



# GREENBUILD

INTERNATIONAL CONFERENCE AND EXPO



November 12, 2009

Creating Sustainable  
Water Supplies in the Desert





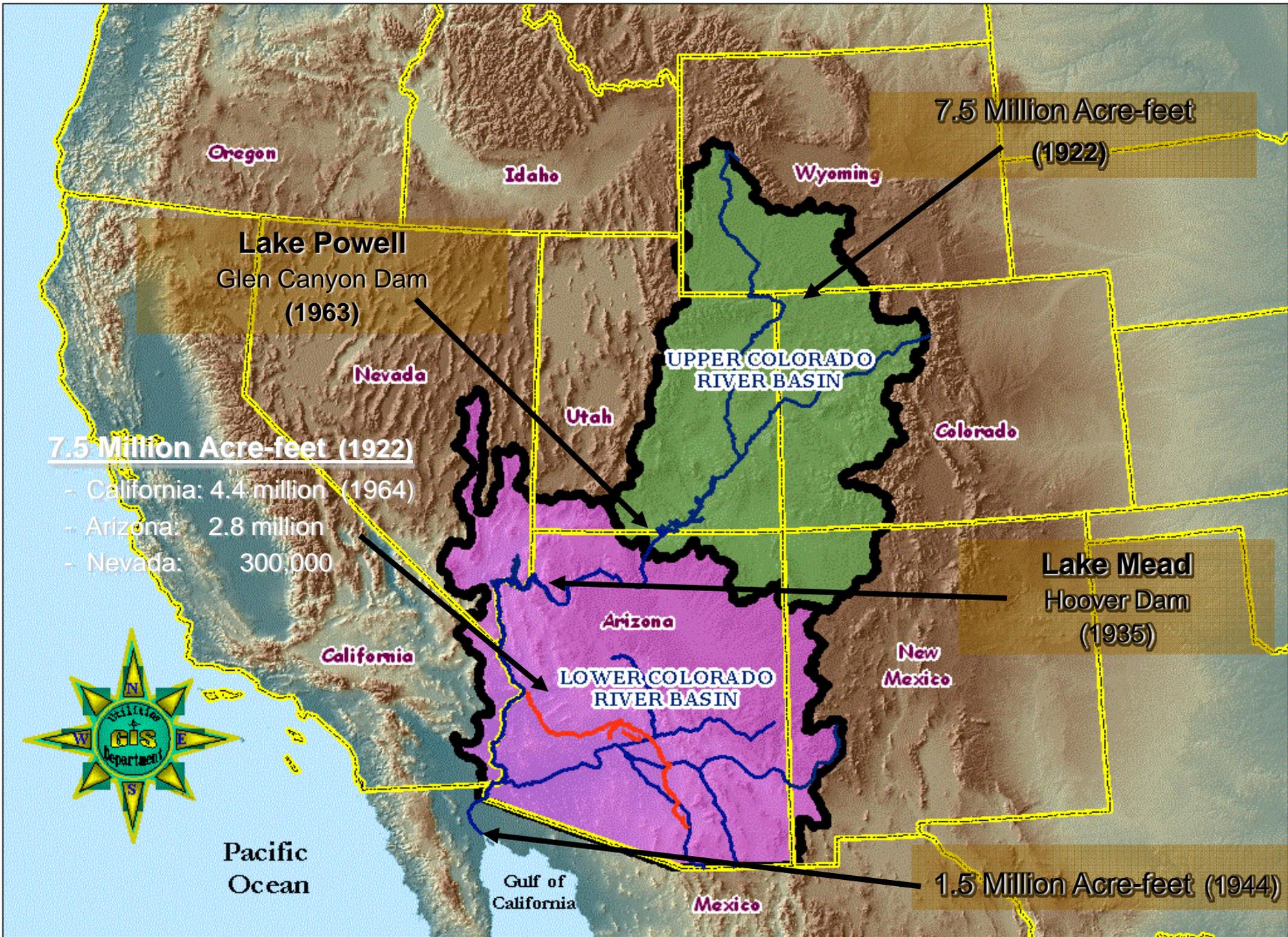
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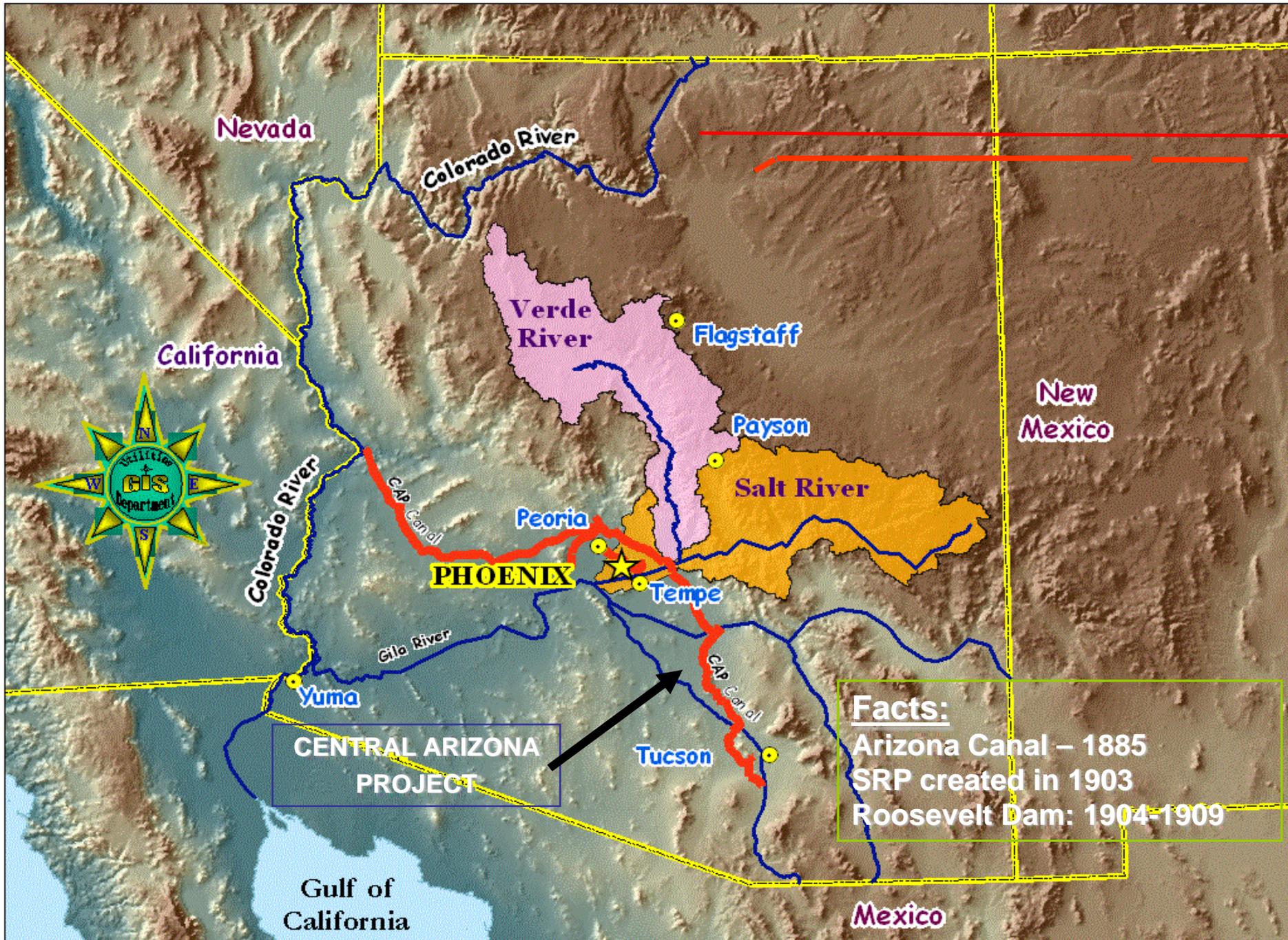
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Robin E. Bain, P.E., DEE

