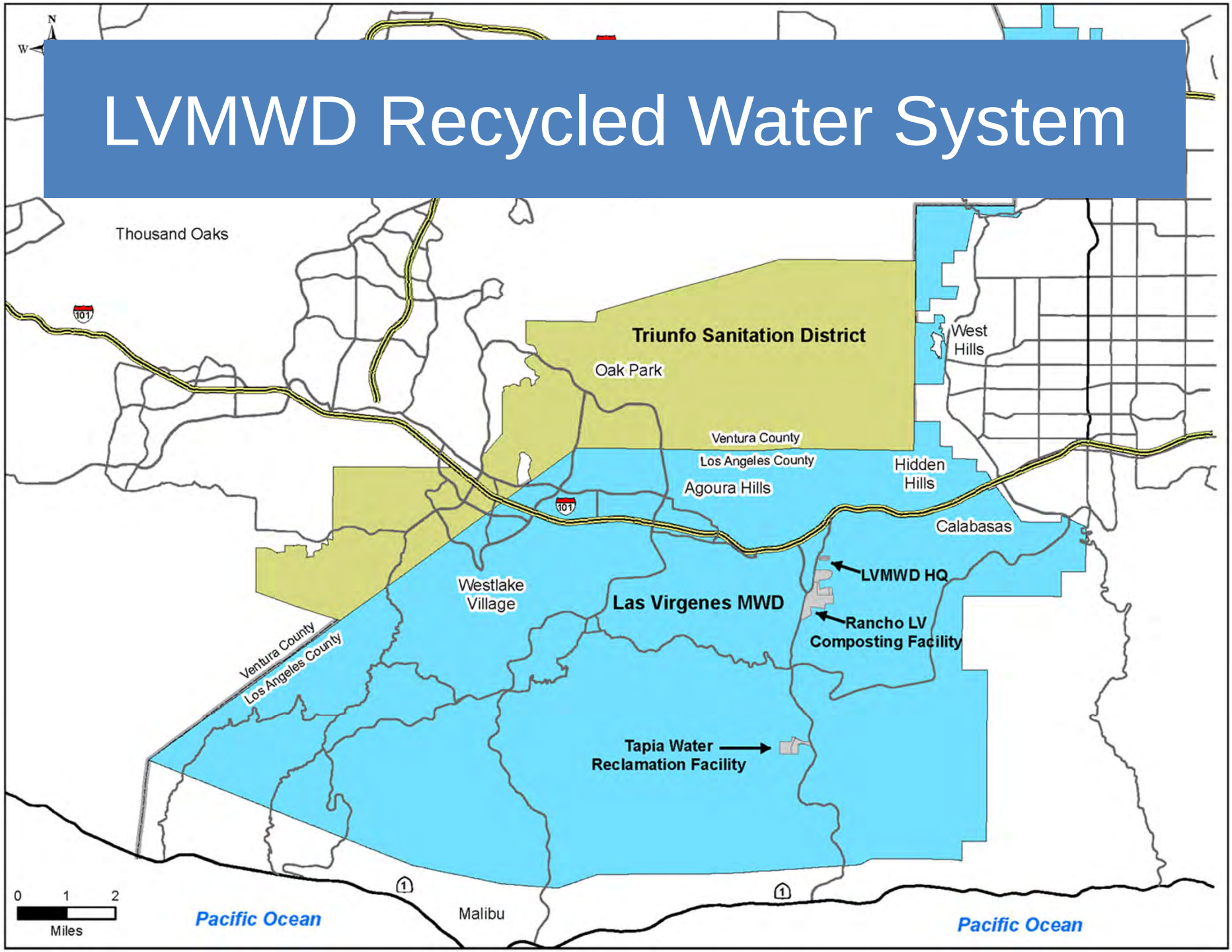
Water Supply

Irrigation and Industrial (non-potable) Reuse

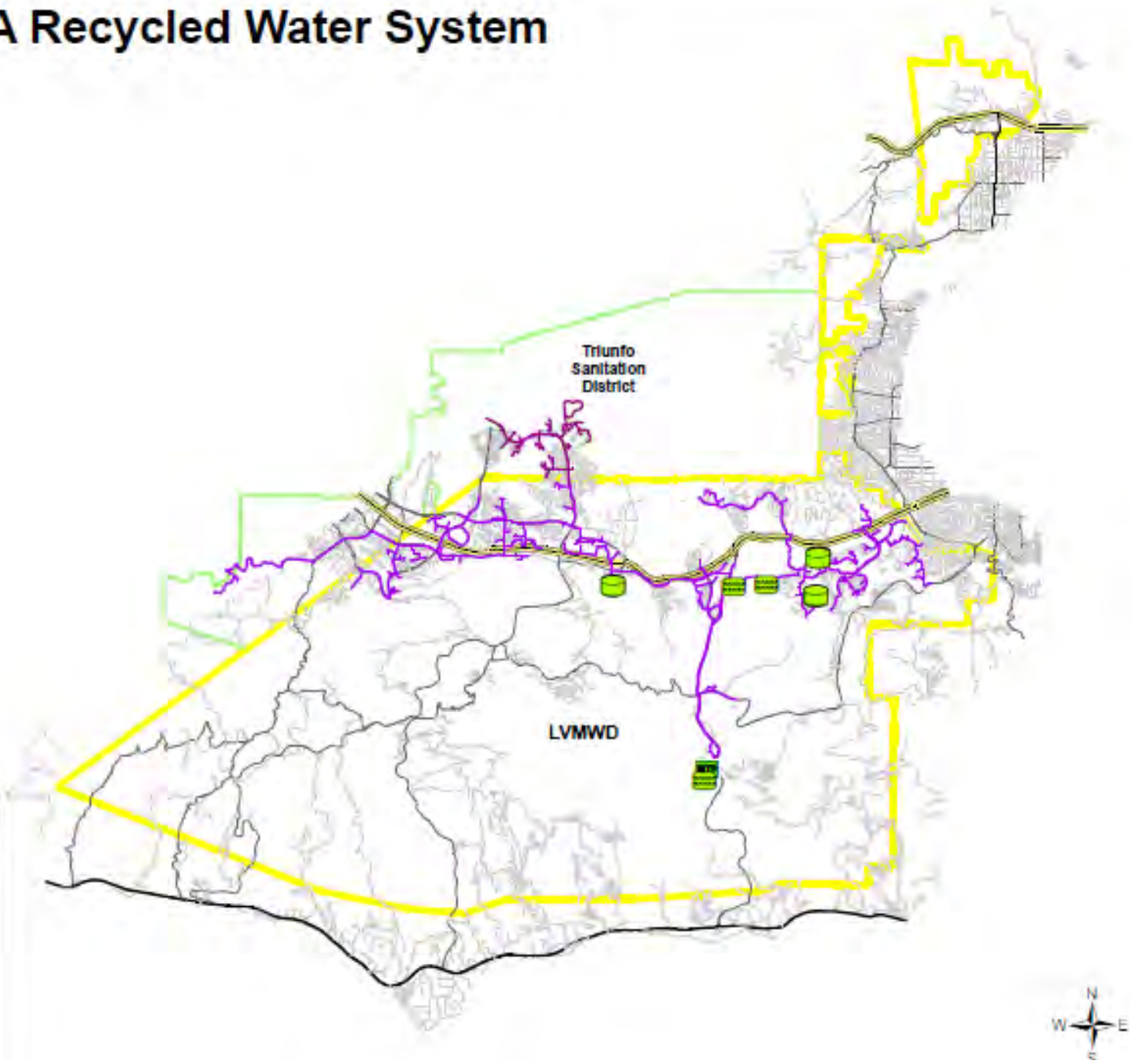
Drinking Water Treatment

Distribution System

