



RIVERSIDE PUBLIC UTILITIES

UTILITY 2.0

WATER INFRASTRUCTURE SUPPLY

JULY 29, 2015

WATER | ENERGY | LIFE



PUBLIC UTILITIES

RiversidePublicUtilities.com

ROAD MAPS – INFRASTRUCTURE IMPROVEMENT – WATER SUPPLY

Executive Summary

Details

- System History/Background
- System Assessment
- Findings
 - Infrastructure
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- Investment Options
- Sample Recommendations

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WATER SUPPLY

INFRASTRUCTURE IMPROVEMENT - SUPPLY
EXECUTIVE SUMMARY

WORKFORCE DEVELOPMENT

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THRIVING FINANCIALLY

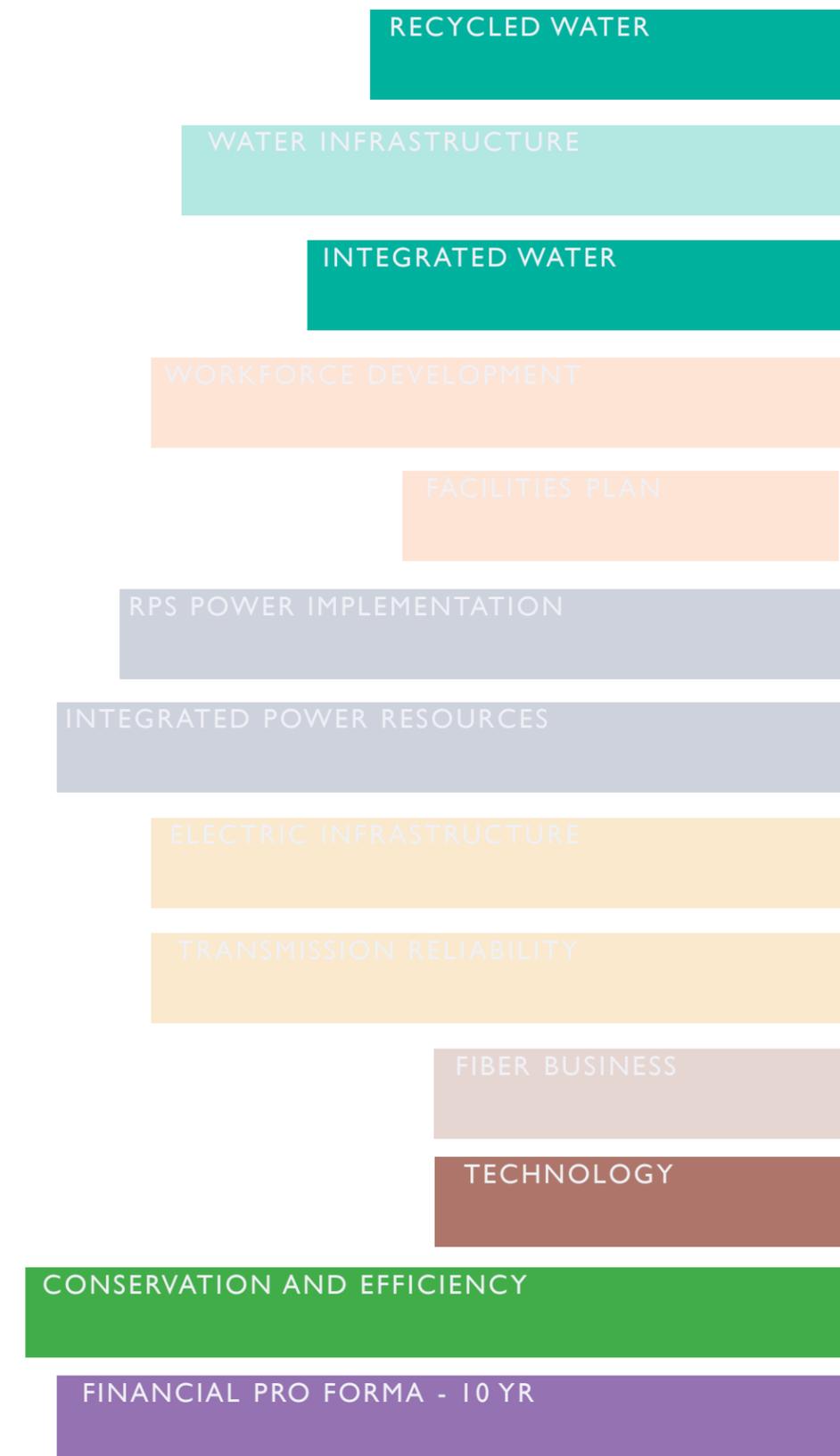
ADVANCED TECHNOLOGIES

ROAD MAPS – INFRASTRUCTURE IMPROVEMENT – WATER SUPPLY - GOALS

WATER INFRASTRUCTURE - SUPPLY

- Minimize operational reliance on imported water.
- Annually exercise groundwater export rights.
- Conjunctive management of water supply.
- Monetize unused and expiring local water rights.
- Ensure water supply availability.

THE PLANS





100%

Independent

Water Supply

- RPU Independent from imported water
 - Starting in 2008 after more than 40 years
 - Historically about 5 percent of annual supply
- Sufficient groundwater supply for current needs
- A potential resource gap has been identified
 - **30,000** acre feet annually
- Solutions to address the gap
 - **16,000** - Storm Water Capture
 - **4,000** - Recycled Water
 - **10,000** - Increased Conservation
- Opportunities to monetize excess water rights

Water Supply Principles

Considered and Approved

- RPU Board, August 1, 2014
- City Council, October 28, 2014

1. Riverside recognizes its important role as **stewards** managing a **publicly owned resource** for the benefit of a diverse community of agricultural, commercial, institutional and residential stakeholders

Water Supply Principles

2. Riverside will plan water supply projects to **minimize** its operational **reliance on imported water** and insulate the community from external pressures faced by other communities dependent on the Bay-Delta water conveyance facilities while appropriately advocating for a viable state water supply system

Water Supply Principles

3. Riverside will strive to **annually exercise** its maximum allowable groundwater production and **export rights** under the 1969 Western Judgment
 - To exercise its rights, Riverside will preferentially produce water at the lowest cost, while ensuring acceptable water quality, best practices for basin management and compliance with agreements, judgments and other restrictions

Water Supply Principles

4. Riverside recognizes the critical role that **conjunctive management of surface, recycled and groundwater supplies** play in the protection, reliability and sustainability of local, regional and statewide water supplies for water users and the environment
 - In recognizing such, Riverside will work cooperatively with regional and wholesale water agencies to purchase and “bank” **imported water** when economically and physically feasible
 - Riverside will continually evaluate the economic feasibility of using imported water to extend recycled water supplies when used for groundwater recharge

Water Supply Principles

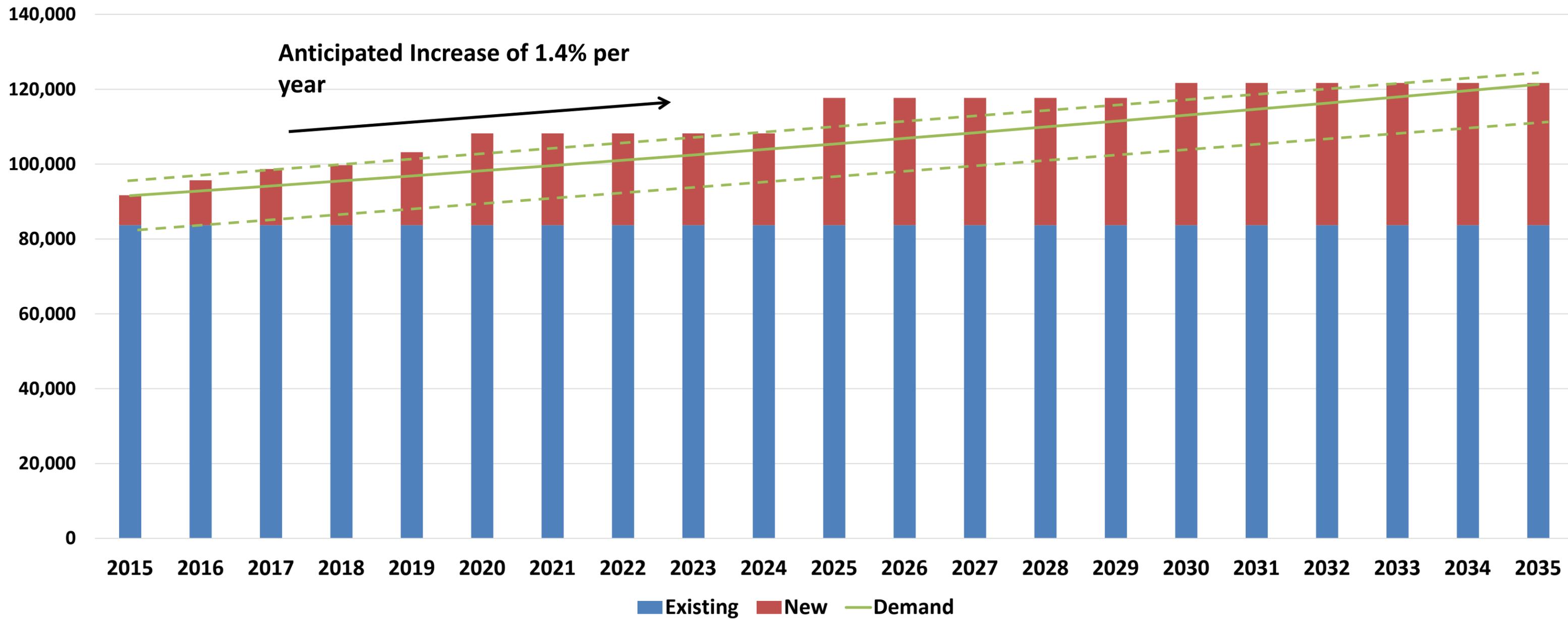
5. Riverside will strive to appropriately **monetize unused and potentially expiring local water production and export rights** through pre-planned and pre-executed water sales agreements

Water Supply Principles

6. Riverside will **ensure water supply** availability for its customers through appropriate and economically balanced local and imported water supplies, conservation and water use efficiency, and demand management measures