Program A: Water Resource Management –  
An Ongoing Commitment to Sustainability





Nevada

Colorado River

California

Verde River

Flagstaff

New Mexico

Payson

Salt River

Peoria

**PHOENIX**

Tempe

Colorado River

Gila River

CENTRAL ARIZONA PROJECT

Tucson

CAP Canal

Facts:

Arizona Canal – 1885

SRP created in 1903

Roosevelt Dam: 1904-1909

Gulf of California

Mexico

# PRINCIPLES OF SOUND WATER MANAGEMENT



## *MISSION STATEMENT*

Implement collaborative, innovative water policies to ensure long-term sustainability, economic vitality and quality life in Peoria today and tomorrow.

*Peoria was the first city in Arizona to develop and implement such an integrated set of principles governing water management.*

## *VISION STATEMENT*

Water for Quality Life



# Water Policy Committee

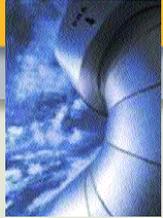
## 10 years of success

- Chaired by a Deputy City Manager to discuss, debate and recommend water policy to City Council for consideration and adoption.
- Designed to preserve the public's trust in our water system.

## Milestone "Principles"

- Emphasizes the importance of
  - water conservation
  - fiscal responsibility
  - maintaining a redundant water supply.

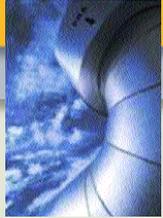
# Foundation and Guidance



- Regulatory Compliance
- Water Quality
- Water Conservation
- Water Reclamation
- Infrastructure
- Funding
- Private Water Companies
- Regional Influence of Water Policy



# Strategic Long-Term Planning



- Central Arizona Project
- Salt River Project
- Central Arizona Groundwater Replenishment District
- Water Acquisition
- Recharge and Recovery
- Redundancy
- Drought Planning
- Land Use Water Management...

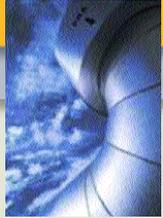


# Economic value of water metric

- Compares the economic value per gallon of water expressed in terms of \$/gallon between the existing land use in the General Plan to the proposed land use change.



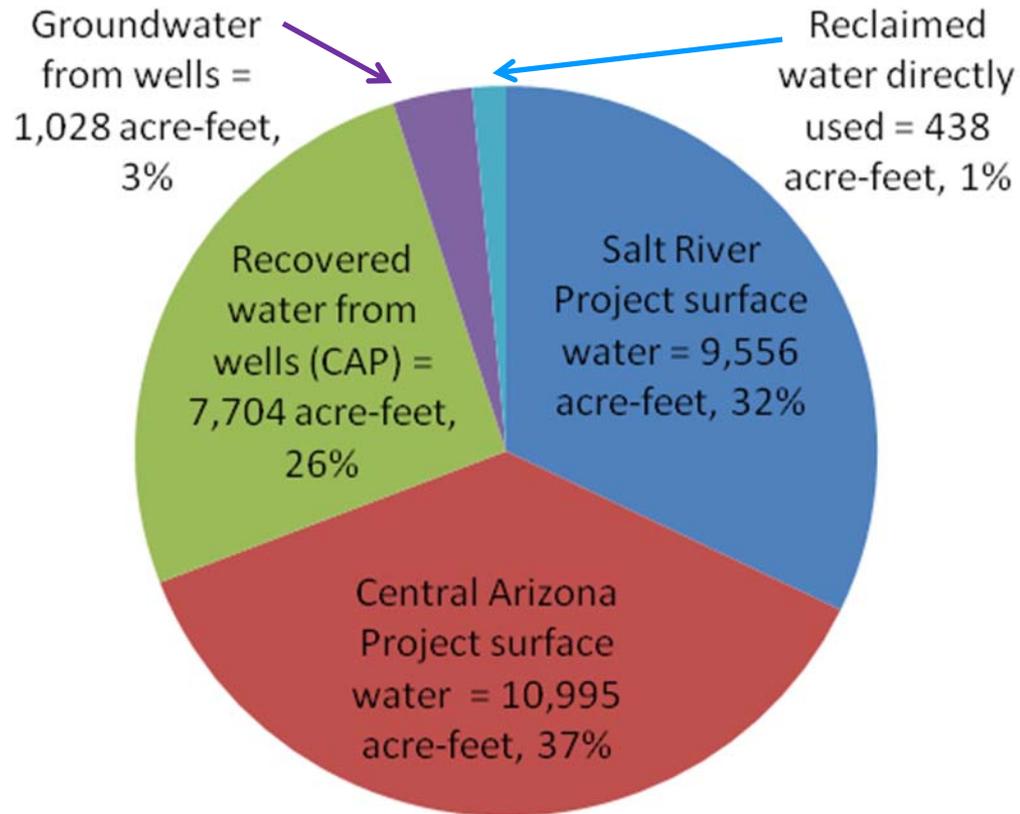
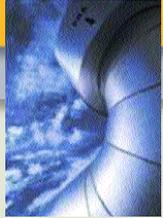
# Diversified Water Resource Portfolio