LVMWD Recycled Water System



JPA Recycled Water System

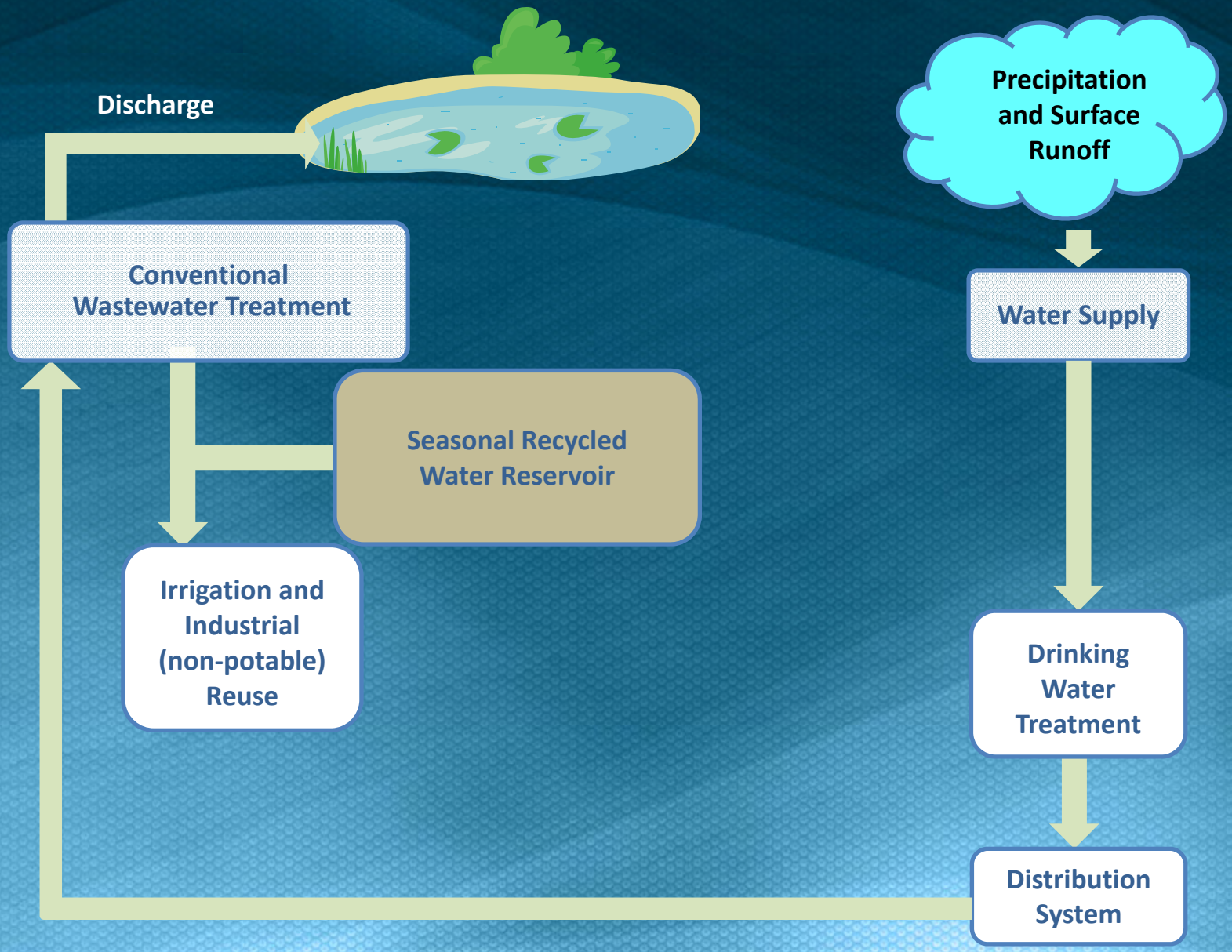


Legend

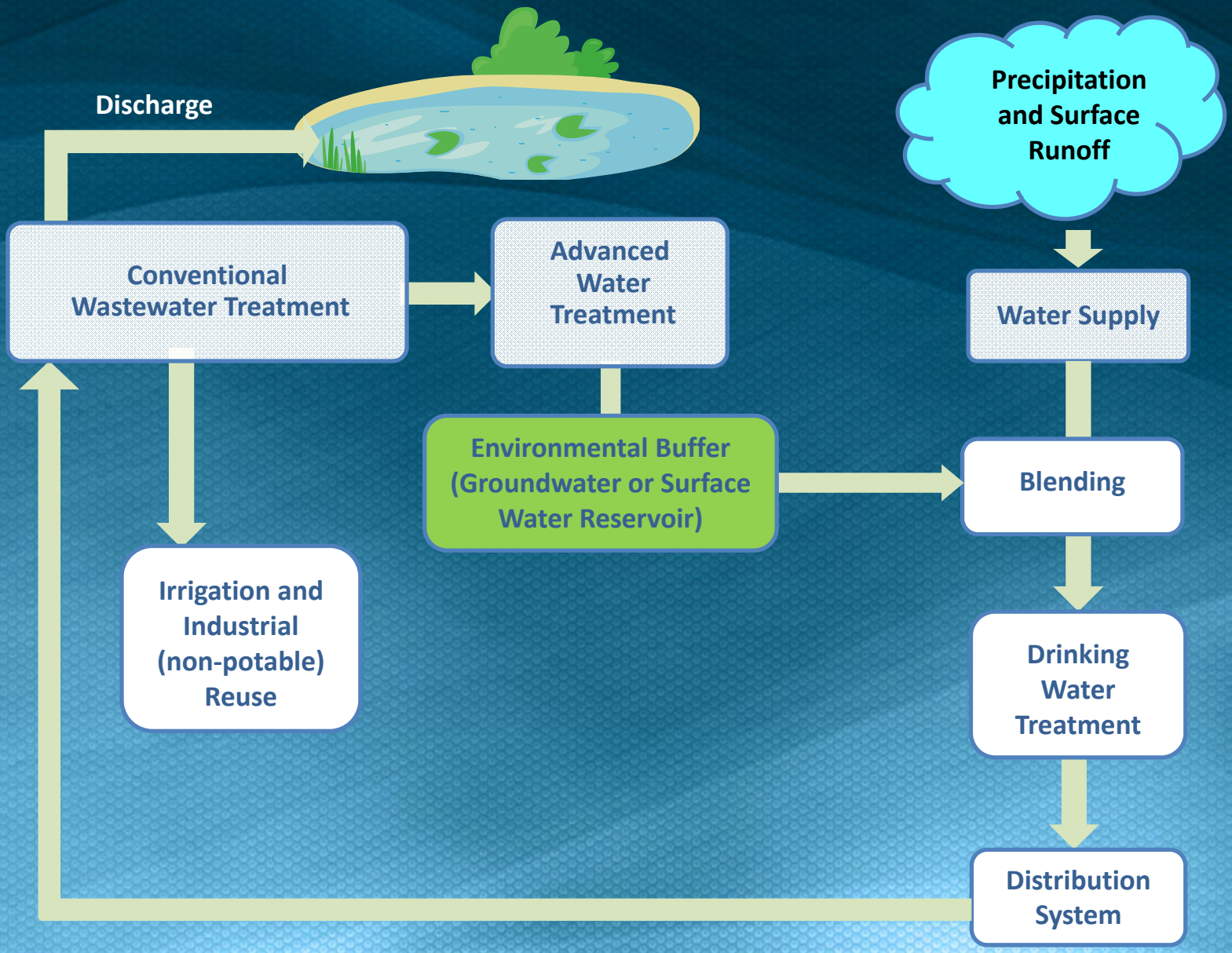
Recycled Water Network Structure

- Reservoir
- Tank
- Treatment Plant
- reWater_line
- Distribution Main
- LVMWD Boundary
- Triunfo Sanitation District

Enhanced Non-Potable Reuse



Indirect Potable Reuse (IPR)