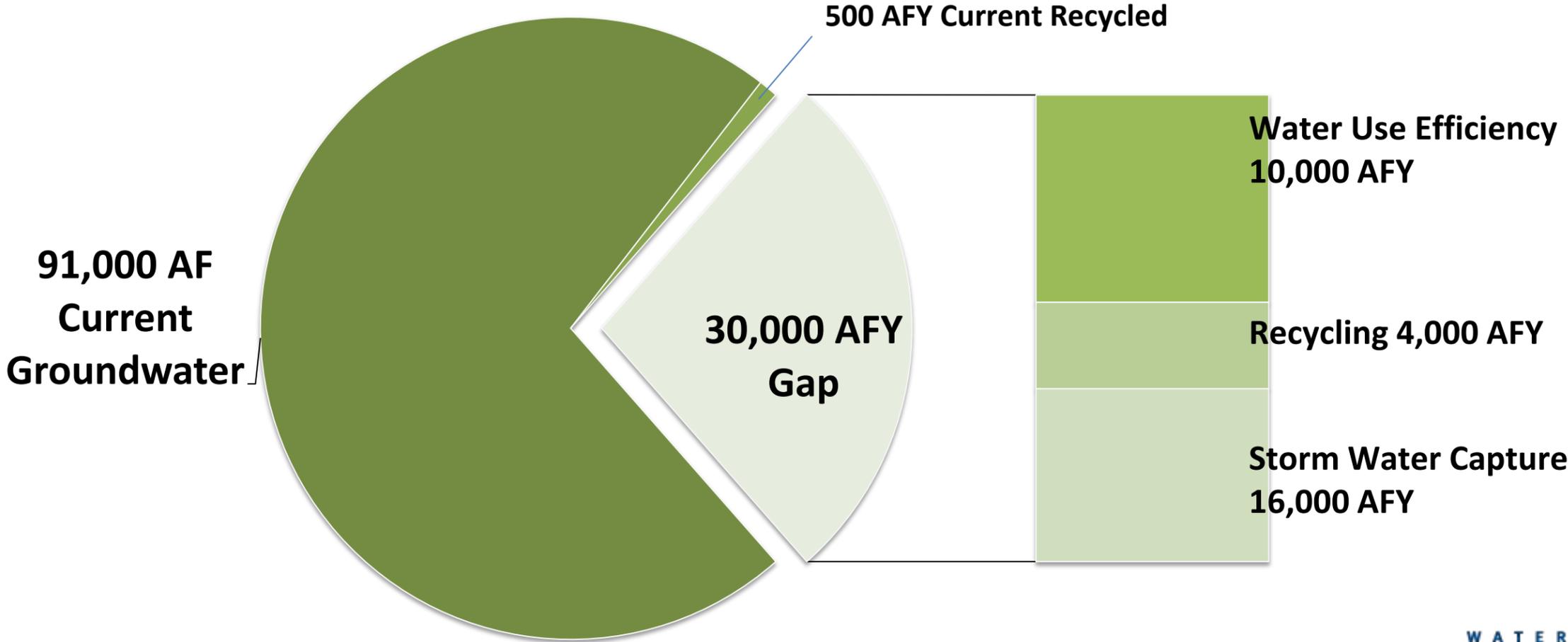
Supply Versus Demand

Supply and Demand, afa



RPU Future Water Supply

Estimated 2035 Water Portfolio



16,000 AF





4,000 AF

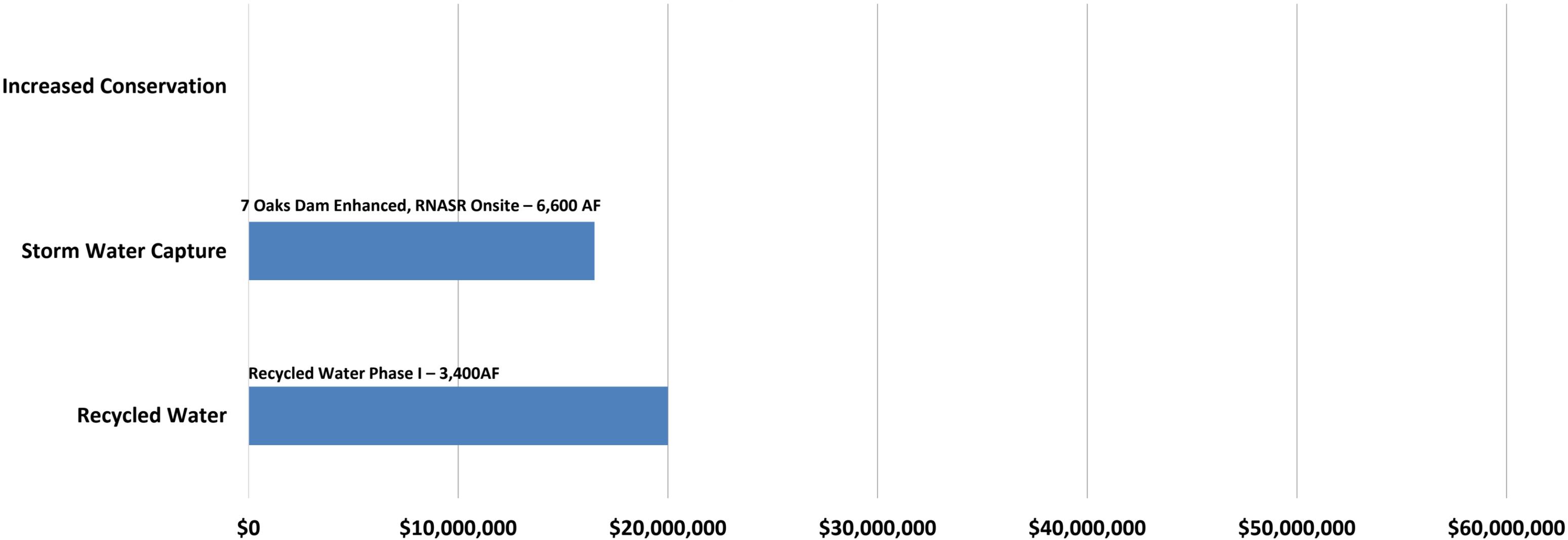


10,000 A/F

Less Water, More Color

Tier 1: In-Flight Projects, First 1/3 of New Supply

10,000 afa



Tier 1: \$34-38 Million

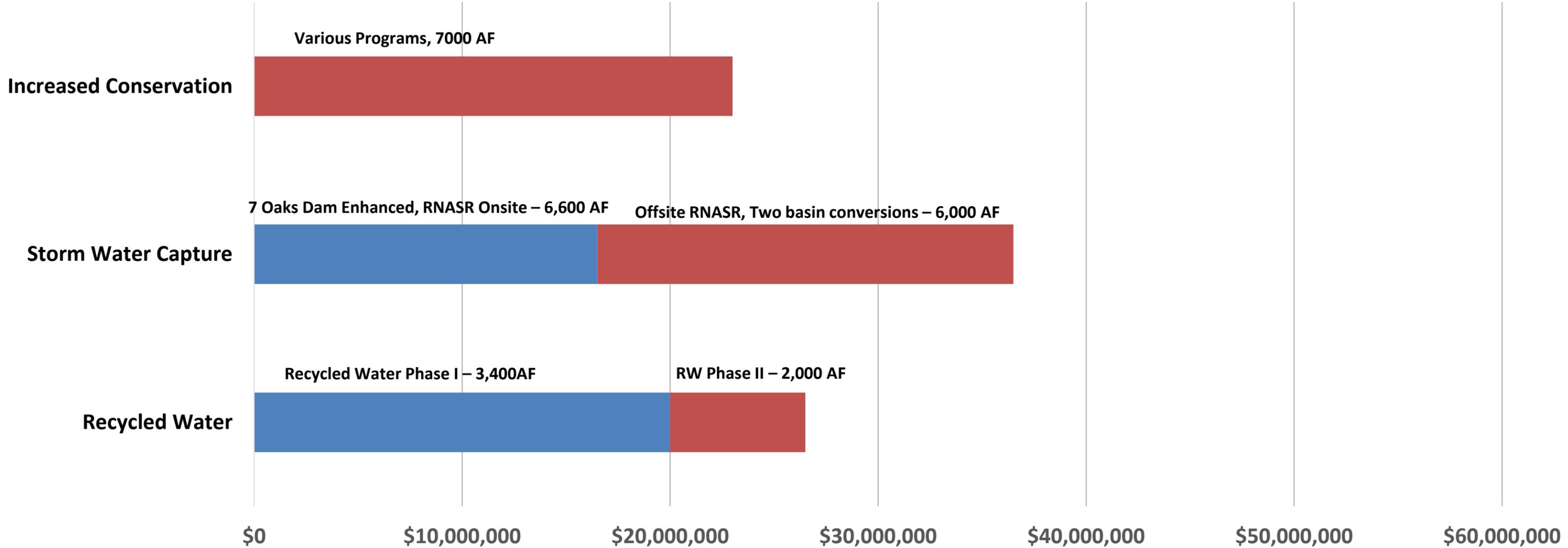
Tier 2: \$74-93 Million

Tier 3: \$99-124 Million

Projects that are currently underway: Seven Oaks Dam Enhanced Recharge, RNASR (Rubber Dam), Recycled Water Phase I

Tier 2: Next ½ of New Water Supply Projects

15,000 afa



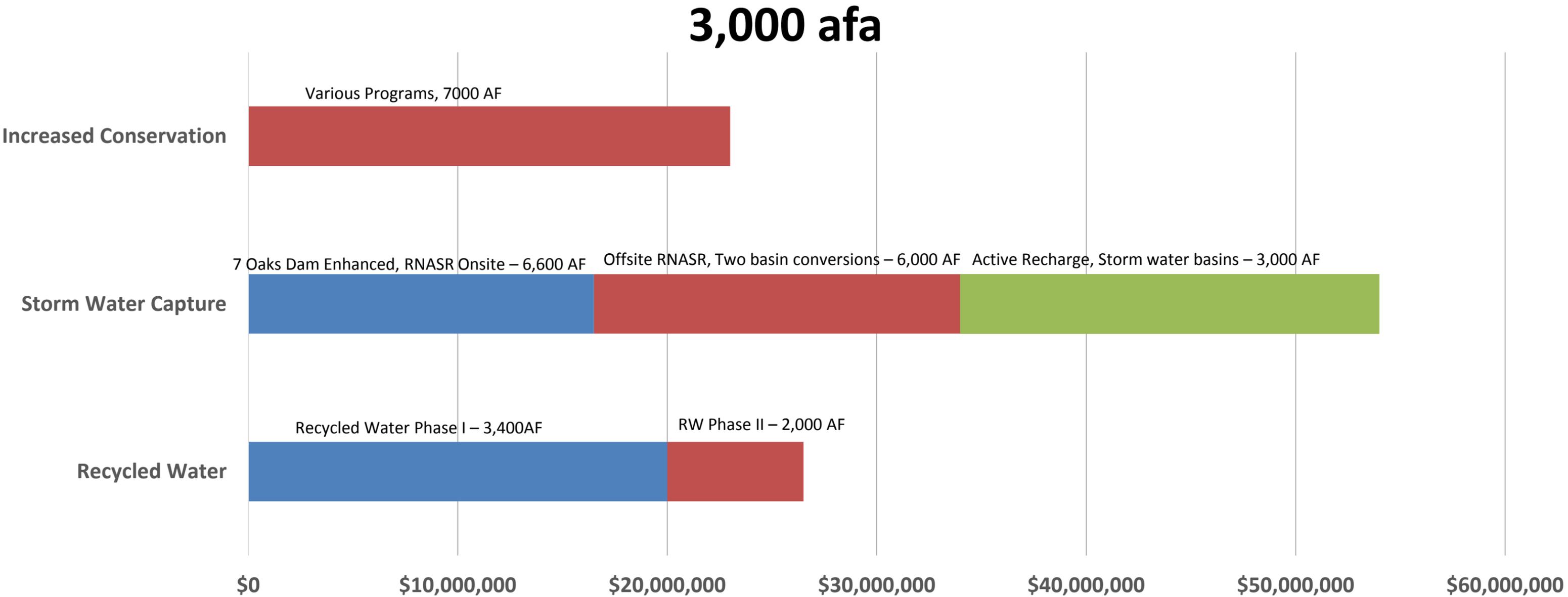
Tier 1: \$34-38 Million

Tier 2: \$74-93 Million

Tier 3: \$102-124 Million

Includes various water conservation programs, Recycled Water Phase B, RNASR (Rubber Dam) offsite storage and conversion of two storm water retention basins to storm water capture.

Tier 3: Last 10% of New Water Supply



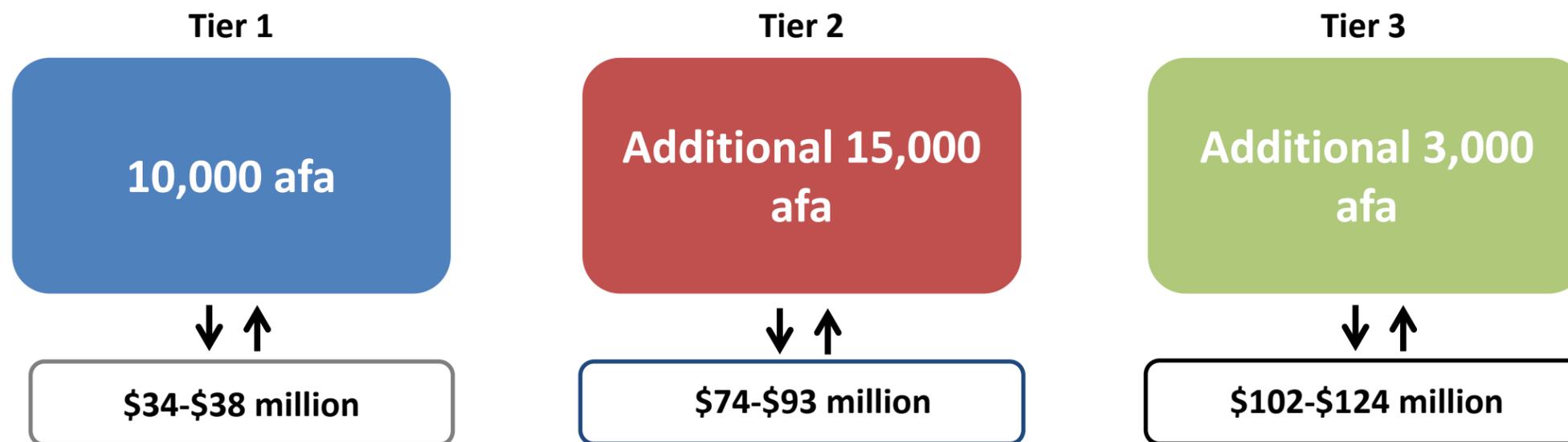
Tier 1: \$34-38 Million
Tier 2: \$74-93 Million
Tier 3: \$102-124 Million

Includes Active Recharge program, conversion of two storm water retention sites to storm water capture and the creation of two storm water capture sites.

Summary of Investment Options

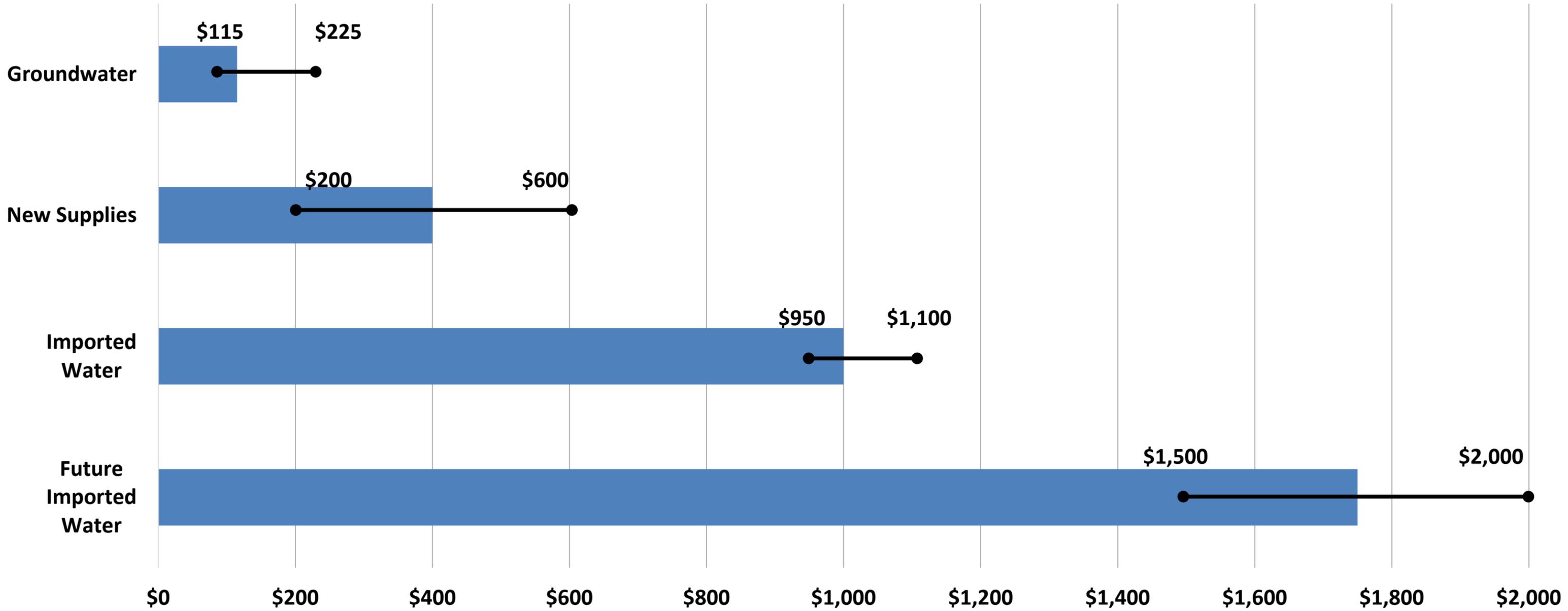
Water Supply

- Additional financial investment is required to secure additional water supplies