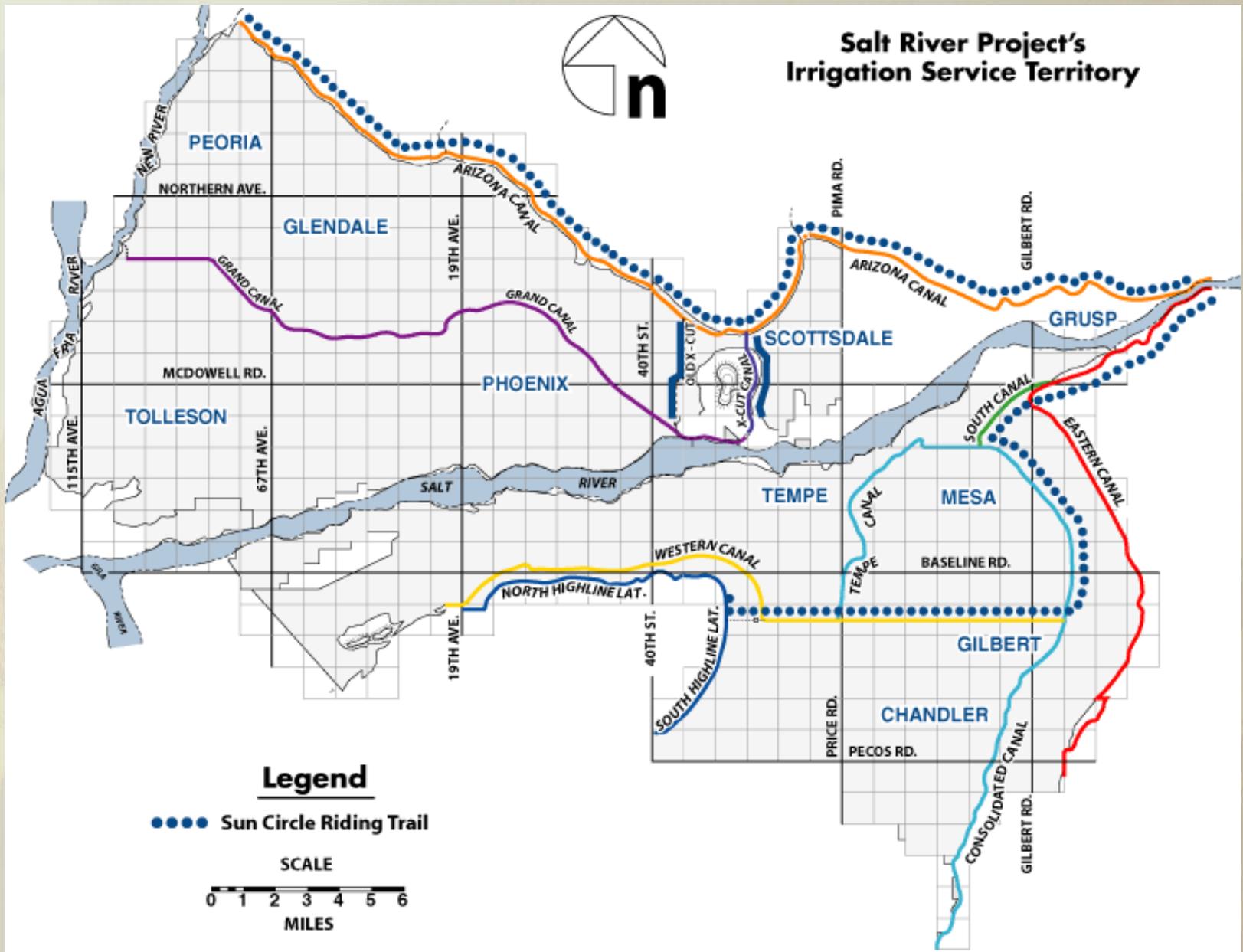
- Colorado River water from Central Arizona Project (CAP)
- Salt-Verde River water from Salt River Project (SRP)
- Groundwater pumped from wells
- Stored water recovered from wells
- Reclaimed water directly delivered



# 2008 Water Supply Portfolio



# Salt River Project's Irrigation Service Territory

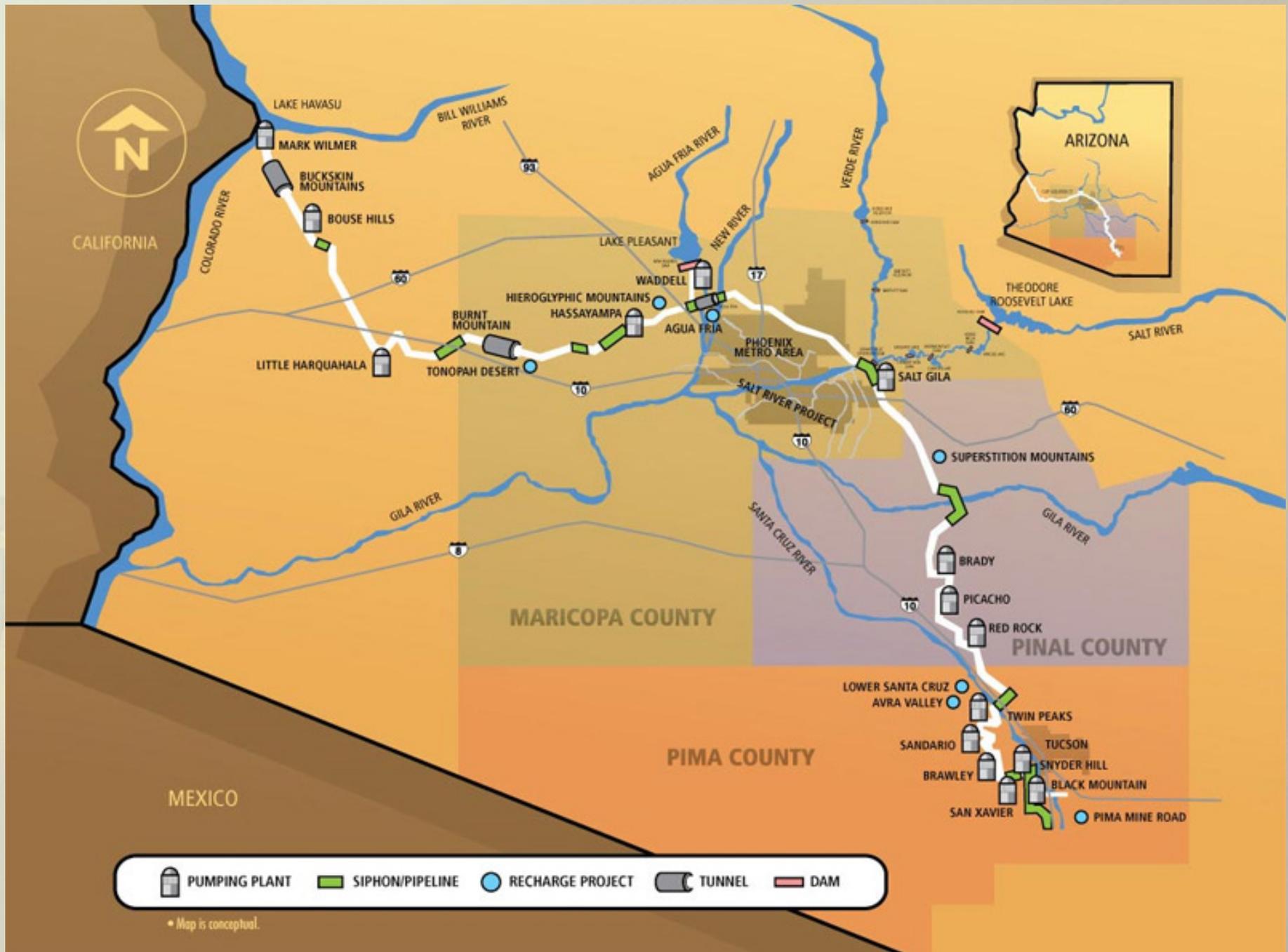


## Legend

●●● Sun Circle Riding Trail

SCALE

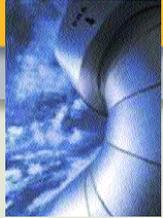




-  PUMPING PLANT
-  SIPHON/PIPELINE
-  RECHARGE PROJECT
-  TUNNEL
-  DAM

• Map is conceptual.

# Groundwater from wells



- Groundwater is pumped from several wells scattered across Peoria.



- Groundwater must be replenished to meet "Safe Yield"
  - Recharge and recovery by Peoria (net Safe Yield within Peoria)
  - Recharge by Central Arizona Groundwater Replenishment District (at an additional cost to Peoria)
- In 2008 the groundwater supply was 1,028 acre-feet or 3% of the total produced.