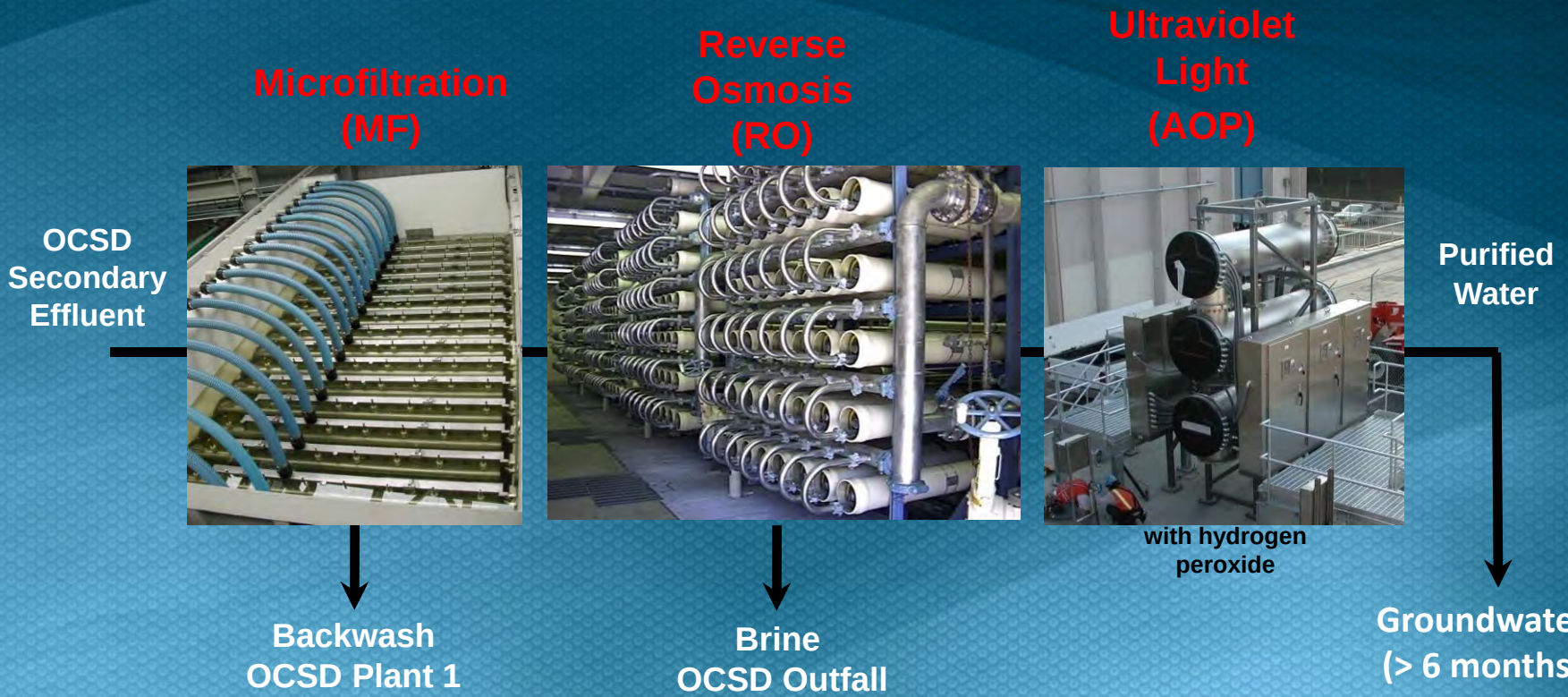


Indirect Potable Reuse Examples

- GWR – OCWD/OCSD
- West Basin MWD
- City of San Diego
- Irvine Ranch WD