Resource Costs

Resource Costs \$/af



Sample Short-Term Recommendations – Year 1

Storm Water Capture	<ul style="list-style-type: none">• Continue processing RNASR (Rubber Dam) EIR and requisite permits• Continue development of Seven Oaks Dam Enhanced Recharge
Recycled Water	<ul style="list-style-type: none">• Design, permit and begin construction of Recycled Water – Jackson Street alignment
Conservation	<ul style="list-style-type: none">• Increase participation in Waterwise landscaping• Continue other ongoing water conservation projects

Sample Mid-Term Recommendations – Years 2-5

Storm Water Capture	<ul style="list-style-type: none">• Complete RNASR (Rubber Dam) project, onsite facilities• Complete Seven Oaks Dam Enhanced Recharge
Recycled Water	<ul style="list-style-type: none">• Complete Recycled Water – Jackson Street alignment
Conservation	<ul style="list-style-type: none">• Continue water conservation programs

Sample Long-Term Recommendations – Years 6-10

Storm Water Capture	<ul style="list-style-type: none">• Complete RNASR (Rubber Dam) offsite facilities• Participate in additional storm water capture projects as needs and/or opportunities arise
Recycled Water	<ul style="list-style-type: none">• Expand Recycled Water System - Arlanza area
Conservation	<ul style="list-style-type: none">• Continue Water Conservation projects

ROAD MAPS – INFRASTRUCTURE IMPROVEMENT –
WATER SUPPLY

INFRASTRUCTURE IMPROVEMENT - SUPPLY
BACKGROUND

WORKFORCE DEVELOPMENT

—

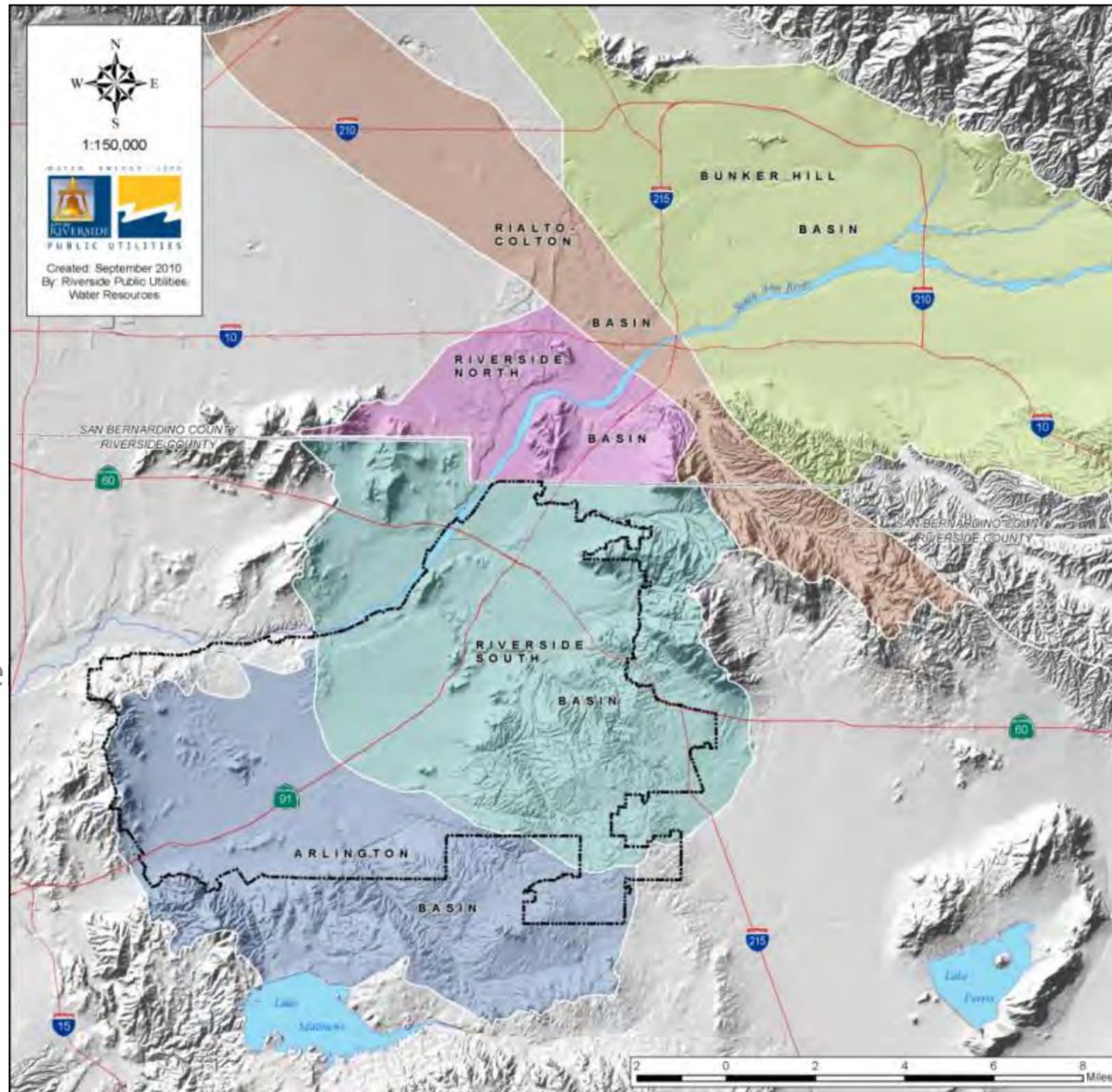
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ADVANCED TECHNOLOGIES





WATER RIGHTS SUMMARY BY BASIN



Extraction/Export Rights

Bunker Hill

- 55,145 AFY Export

Colton

- 2,728 AFY Export

Riverside North

- 11,351 AFY Export

Riverside South

- 16,880 AFY Extraction

86,104 AFY Total



Appe

Basin Characteristics

Groundwater Basin	Surface Area (acres)	Storage Capacity (acre-ft)	Depth to Bedrock (ft)	Estimated Safe Yield (acre-ft/yr)	Safe Yield % of Storage Capacity
Bunker Hill	89,600 ^C	5,976,000 ^C	> 1,200 ^B	232,100 ^A	4%
Rialto-Colton	30,000 ^C	2,517,000 ^C	> 1,000	17,675	1%
Riverside	39,680	1,646,000	400 to 700	62,300 ^D	4%
Total	159,280	10,139,000	---	---	---