**18.2 feet land elevation  
decline over 35 years**

**1957**

1957

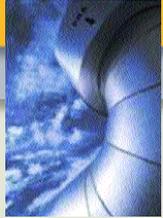
NEAR  
LUKE AFB, AZ  
 $\Delta=18.2$  FT  
1957-1991

1991

**1991**

U.S. Geological Survey

# Recharge and Recovery



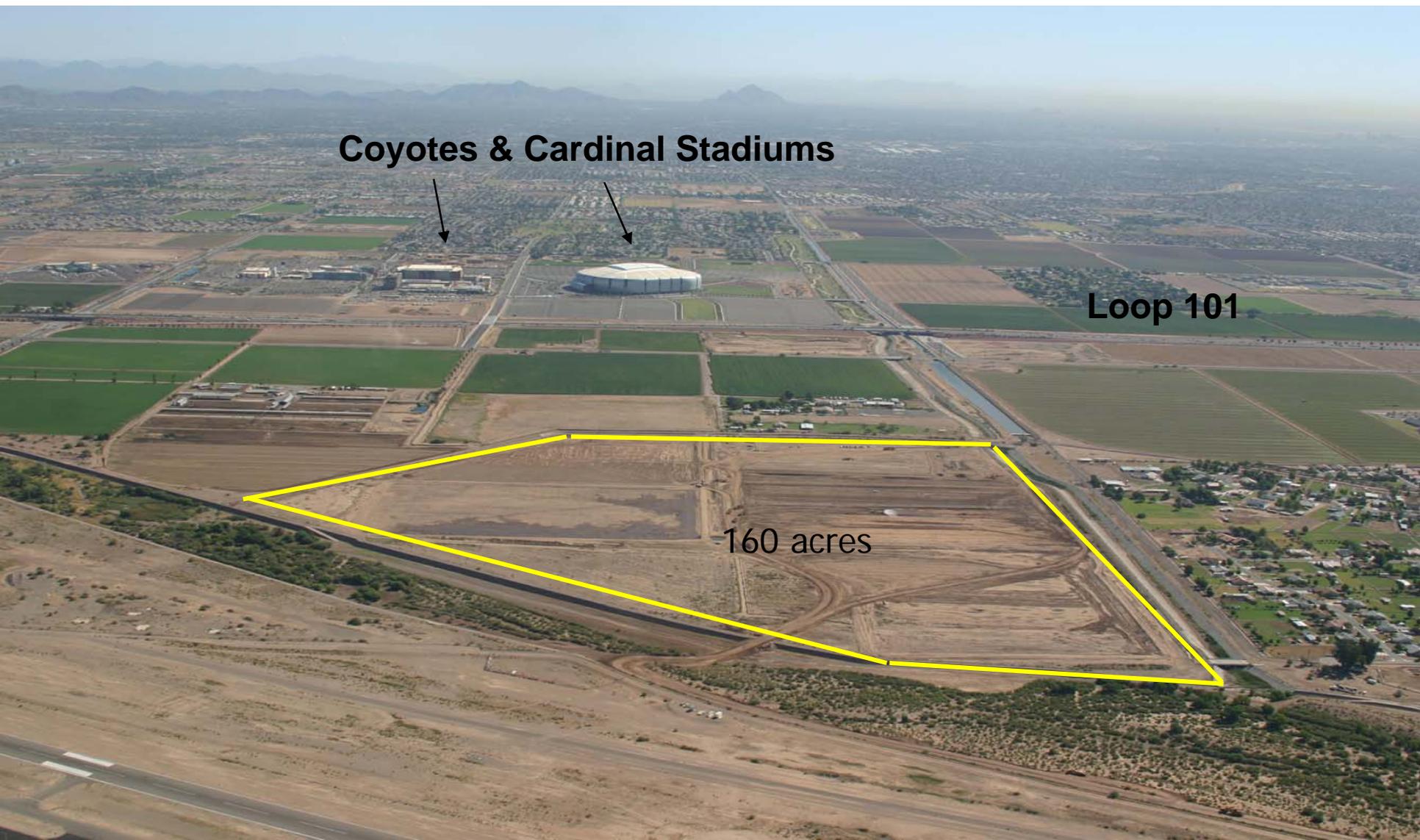
- Peoria stores water underground at four underground storage facilities.
- Stored water then can be pumped from wells and is then recovered water.



- Wells can be permitted as both service area and recovery wells.
- In 2008 stored water recovered from wells was 7,704 acre-feet, or 26% of total.



# New River Agua Fria Underground Storage Project



**Coyotes & Cardinal Stadiums**

**Loop 101**

160 acres

# *Agua Fria Recharge Project*



# Direct reuse



Direct use of recycled water for amenities, landscaping, golf courses, other non-potable uses



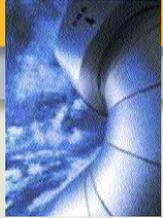
# Designation of Assured Water Supply



- Peoria must show water supply that is physically, continuously, legally available for 100 years and of sufficient quality
- Goal is to be on replenishable supplies
- Designation allows Peoria to better regulate growth of subdivisions by plat approval
- Current DAWS runs out in 2010; renewal application filed March 09



# Sustainable Water Portfolio



- Diversified = Sustainable
- Surface water in fixed amounts remains the basis of Peoria's water supply
- Recharge of excess surface water and reclaimed water are critical to Peoria's water supply
- Direct use of reclaimed water offers significant opportunities for the future
- Water Conservation is the best way to reduce demand





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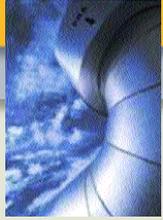
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Rhonda A. Humbles

Program B: The Role of Water conservation in  
a Water Resource Program

# The Role of Water Conservation in a Water Resource Program



## Learning Objectives:

- Awareness of the importance of Xeriscape in the Sonoran Desert
- The role of a Xeriscape program in water conservation.
- Effectiveness of rebate programs on water conservation



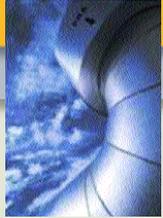
# Awareness and Messaging



- Education Programs – Youth & Adult
- Literature
- Speaker's Bureau – HOAs, Civic Groups
- Website
- Events
- Financial Incentives
- Desert Fusion Garden



# Nature usually knows best



Award Winning Desert Fusion Garden and Certified wildlife Habitat.



# 7 Principals of Xeriscape

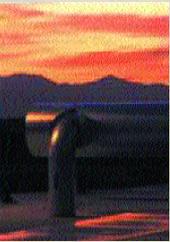
1. Plan and Design
2. Create Practical Turf Areas
3. Select Low Water Plants
4. Use Soil Amendments
5. Use Mulches
6. Irrigate Efficiently
7. Maintain the Landscape Properly



# Education



# Role of Xeriscape

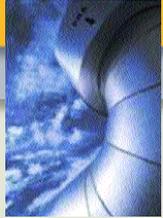


- Contributes to a water resource portfolio.
- Provides measurable results.
- Strengthens community partnerships.
- Encourages participation in Peoria's rebate program.



# Effectiveness of Rebates

Using a test case of a multi-family development, with 6 acres of landscaping planned, the water use and costs at today's rates would be as follows:



# Comparison of Water Usage



## Xeriscape

- 6 acres X 1.5 acre-ft per acre per year = 9 acre-ft or 2,932,659 gallons



## Grass

- 6 acres X 4.9 acre-ft. per acre per year = 29.4 acre-ft or 9,580,019 gallons



Total difference = 20.4 acre-ft per year



# Cont.



Total gallons saved = 20.4 acre-ft per year X 325,851 gallons per acre-ft = 6,647,360 gallons per year!