- Dublin-San Ramon WD
- City of San Jose

Example: Indirect Potable Reuse

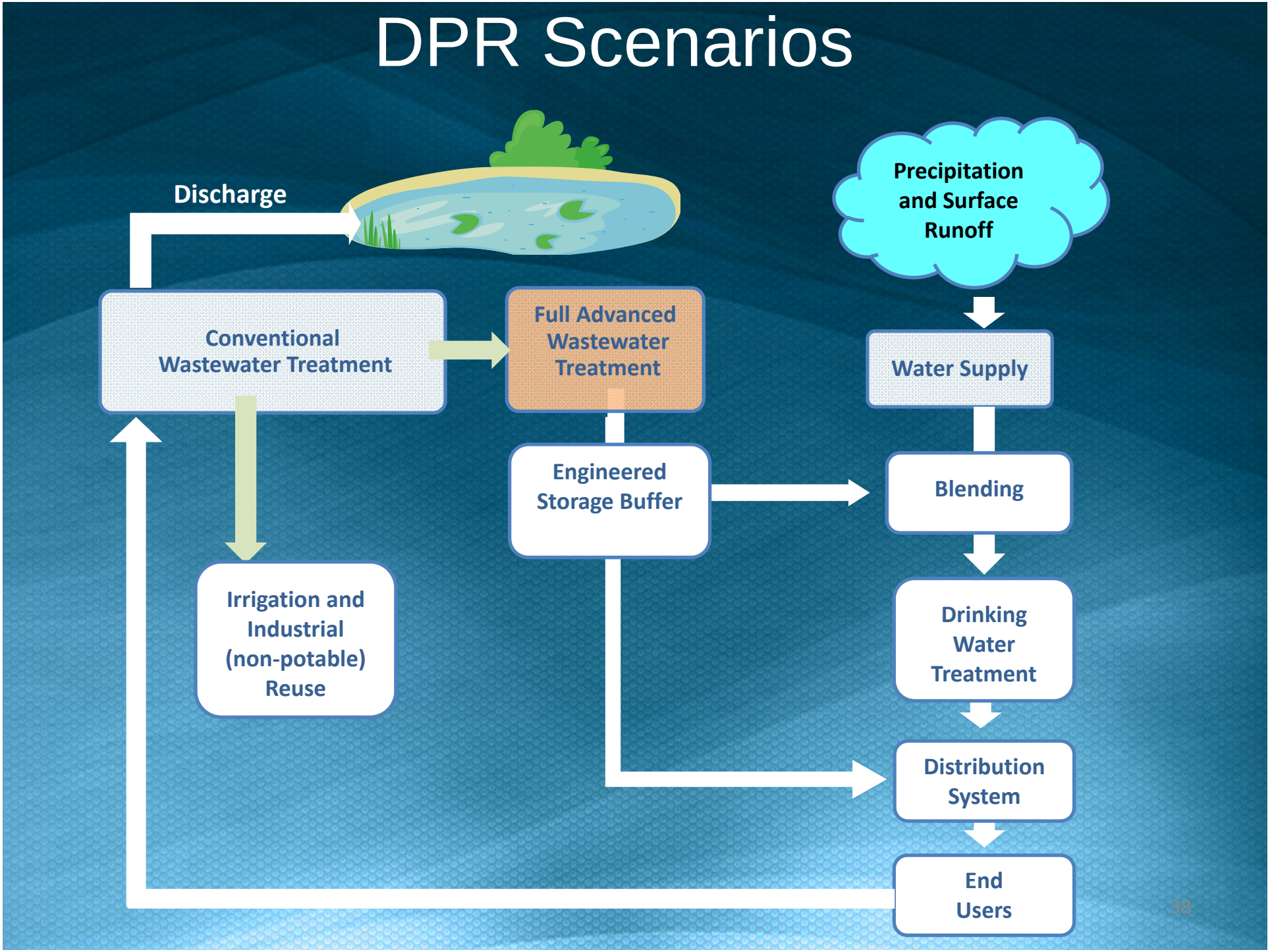
GWR Advanced Water Treatment (AWT)