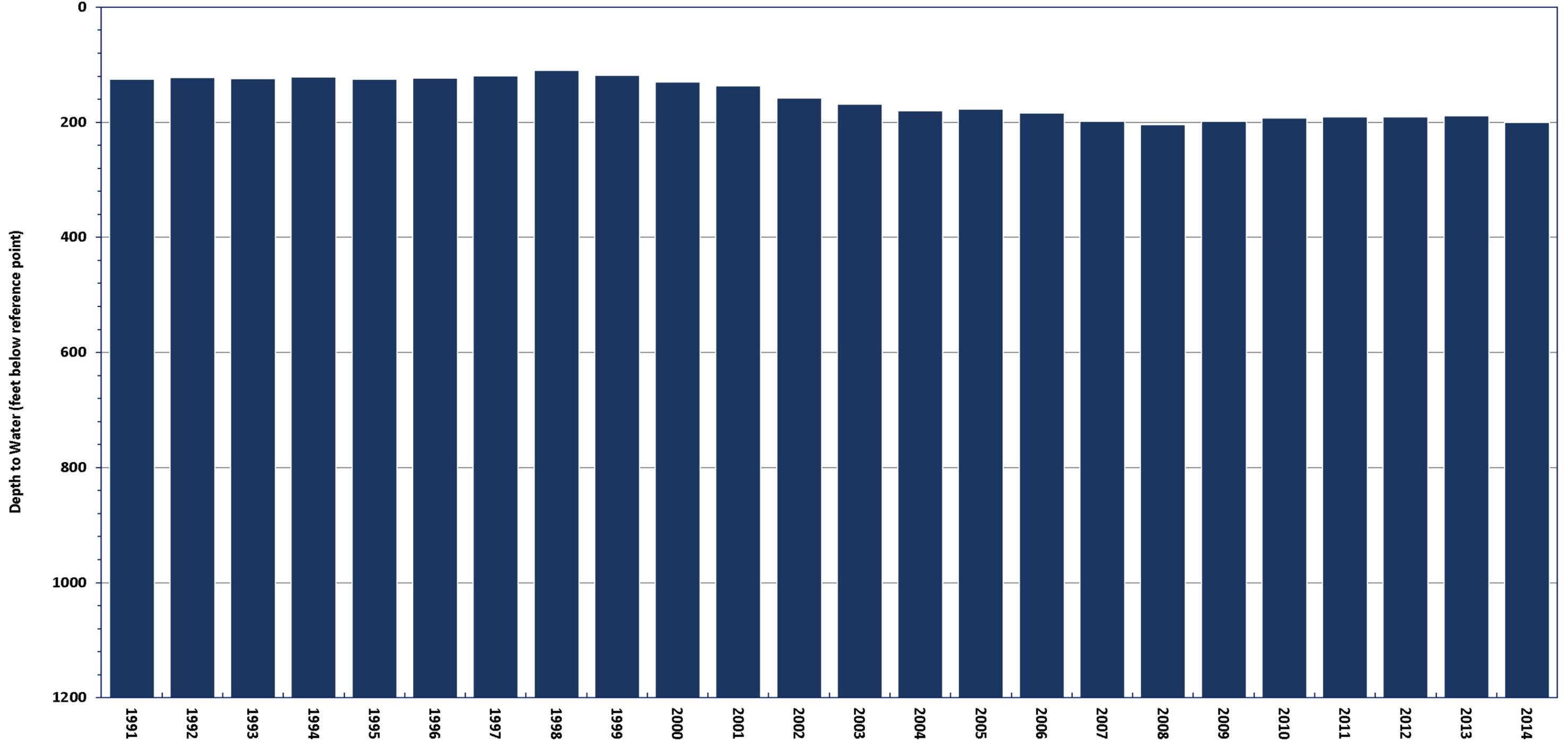
A) Western-San Bernardino Judgment

B) USGS Open-File Report 2005-1278

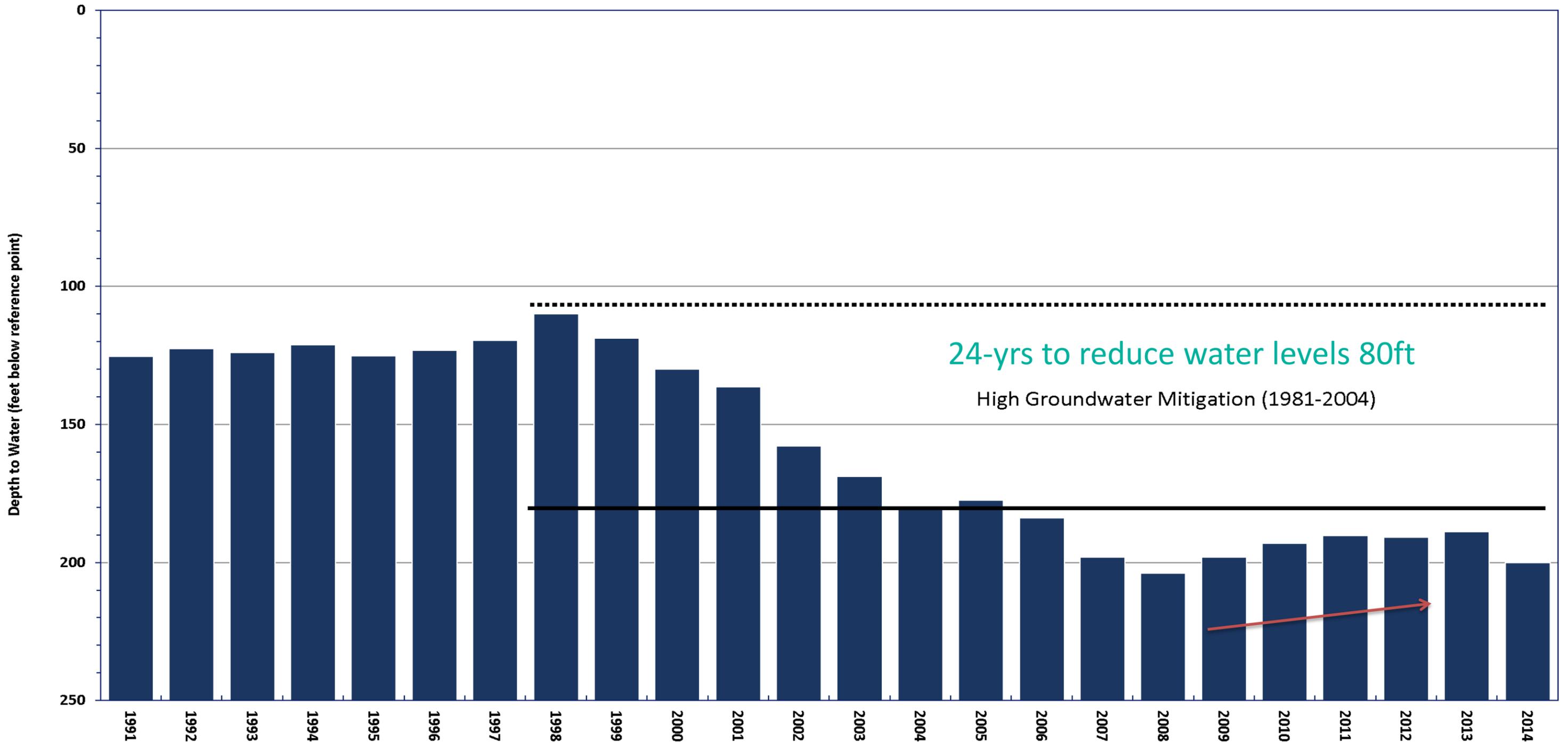
C) DWR bulletin 118

D) Riverside-Arlington Groundwater Flow Model

Bunker Hill Water Levels

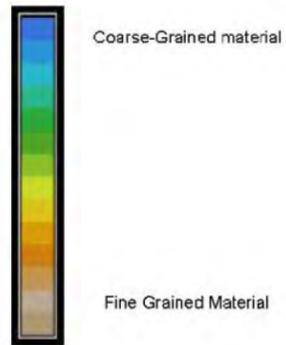


Bunker Hill Water Levels

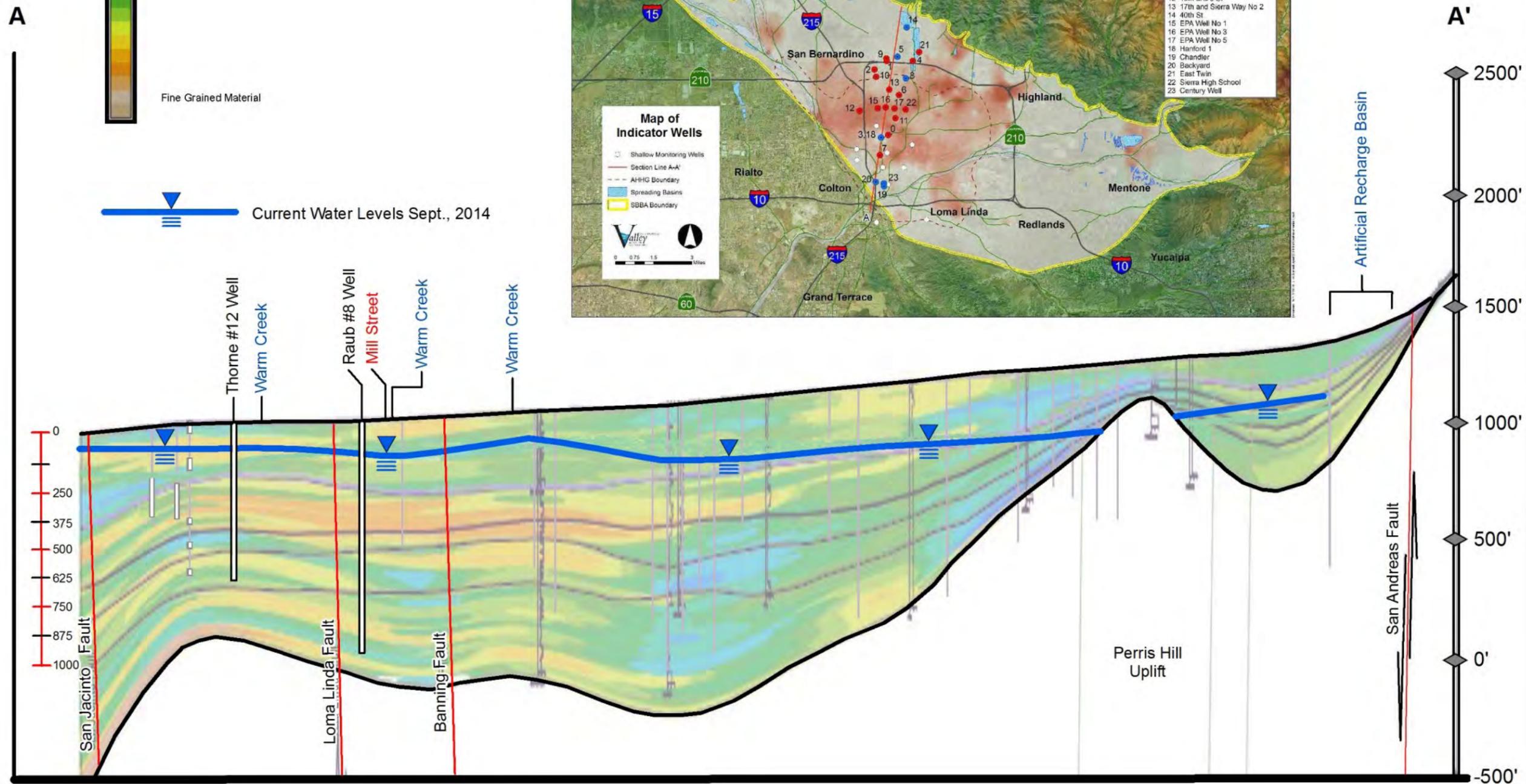
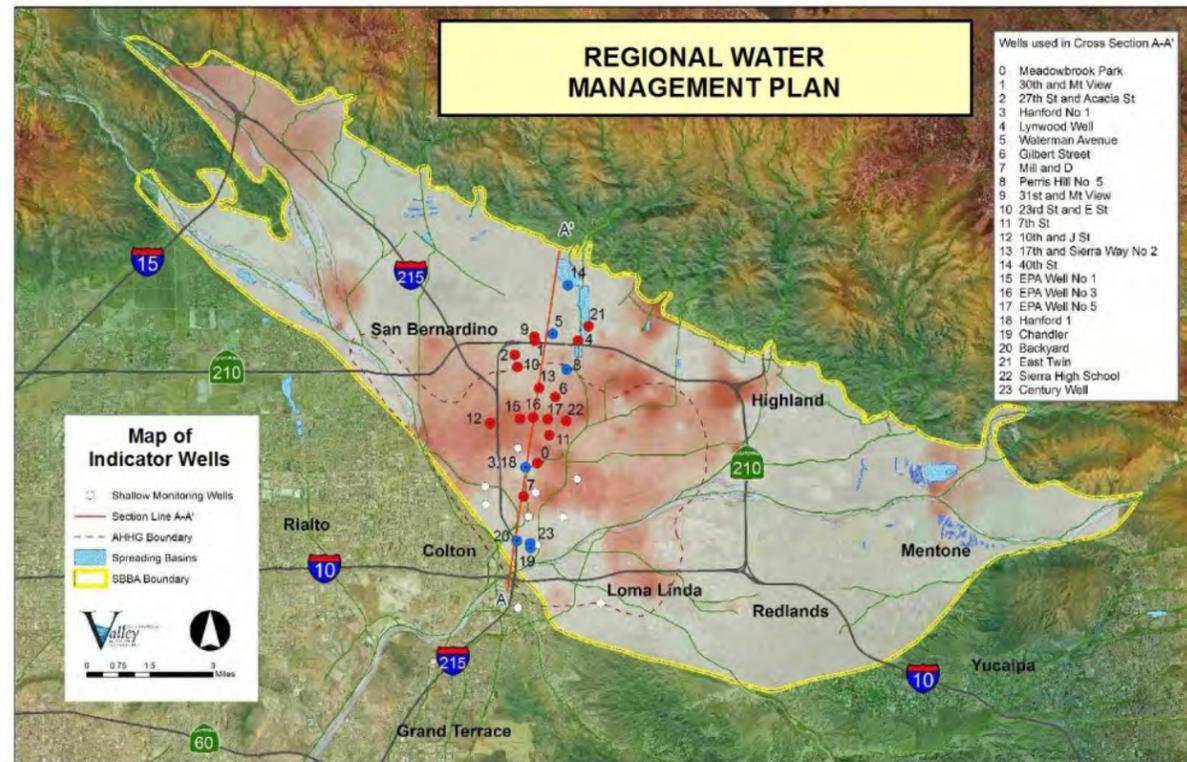


Levels trended upward from 2008 to 2013, during a time of below average hydrology

San Bernardino Basin Lithology



Current Water Levels Sept., 2014

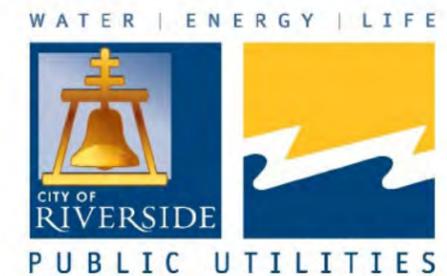


Section A-A' and stratigraphic base from Numeric Solutions, LLC.

Well construction and water level data from the SBVMWD Water Resources Database

Created by: Riverside Public Utilities
On: June, 2015

Water Resources

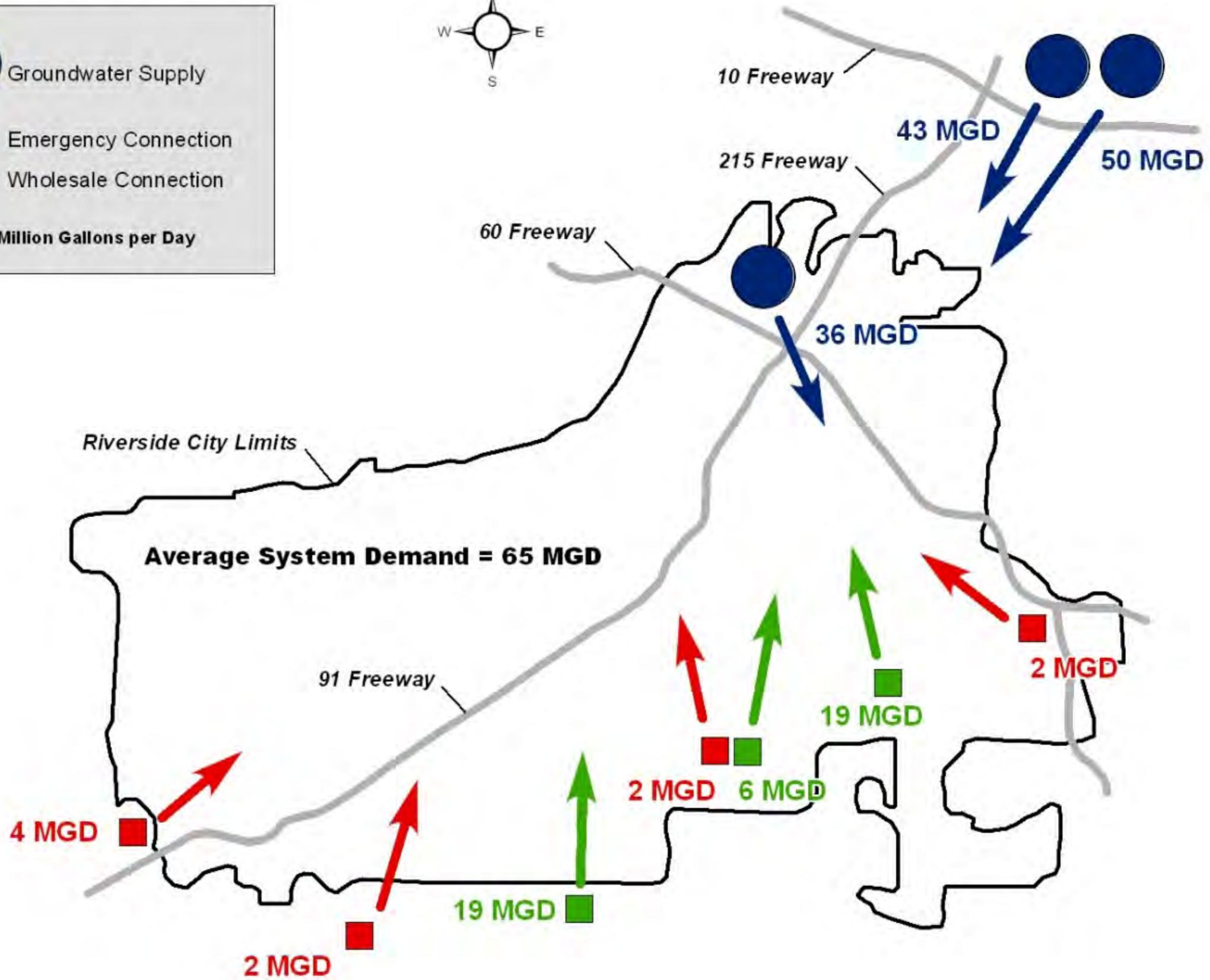
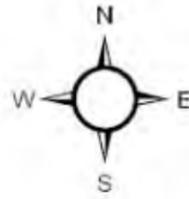


Water Source Map

Legend:

- Groundwater Supply (Blue circle)
- Emergency Connection (Red square)
- Wholesale Connection (Green square)