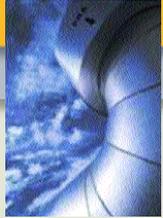


Per thousand gallons billed = 6,647.36 gallons annually

- \$20,935.32 annual savings!



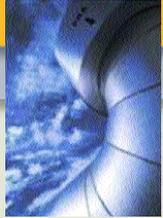
# Residential



- Average Peoria lot size = 7,000 square feet
- Average Peoria landscaped area = 5,324 square feet / 0.12 acre
- Estimated Water Savings  
0.408 acre-feet or 132,947 gallons per year



# Residential Cont.



- $132,947 / 1000 = 132.95$  actual amount billed



- $133 / 12$  months = 11.08 round down to 11

## Residential – (Billed in Tiers)

- 2,000-5,000 \$1.49 = \$5.96
- 6,000-10,000 \$2.69 = \$13.45
- 11,000-25,000 \$3.24 = \$3.24

Total = \$22.65

$\$22.65 \times 12 = \$271.80$  annual savings



# Considerations – Will It Work?

- Funding
- Resistance of education
- Lack of resources - time and staff
- Council support
- Community support





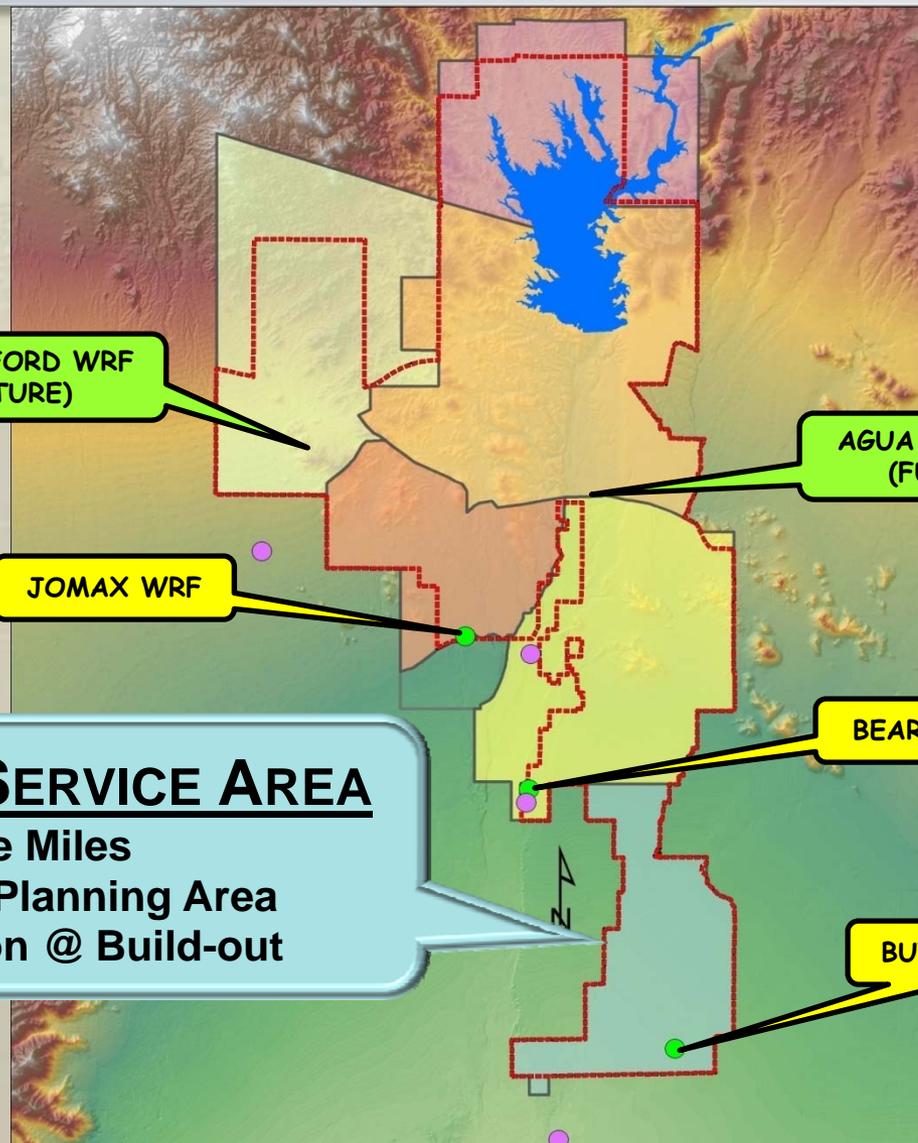
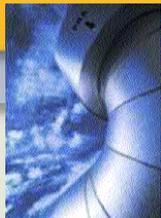
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**Shawn V. Kreuzwiesner, P.E.**

**Program C: Planning and Constructing to  
Convert Wastewater into a Water Resource**

# Peoria's Wastewater Areas



PADDLEFORD WRF  
(FUTURE)

AGUA FRIA WRF  
(FUTURE)

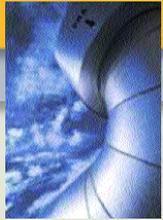
JOMAX WRF

BEARDSLEY WRF

**BUTLER WRF SERVICE AREA**  
26 Square Miles  
10% of Peoria's Planning Area  
27% of Population @ Build-out

BUTLER WRF

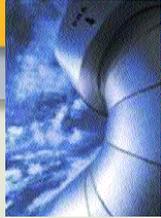
# Peoria's Wastewater History



- 1954 Peoria incorporated and starts providing municipal water service
- 1978 Peoria purchases capacity in Tolleson WWTP (**9.4 MGD** by 1995)
- 1980 99<sup>th</sup> Ave Interceptor completed, but Peoria's capacity is limited to **7.3 MGD**
- 1984 through 2002 Wastewater Master Plans identify a shortage of treatment capacity in southern basin (Projected to be **13.2 MGD**)