RO Concentrate Disposal Options

- Surface water discharge
- Discharge to wastewater collection system
- Deepwell injection
- Evaporation ponds (without and with greenhouse)
- Land application
- Zero liquid discharge (ZLD)
- RO concentrate line to ocean

DPR Scenarios



Engineered Direct Potable Reuse Examples

- Big Spring, Texas
- Wichita Falls, Texas
- Cloudcroft, New Mexico
- Windhoek, Namibia

San Diego: Journey to Pure Water

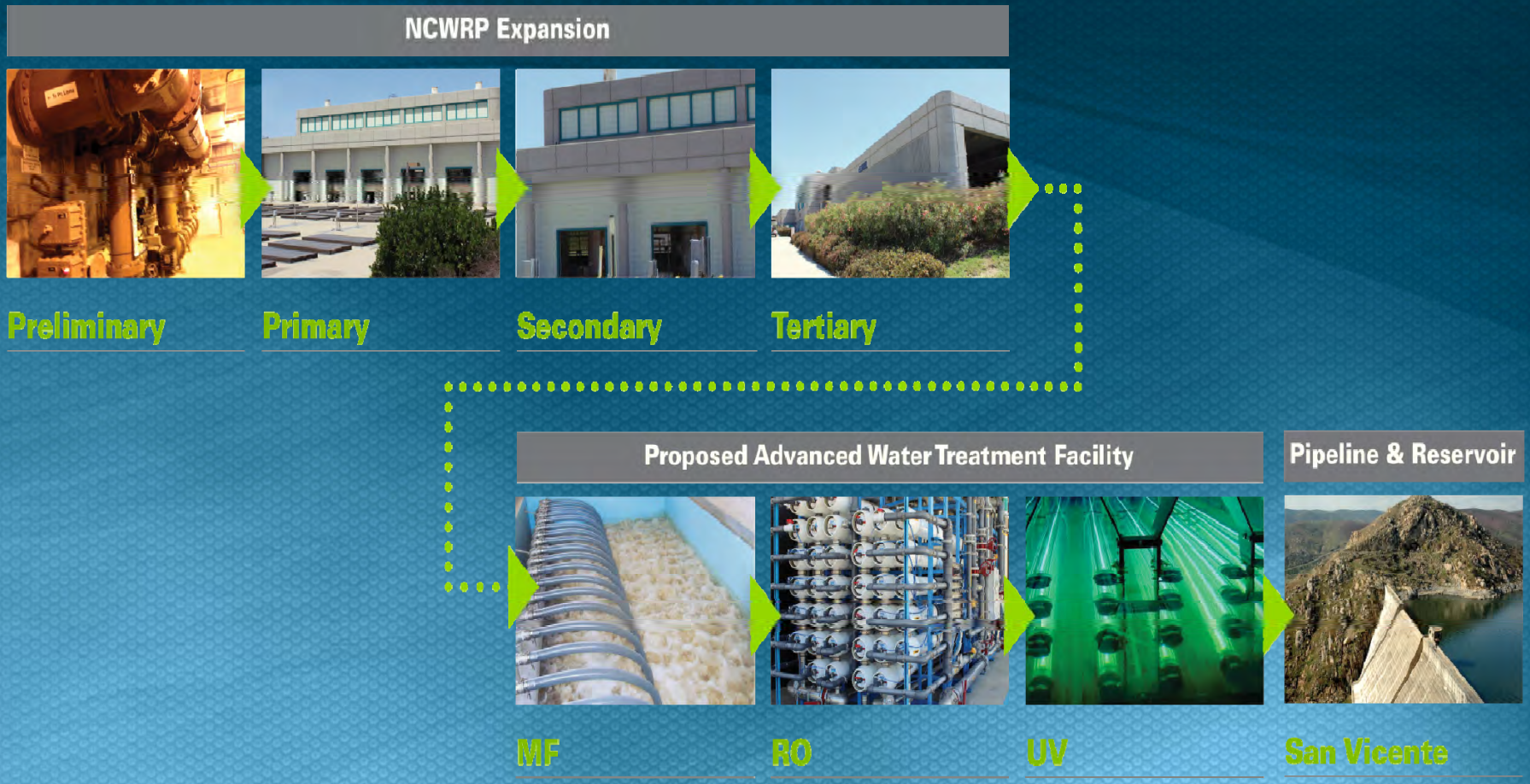
Over 20 Pure Water Scenarios Analyzed


San Vicente Reservoir
27
41
North City
Otay Reservoir
15
Harbor Drive
Point Loma
87
South Bay
16