MGD = Million Gallons per Day



ROAD MAPS – INFRASTRUCTURE IMPROVEMENT –
WATER SUPPLY

INFRASTRUCTURE IMPROVEMENT - SUPPLY
ASSESSMENT

WORKFORCE DEVELOPMENT

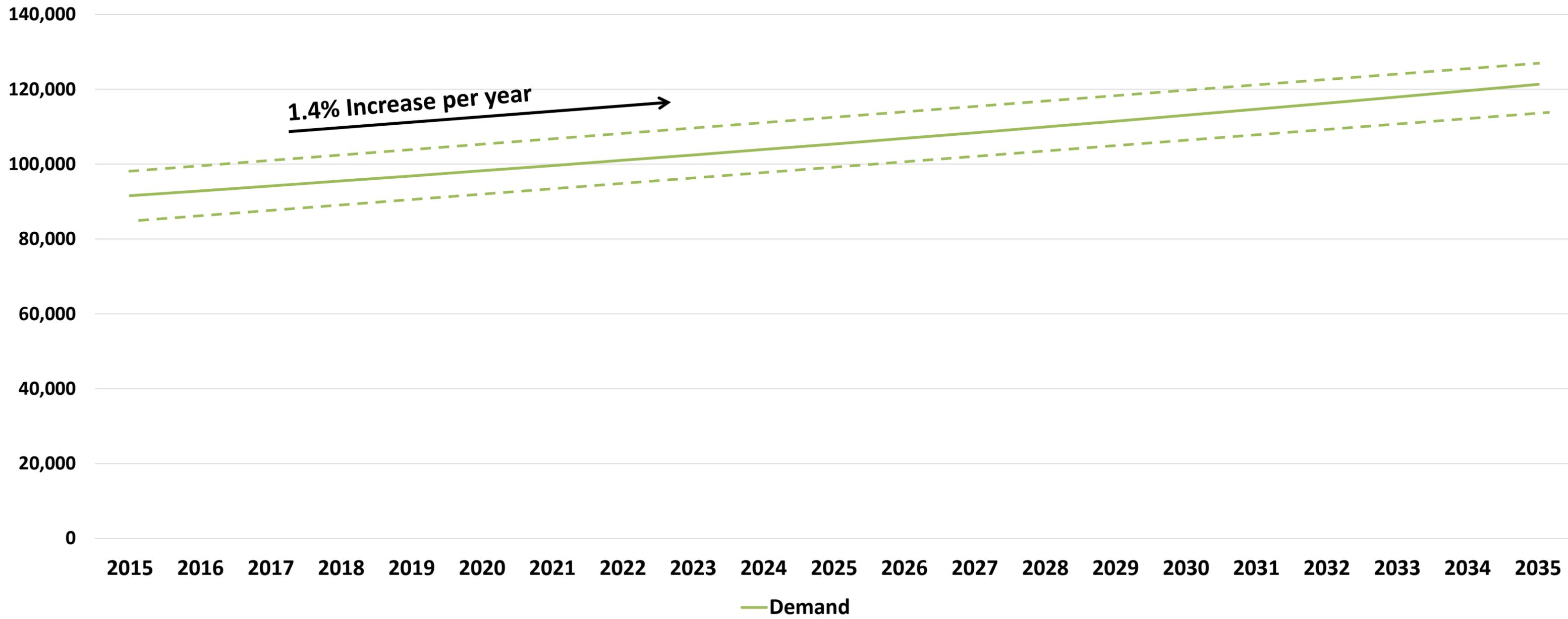
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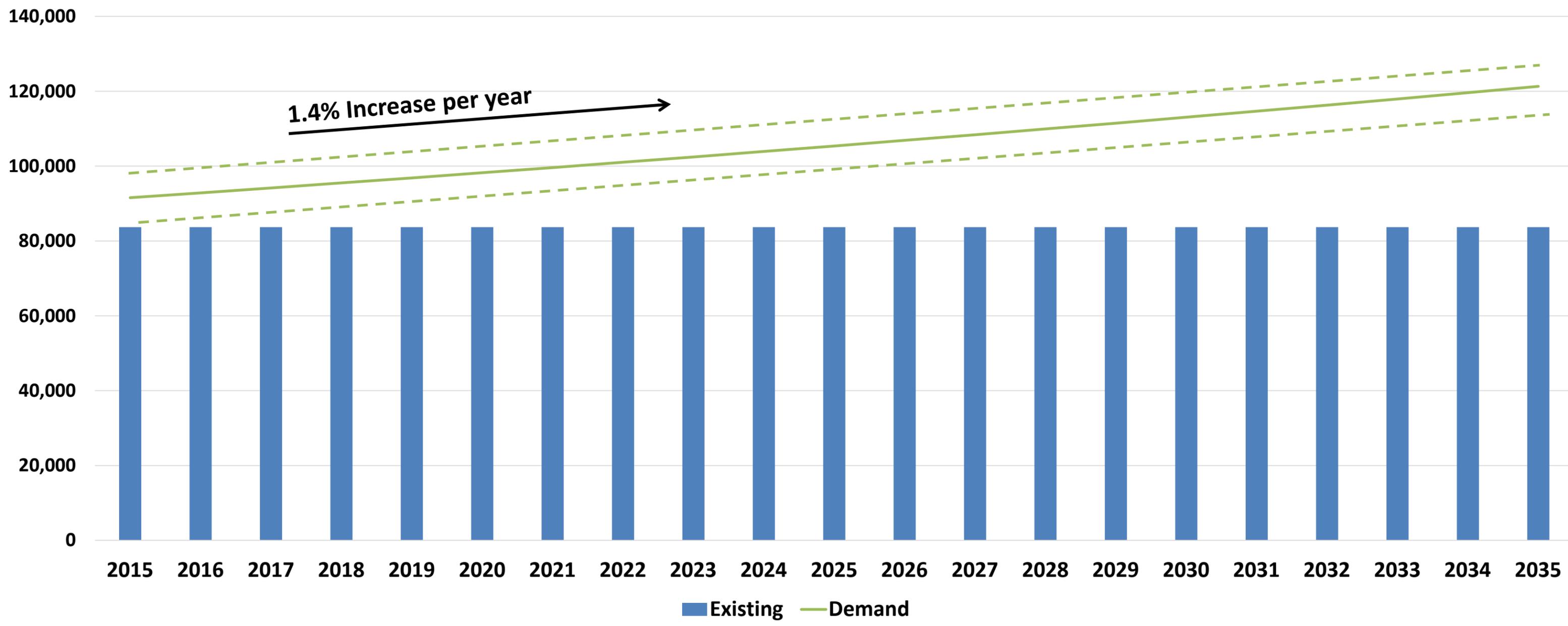
Supply Versus Demand

Supply and Demand, afa



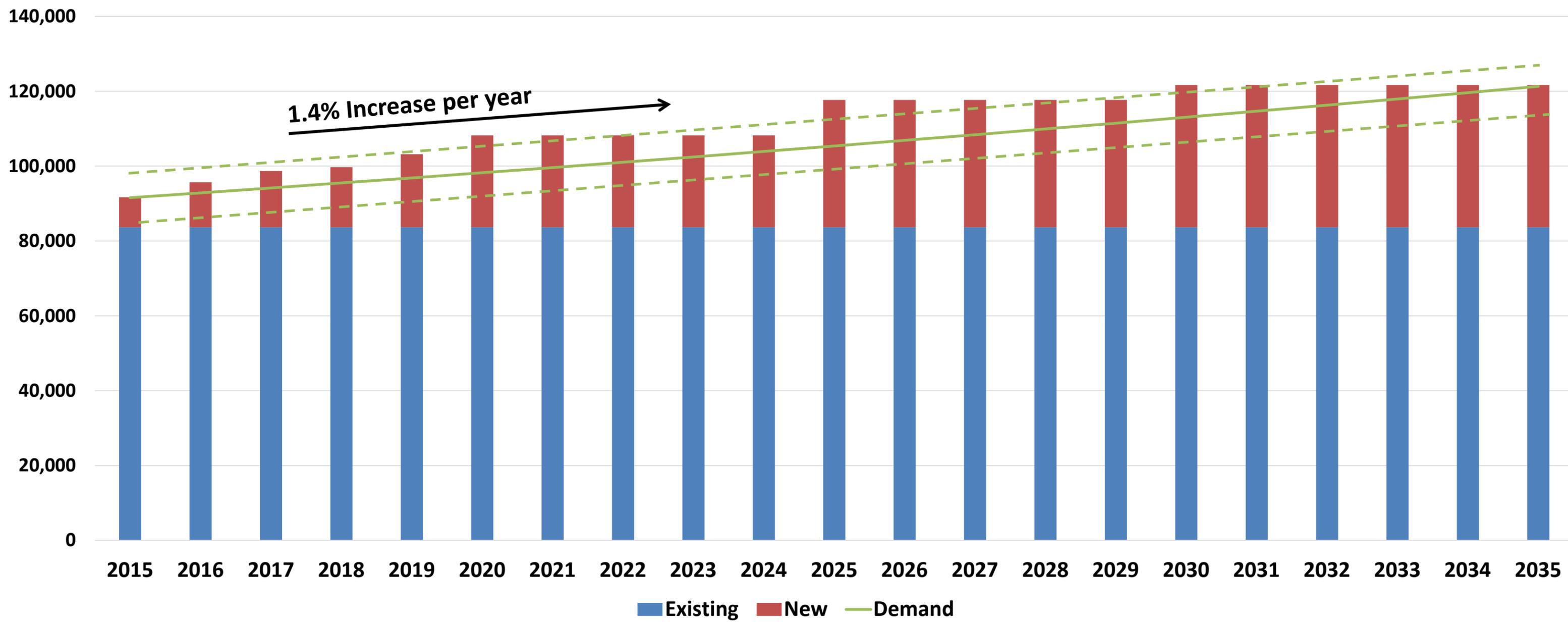
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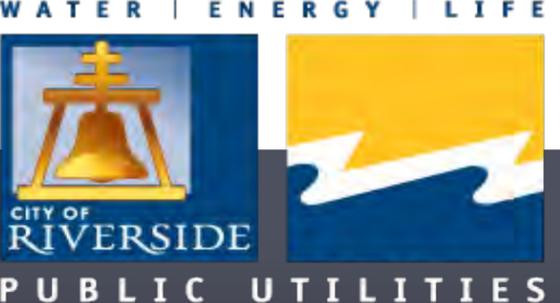
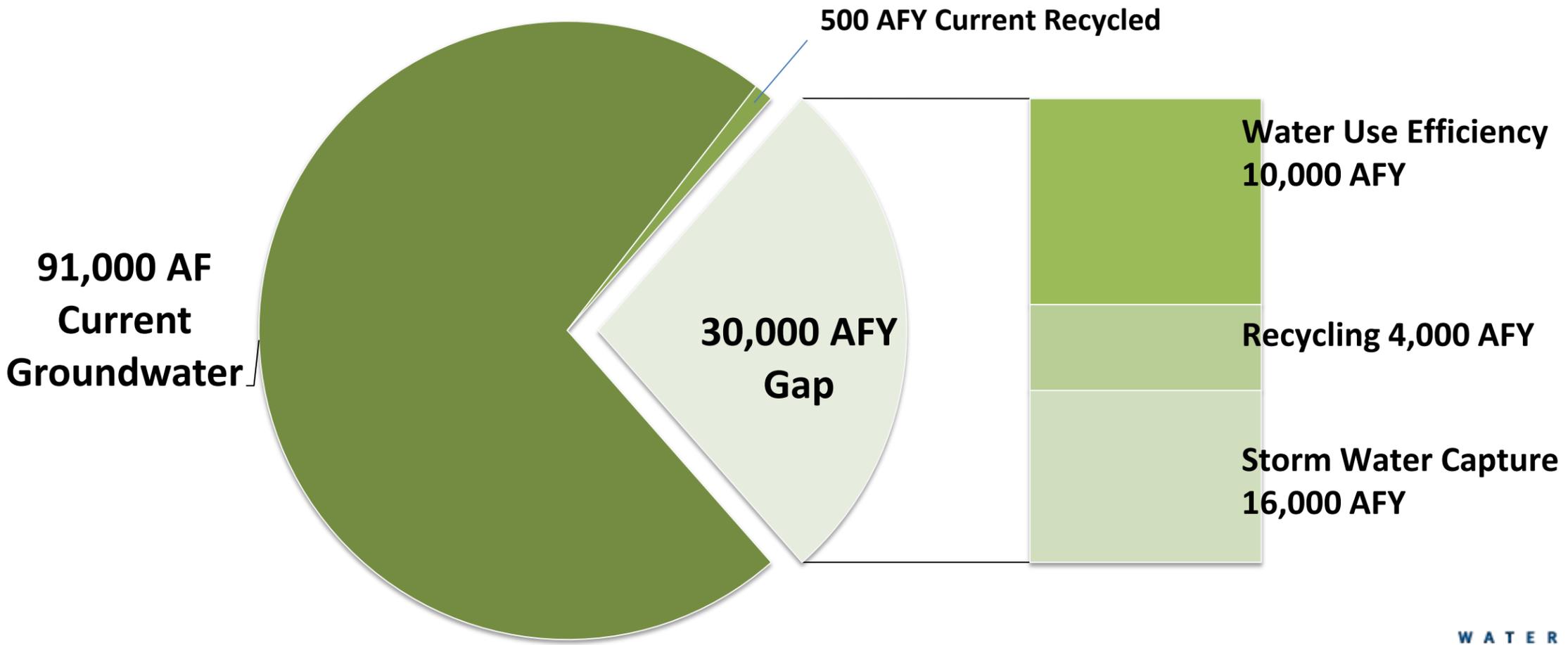
Supply Versus Demand

Supply and Demand, afa



RPU Future Water Supply

Estimated 2035 Water Portfolio



A large black pipe is installed in a riverbed, extending from the foreground towards the background. The pipe is supported by concrete structures. In the background, there is a bridge with concrete pillars and a small building. The landscape features rolling green hills under a clear blue sky. Two ducks are visible in the water on the right side of the pipe.