# Pre-2003 Planning Efforts



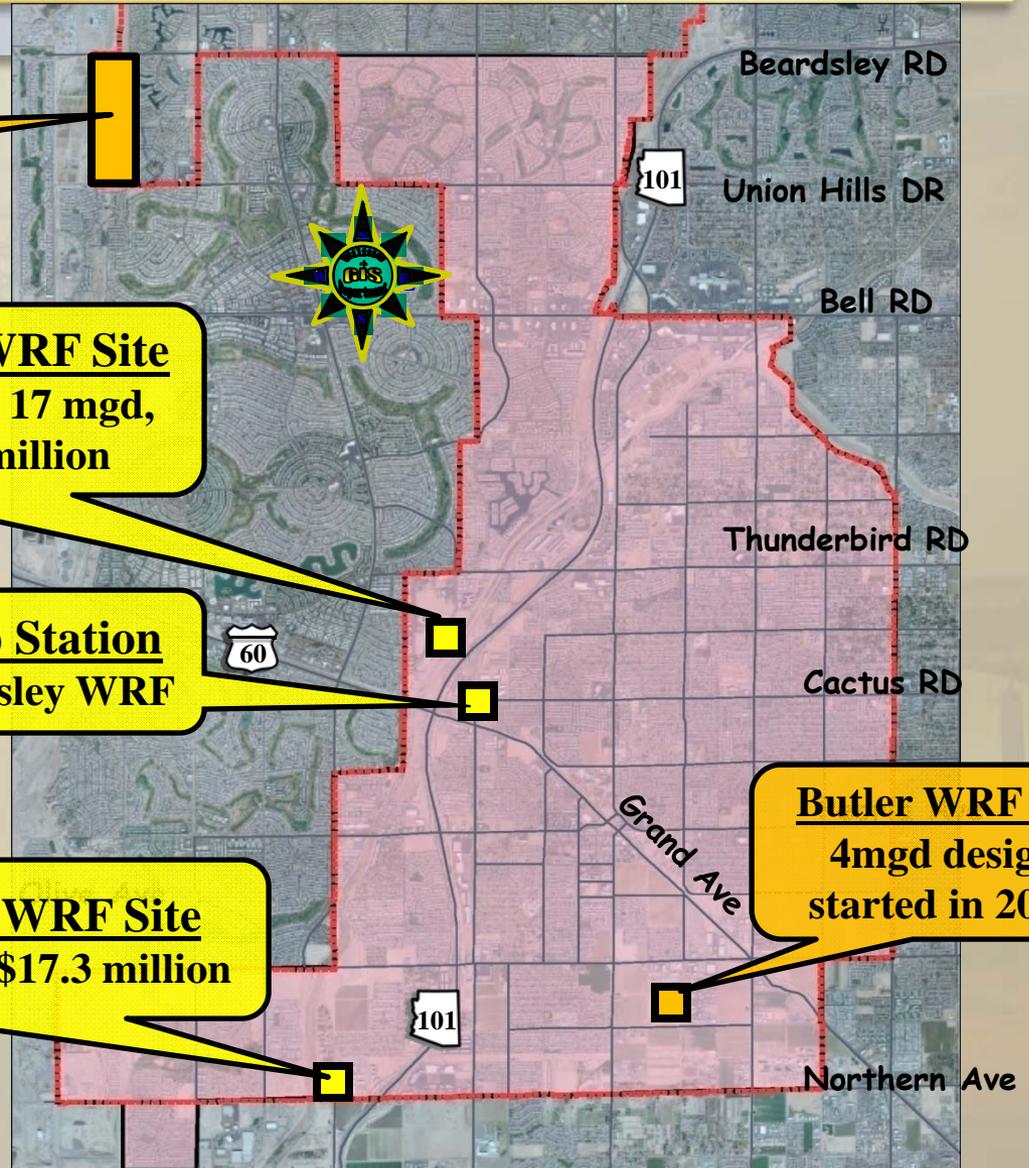
**Existing Beardsley WRF**

**1989 WWMP - Southern WRF Site**  
Plant capacity between 6 and 17 mgd,  
40 acres in size cost \$48.9 million

**2000 Alt. Analysis - Pump Station**  
4 mgd pump station to Beardsley WRF

**1995 WWMP - Southern WRF Site**  
Plant capacity 2.8 mgd – cost \$17.3 million

**Butler WRF site**  
4mgd design  
started in 2002



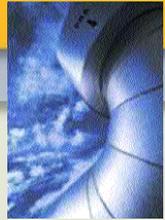
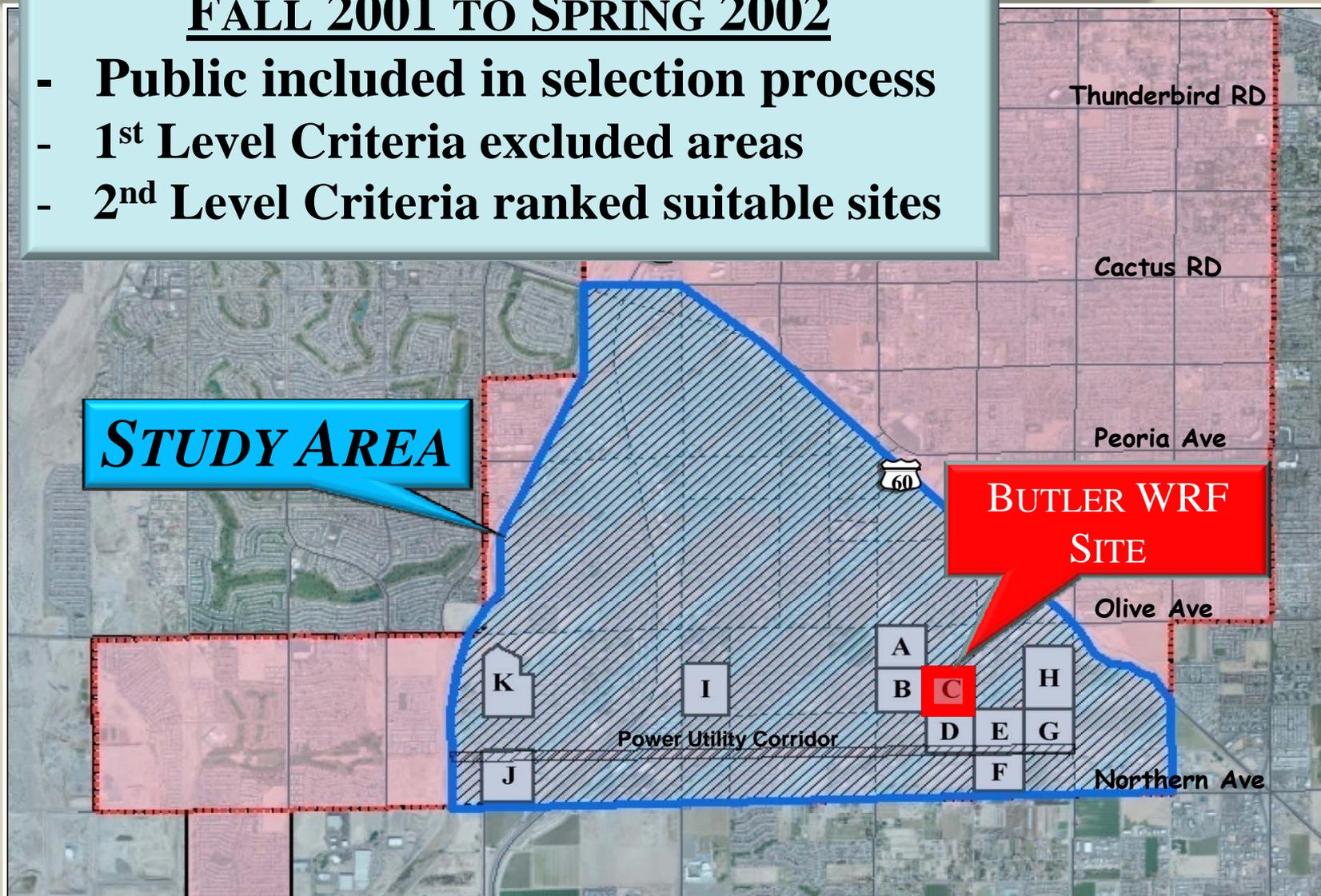
# Site Selection Process

FALL 2001 TO SPRING 2002

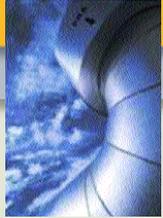
- Public included in selection process
- 1<sup>st</sup> Level Criteria excluded areas
- 2<sup>nd</sup> Level Criteria ranked suitable sites