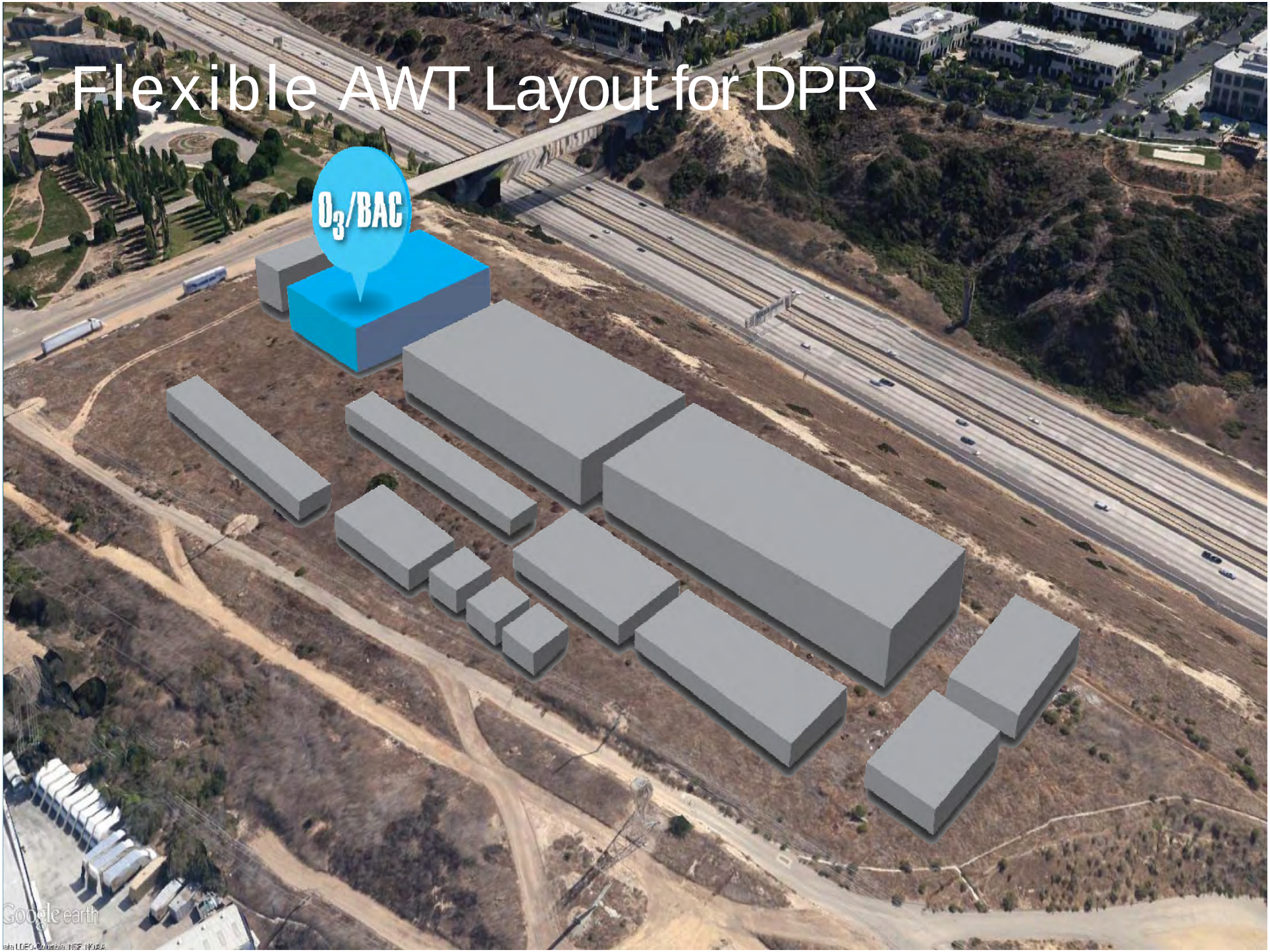

Image Landsat
Google earth

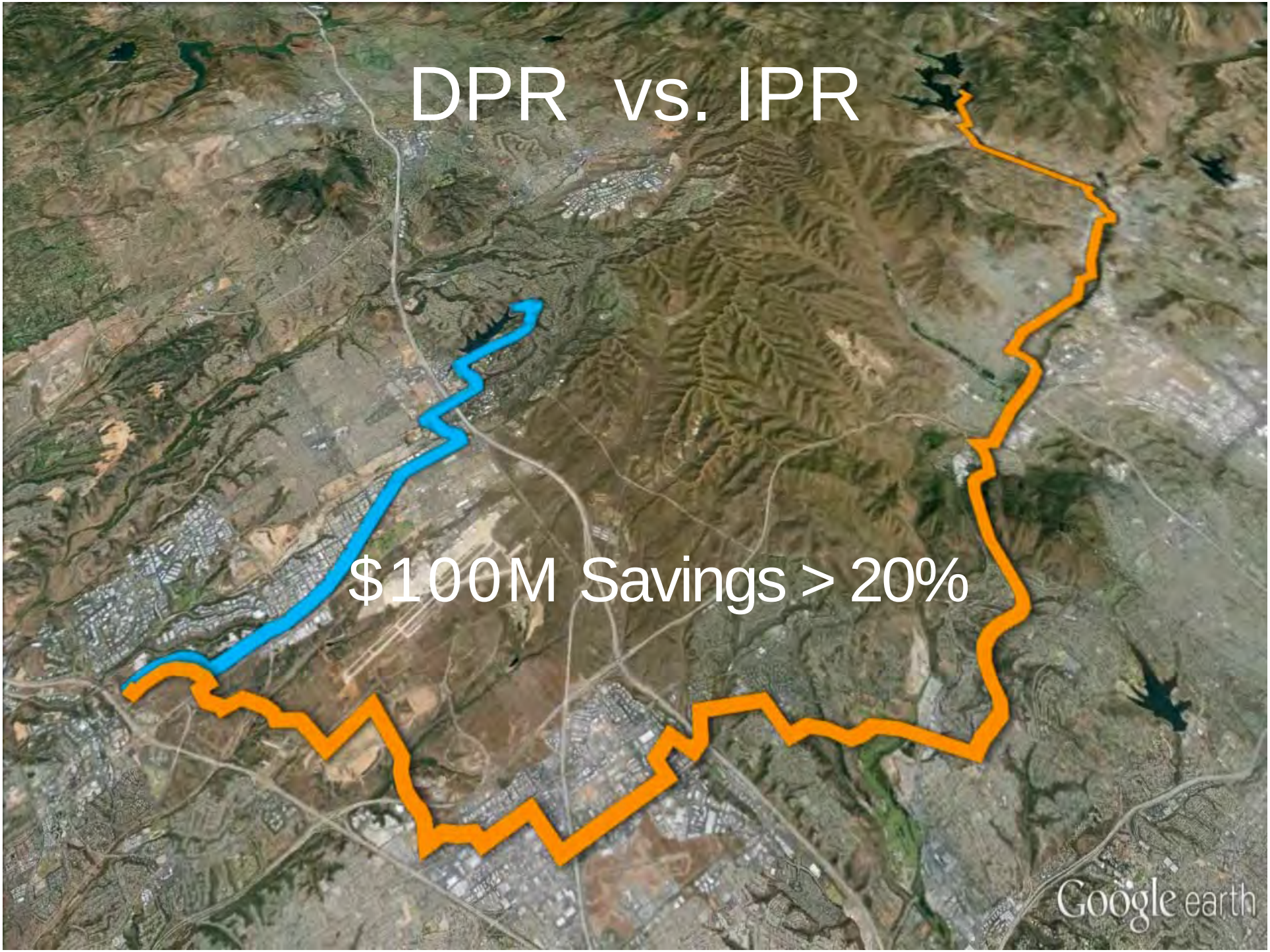
Proposed AWT

North City Technical Aspects



Flexible AWT Layout for DPR




DPR vs. IPR
$100M Savings > 20%
Google earth

Summary of Water Reuse Options

- Unplanned or Incidental Reuse
- Non-Potable Reuse
  - Purple Pipe System
  - Seasonal Storage
- Indirect Potable Reuse
  - Advanced Water Treatment
  - Environmental Buffer
- Direct Potable Reuse
  - Full Advanced Water Treatment
  - Engineered Buffer

Questions?

BREAK

PESTLE EXERCISE

Political
Economic
Social
Technical
Legal
Environmental

PESTLE EXERCISE

NEXT STEPS:

TECHNICAL PRESENTATIONS FOR WORKSHOP #2

Tentative Schedule

Interviews with JPA Board Members	December 18-19
Workshop #1	January 29
Workshop #2	February 11
Working Group and Technical Group Meetings	February
Working Group Meeting #2	March
Workshop #3	March
Board Presentation	April

Questions / Comments / Adjourn