16,000 AF

Storm Water Capture

- Slow down or retain storm water to allow for recharge
 - Dams
 - Diversion structures
 - Basins
 - Sand and gravel beds
 - “Recoverable”

Storm Water Capture, 53% of Future Supply

- Large Scale
 - Riverside North ASR (Rubber Dam Project) 3,500 afy and 4,600 afy
 - Seven Oaks Dam (Enhanced Recharge Project) 3,000 afy
 - Active Recharge Project 2,000 afy
- Mid Scale
 - Conjunctive use of storm water basins 2,500 afy
- Small Scale
 - Urban projects 400 afy



POTENTIAL LARGE-SCALE STORM WATER CAPTURE PROJECT

RIVERSIDE NORTH ASR PROJECT



- Existing RPU Well
- ◆ Dam Location
- ~ Existing Pipeline
- - - Proposed Pipeline
- RPU Property

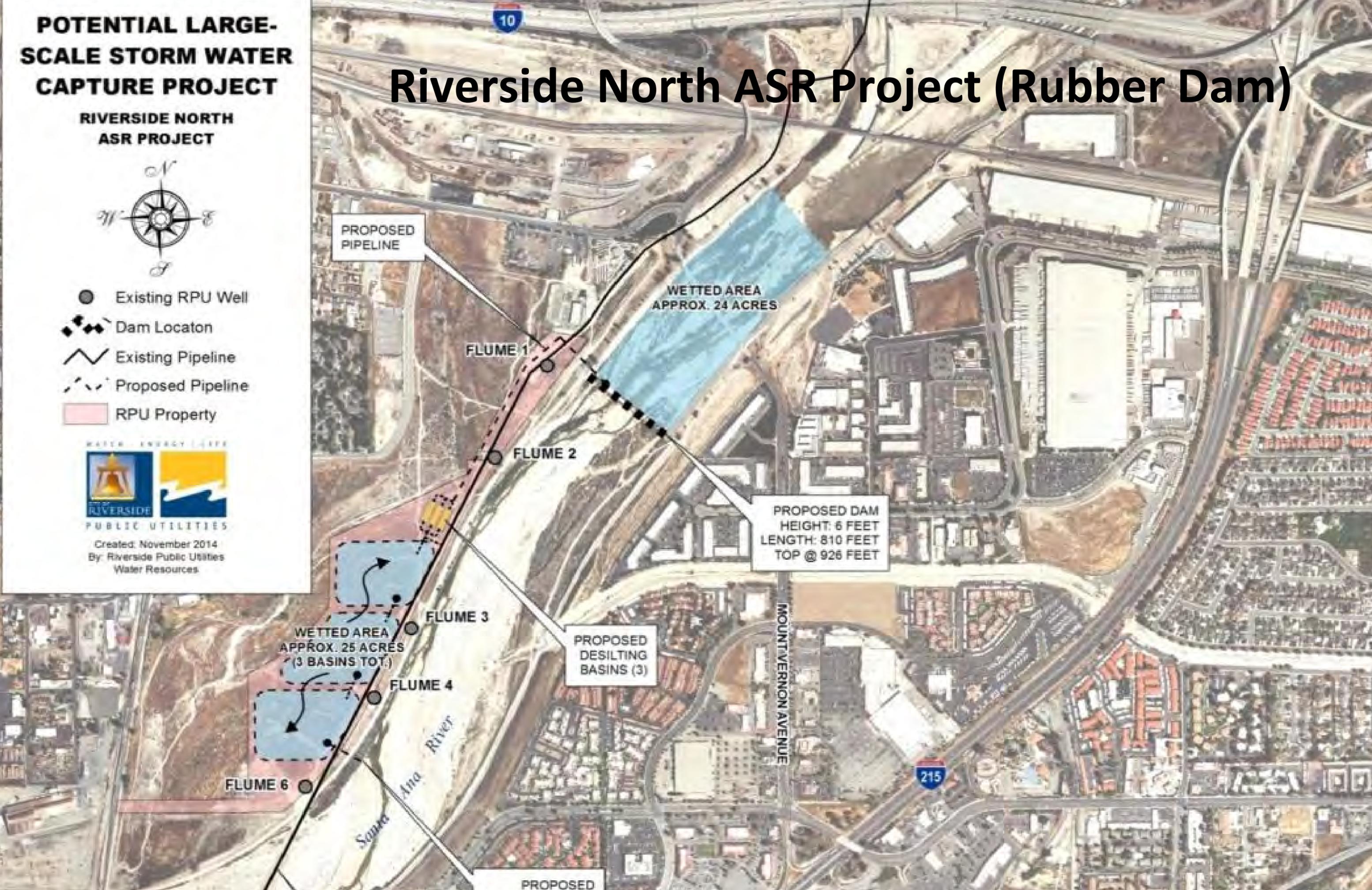
WATER ENERGY LIFE



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Water Resources

Riverside North ASR Project (Rubber Dam)

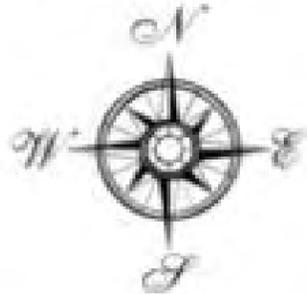


Seven Oaks Dam



POTENTIAL LARGE SCALE STORMWATER CAPTURE

ENHANCED RECHARGE PROJECT
(SEVEN OAKS PHASE 2)

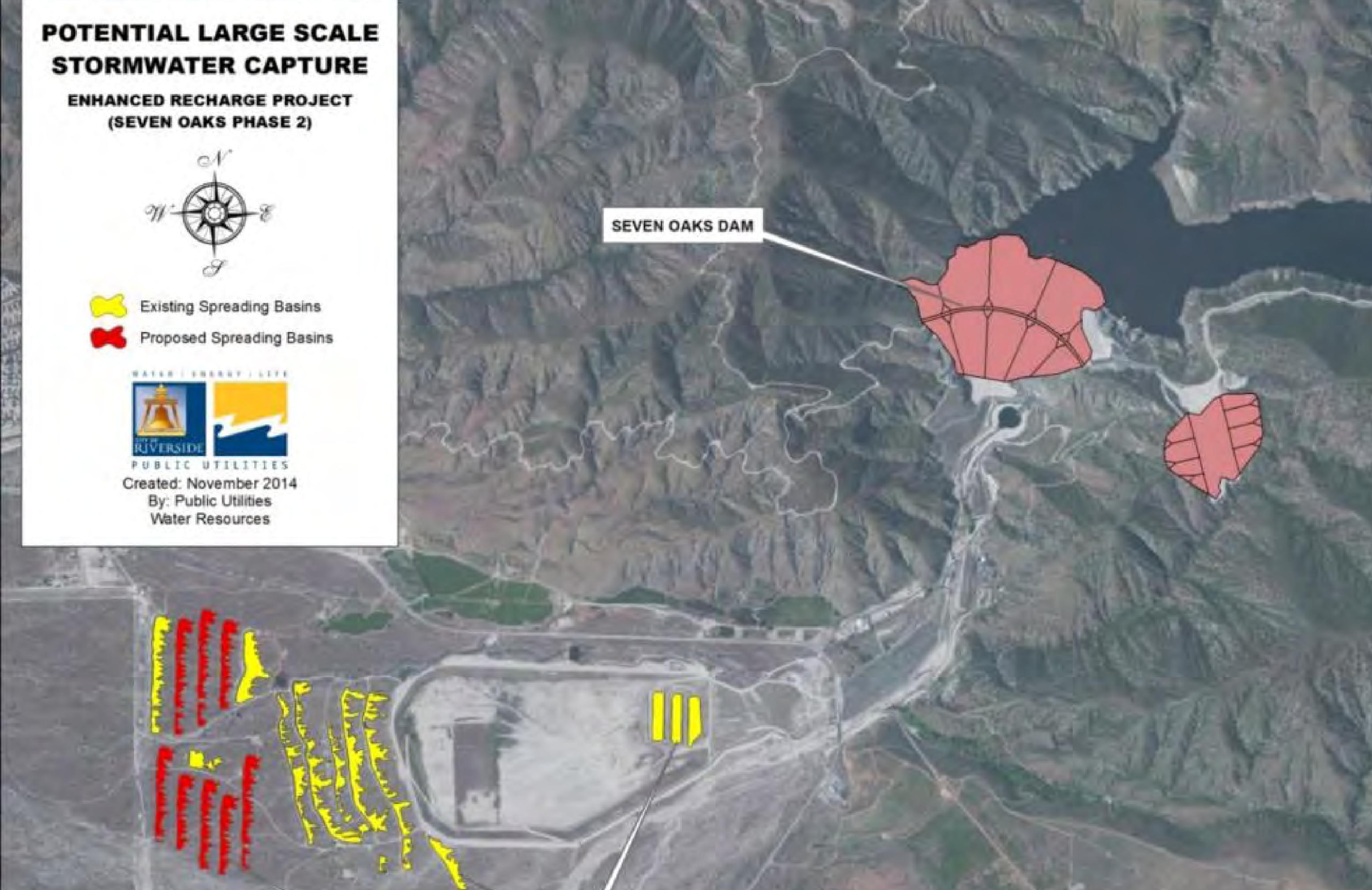


-  Existing Spreading Basins
-  Proposed Spreading Basins



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SEVEN OAKS DAM



POTENTIAL MID-SCALE STORM WATER CAPTURE PROJECT

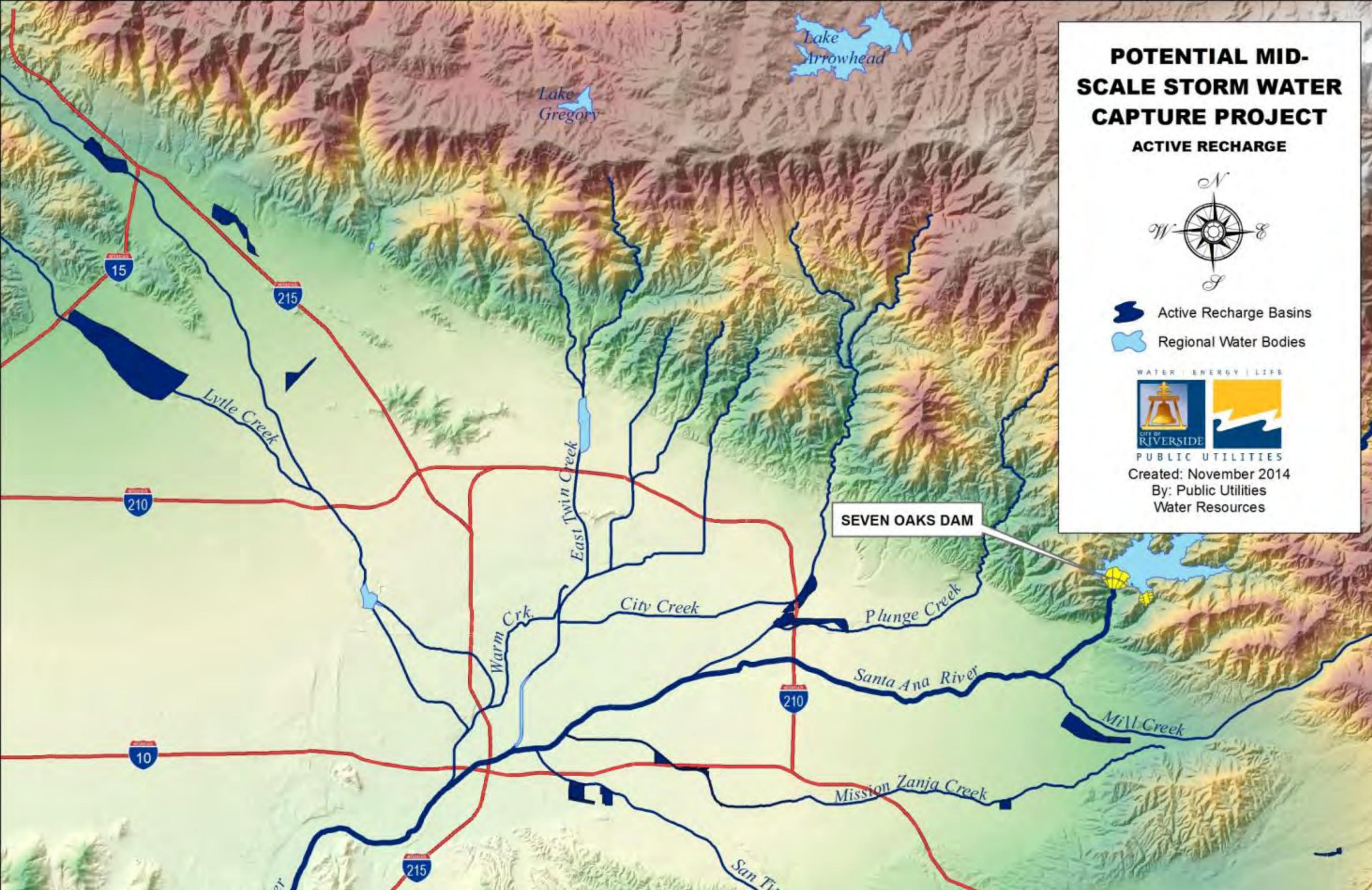
ACTIVE RECHARGE

- Active Recharge Basins
- Regional Water Bodies

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CITY OF RIVERSIDE
PUBLIC UTILITIES

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By: Public Utilities
Water Resources