**STUDY AREA**

**BUTLER WRF  
SITE**



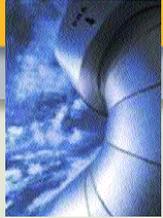
# 2003 Planning Effort



- Peoria reviews **Best** option for meeting future wastewater needs in Southern basin
  - Construct **4 MGD** Facility to supplement Tolleson WWTP capacity
  - Replace Tolleson WWTP capacity with capacity in 91st Ave WWTP (SROG)
  - Construct a **10 MGD** Facility, expandable to **13.2 MGD**
- **Major Evaluation Criteria:**
  - Capital & Operating Costs, **RATE IMPACTS**
  - **WATER RESOURCES**, Public Perception, Jurisdictional Control



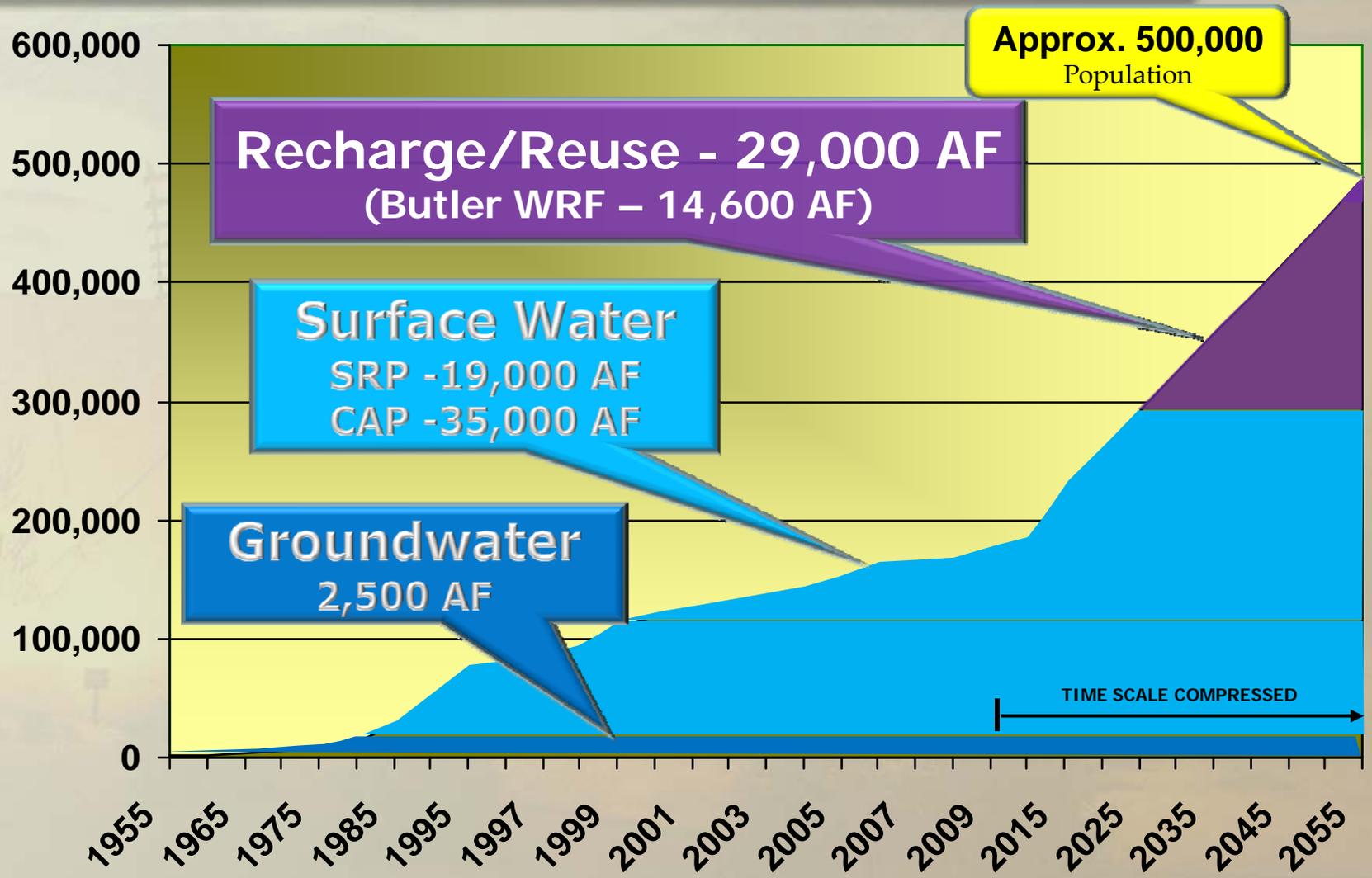
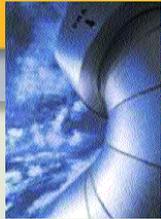
# 2003 Planning Results



- Membership in the 91st Avenue WWTP Sub Regional Operational Group was denied.
- 20 year present worth of 13 MGD plant is the same as continued use of Tolleson WWTP and constructing a 4 MGD plant.
- Use of Tolleson WWTP would require additional investments in an aging facility and **CONTINUED LOSS OF WATER RESOURCES.**



# Where will Peoria Get Its Water?



# Recharge/Reuse Options

- **DIRECT REUSE**
  - Replace potable water for irrigation
  - **3 mgd** of reuse potential in Butler WRF basin
- **GROUNDWATER AQUIFER RECHARGE**
  - Vadose Zone injection wells
  - Direct Injection wells **NOT** considered due to public perception issues
  - Recharge Basins
- **WATER EXCHANGE**
  - Trading reclaimed water for potable water or rights to potable water on SRP lands



# RECHARGE OPTIONS

- Water Resource Benefits
- Regulatory Constraints
- Costs

Participation in Agua Fria Linear Recharge Project (SROG)