MID-SCALE CAPTURE PROJECTS

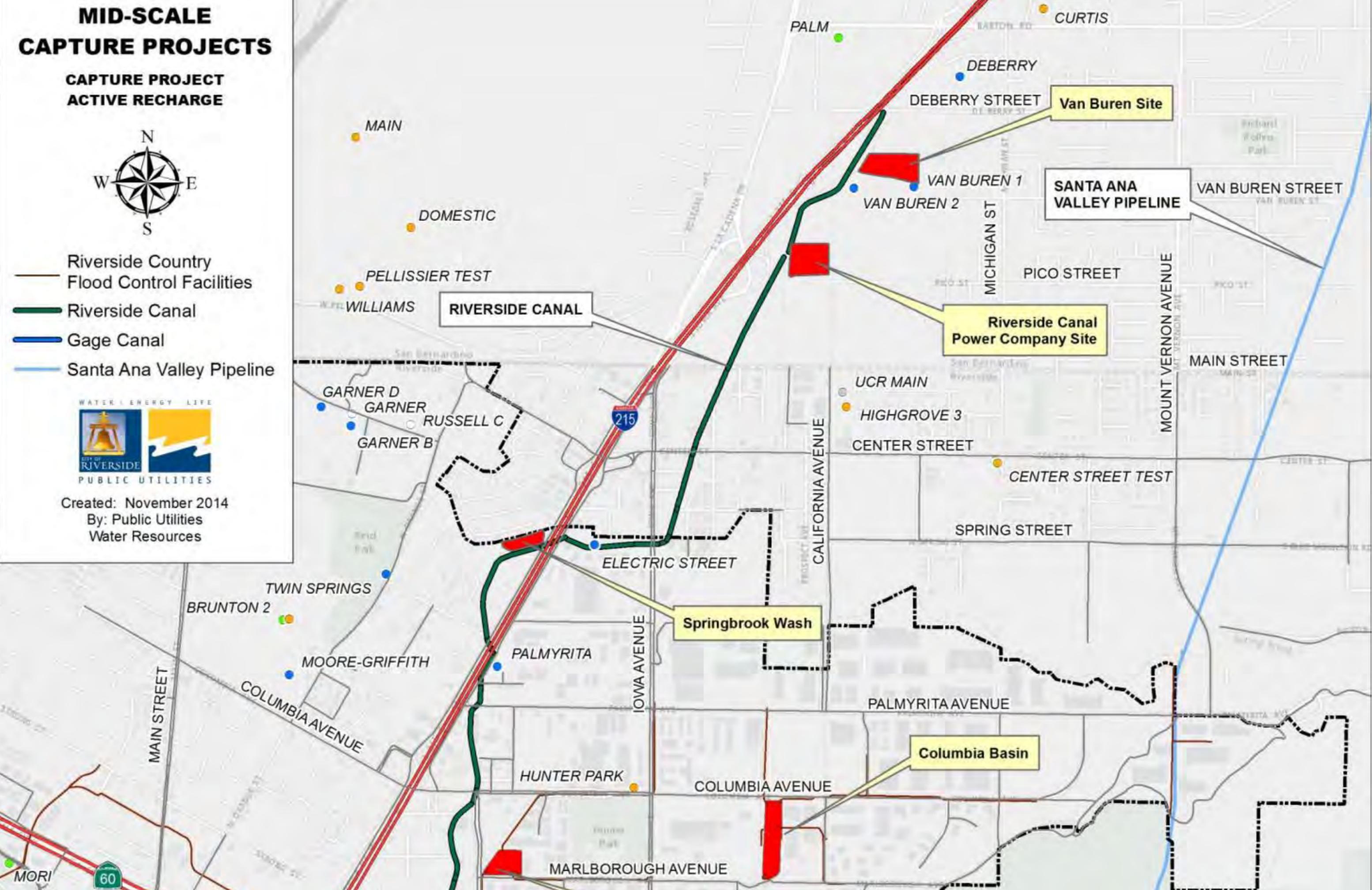
CAPTURE PROJECT
ACTIVE RECHARGE



-  Riverside Country Flood Control Facilities
-  Riverside Canal
-  Gage Canal
-  Santa Ana Valley Pipeline



Created: November 2014
By: Public Utilities
Water Resources

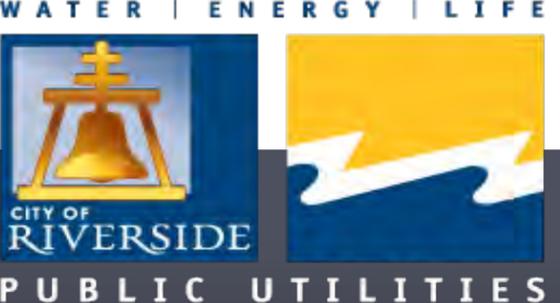
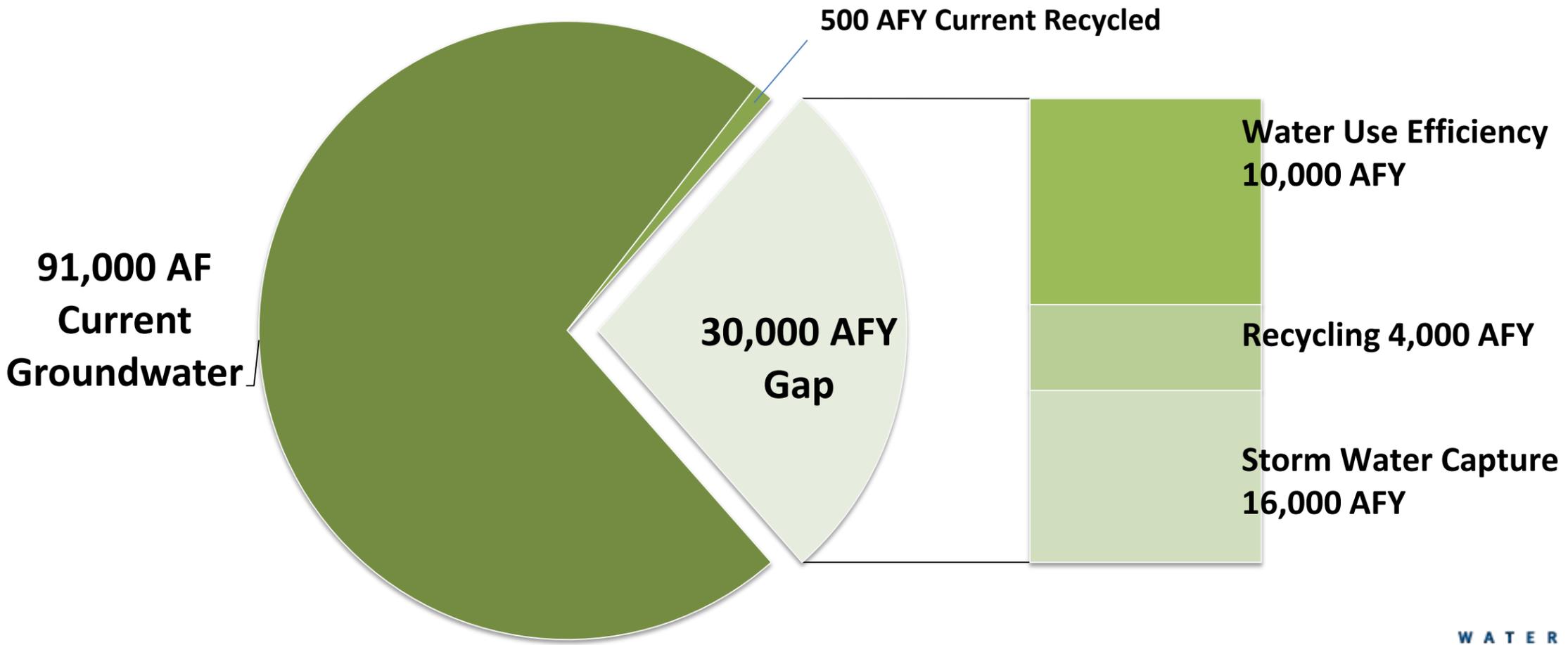


Small Scale Projects



RPU Future Water Supply

Estimated 2035 Water Portfolio



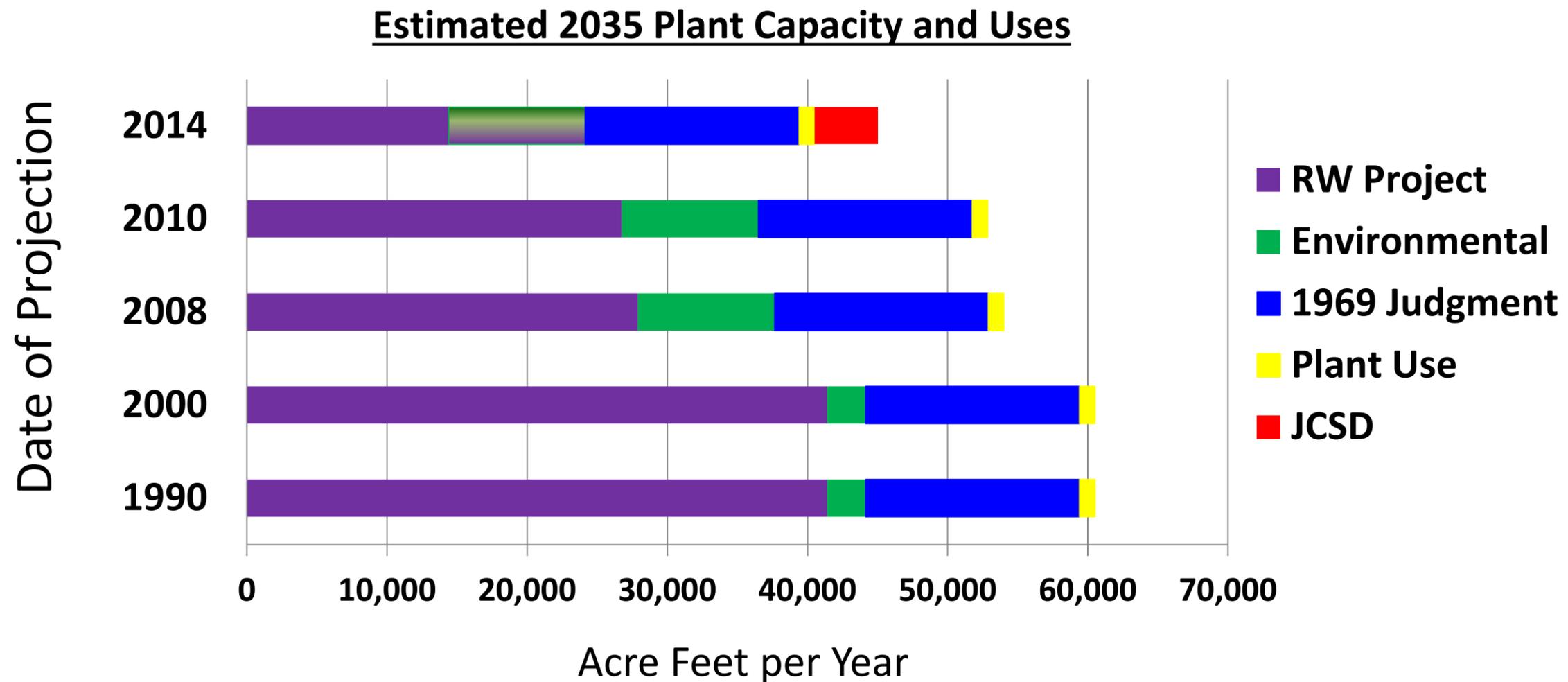
The image shows three large, black, cylindrical pipes lying horizontally on a dirt surface. Each pipe is secured with a red metal clamp. The pipes are arranged in a slightly overlapping manner, with the top pipe partially obscured by the middle one, and the middle one by the bottom one. The background consists of dry, brownish soil and some sparse green vegetation. The text '4,000 AF' is overlaid in a large, bold, red font across the center of the pipes.

4,000 AF

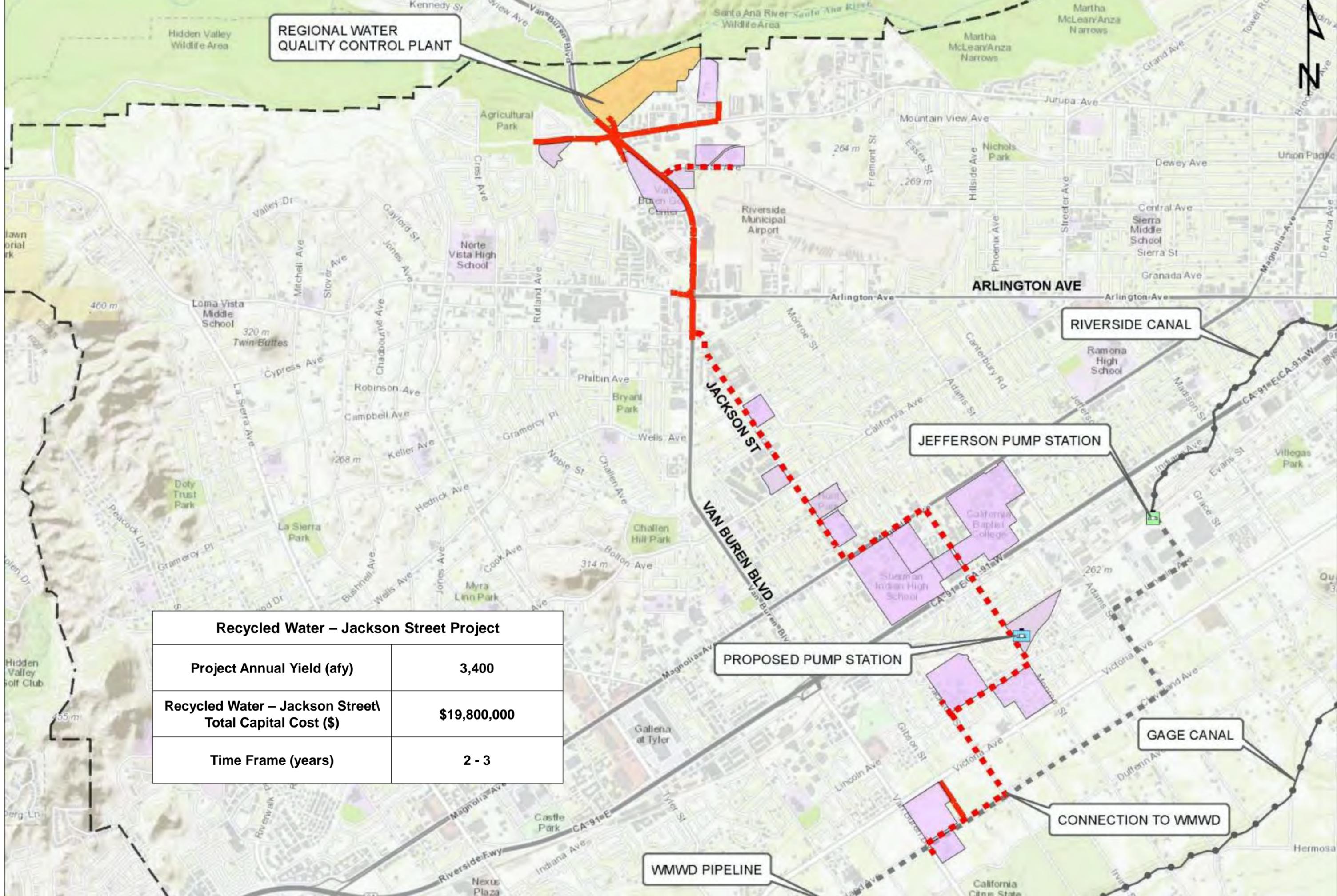
Recycled Water, 13% of new Supply

- Began considering in 1991
 - Multiple configurations
- 4,000 afa
- Small customer base
- Reliable