Recharge Facility at 115<sup>th</sup> & Northern Ave

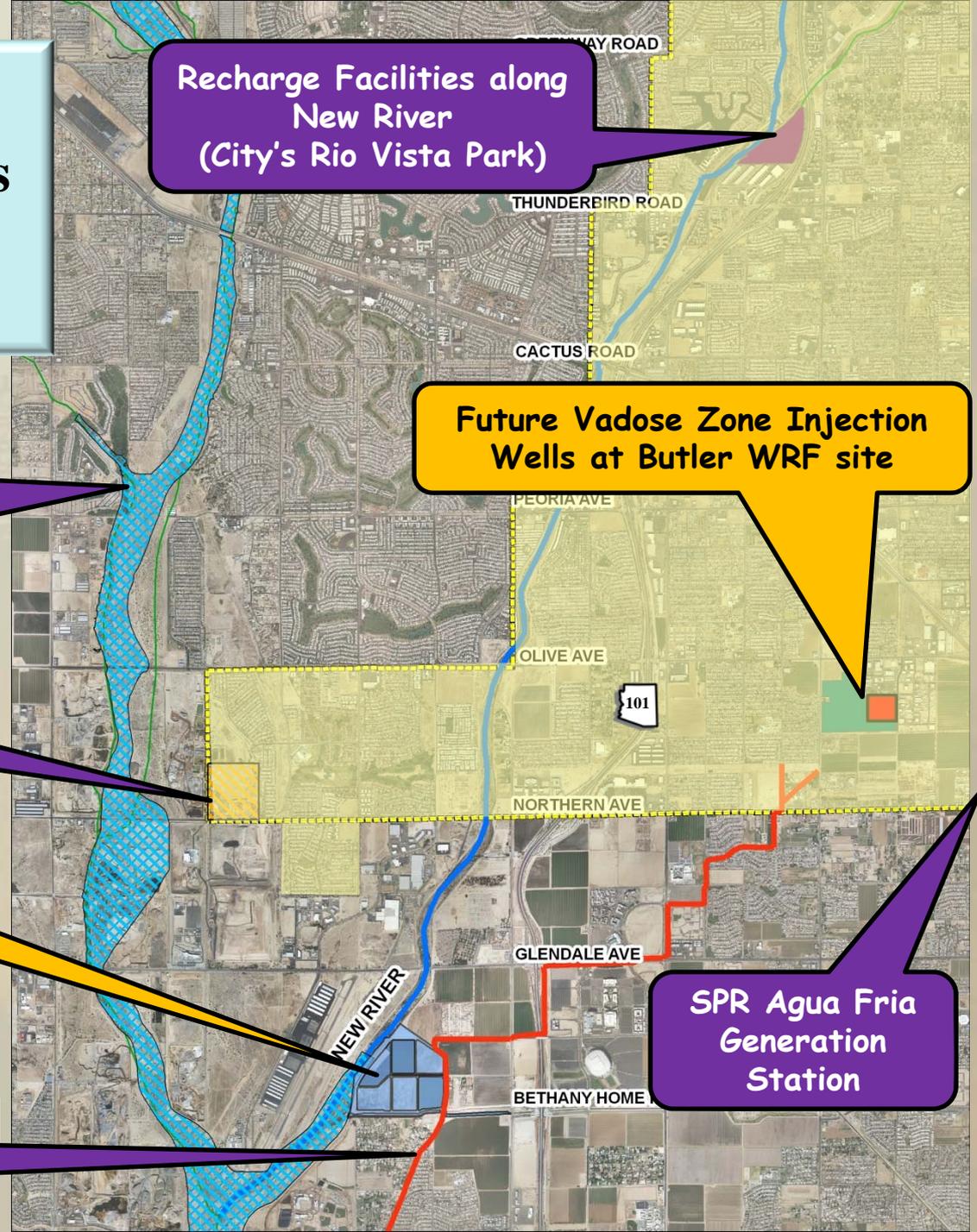
Participation in NAUSP  
Peoria purchased 20% of permitted capacity

Participation with Roosevelt Irrigation District

Recharge Facilities along New River  
(City's Rio Vista Park)

Future Vadose Zone Injection Wells at Butler WRF site

SPR Agua Fria Generation Station



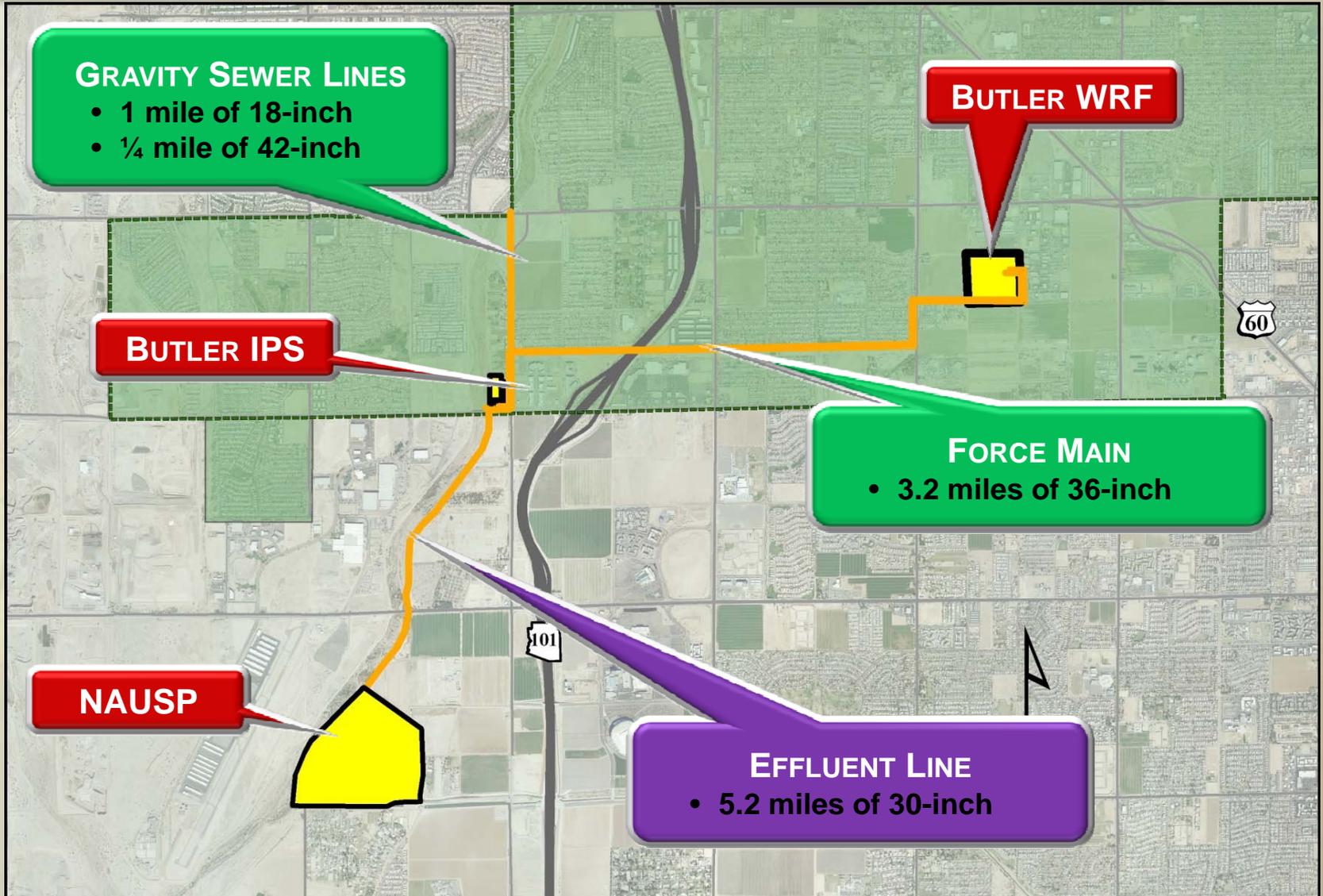
# FINAL DESIGN:

- 10 MGD Facility Expandable to 13.4 MGD



- Class A+ Effluent suitable for DIRECT REUSE or AQUIFER RECHARGE
- Provides reliable (DROUGHT-RESISTANT) water resources

# Project Components



**Butler WRF  
30-inch Effluent Line**

GLENDALE AVE

**Proposed  
Connection to  
RID Canal**

101

**NAUSP**

BETHANY HOME ROAD

**Roosevelt Irrigation  
District (RID) Canal**

**NEW RIVER**



**New 80 Acre  
Community Park**

**Butler WRF**

**OLIVE AVENUE**

**83rd AVENUE**

**79th AVENUE**





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Questions?