Recycled Water – Lowered Estimates



Current yield available \approx 7,500 AFY



REGIONAL WATER QUALITY CONTROL PLANT

RIVERSIDE CANAL

JEFFERSON PUMP STATION

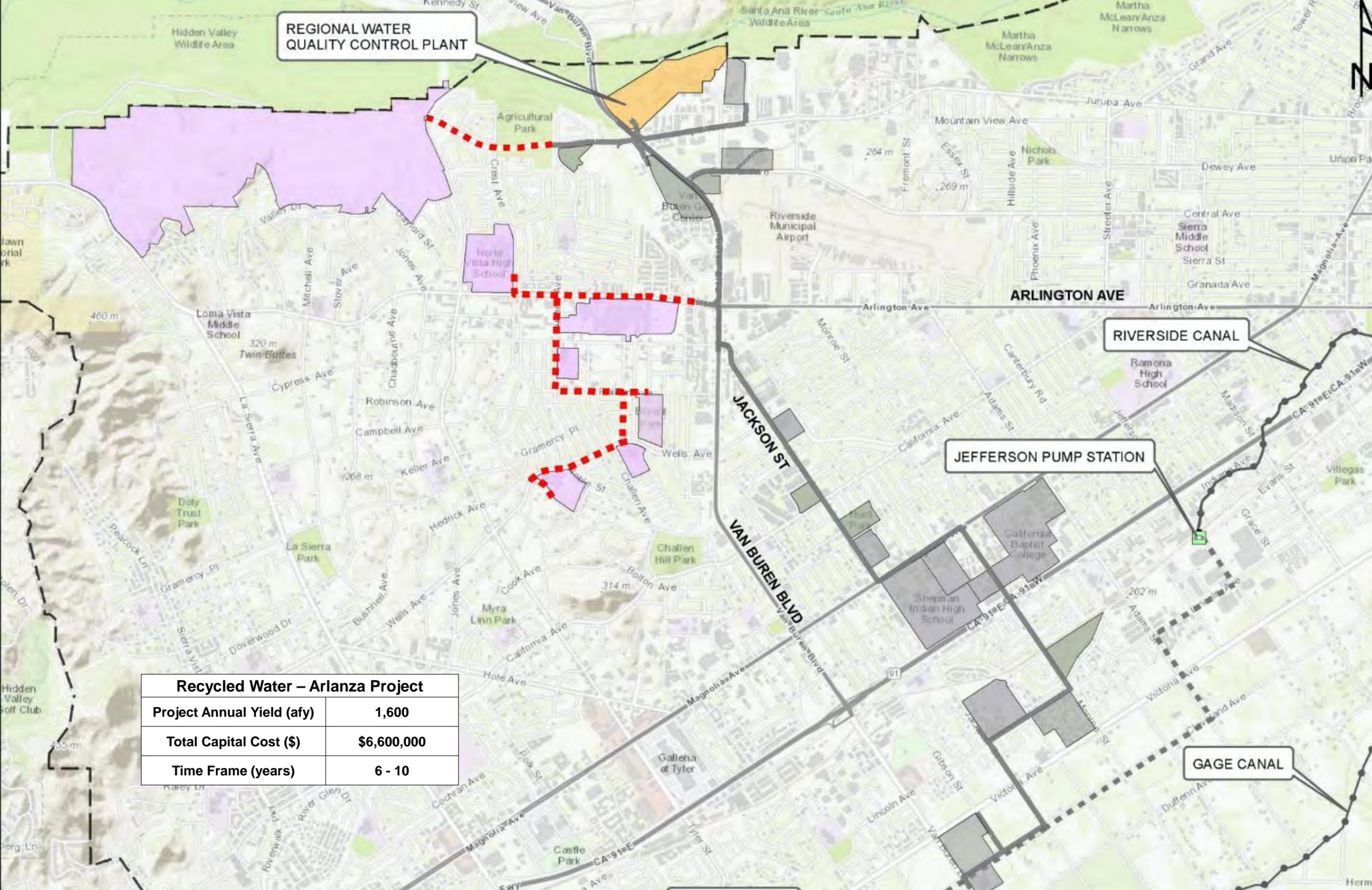
PROPOSED PUMP STATION

GAGE CANAL

CONNECTION TO WMWD

WMWD PIPELINE

Recycled Water – Jackson Street Project	
Project Annual Yield (afy)	3,400
Recycled Water – Jackson Street/ Total Capital Cost (\$)	\$19,800,000
Time Frame (years)	2 - 3



REGIONAL WATER QUALITY CONTROL PLANT

RIVERSIDE CANAL

JEFFERSON PUMP STATION

GAGE CANAL

Recycled Water – Arlanza Project	
Project Annual Yield (afy)	1,600
Total Capital Cost (\$)	\$6,600,000
Time Frame (years)	6 - 10



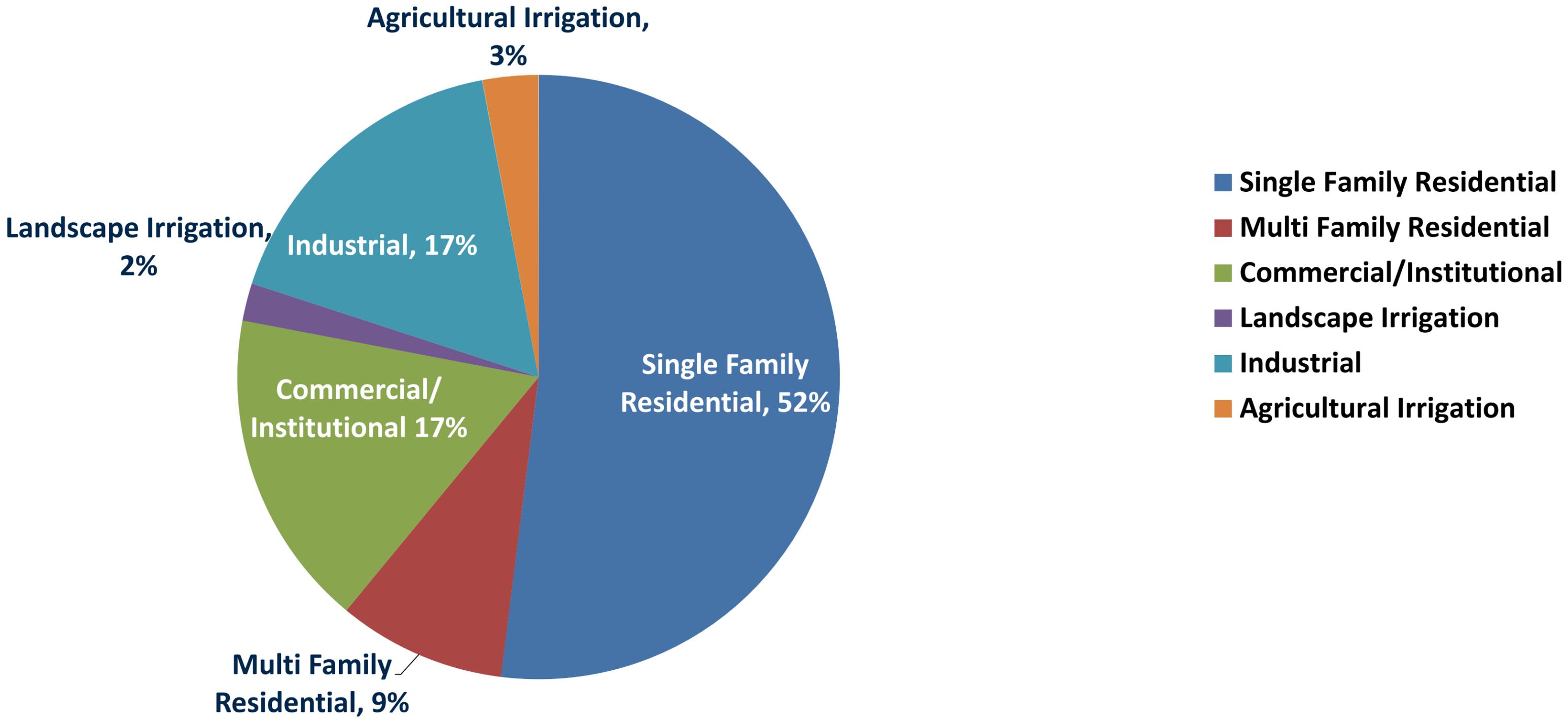
10,000 A/F

Less Water, More Color

Water Conservation, 33% of Future Supply

- Already gaining benefits of conservation
 - Existing programs
 - Turf removal
 - Culture shift
- Approximately 35% of all water is used indoors
 - 10% during winter months
 - 40% during summer months

Water Demand by End User



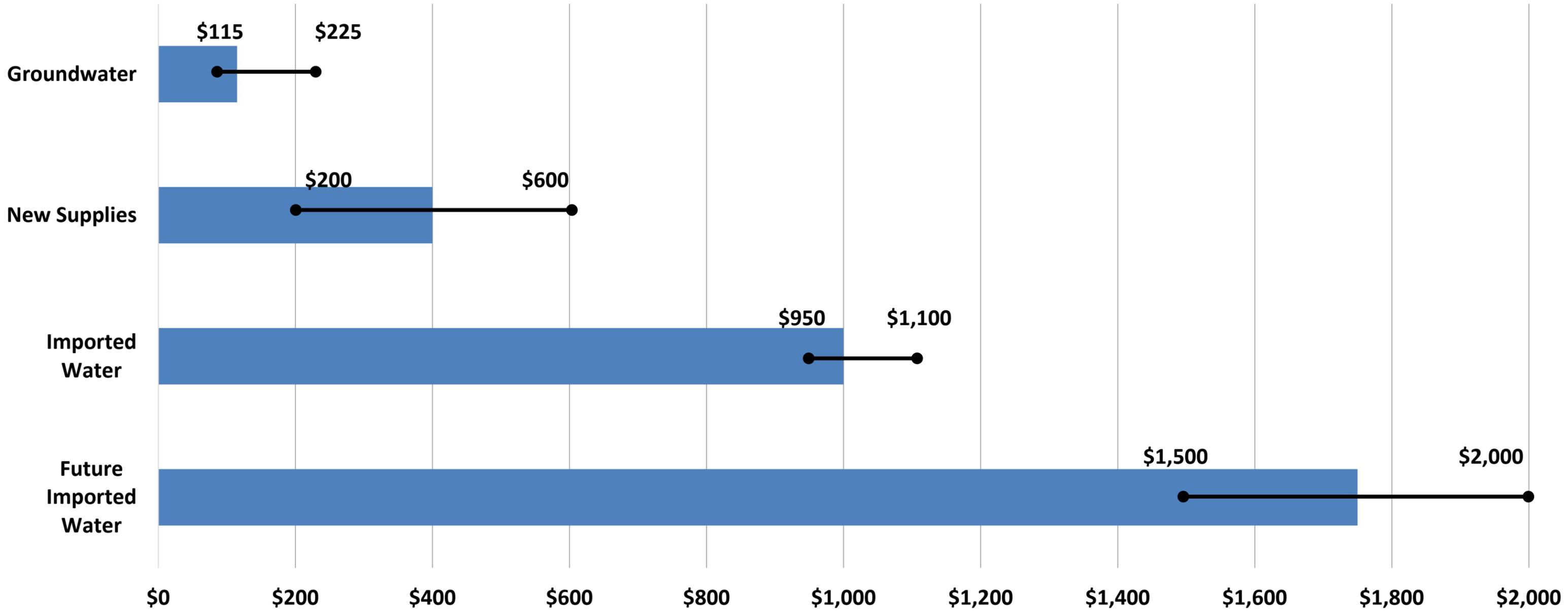
Water Conservation Measures

Measure	Annual Water Savings (AF)	Unit Cost (\$/AF saved)
SFR Surveys (5%)	500	\$356
Precision Nozzles	1,000	\$264
Toilet Rebates	400	\$485
Irrigation Surveys (large landscapes)	800	\$434
CII Surveys & Controllers (5%)	900	\$187
CII Precision Nozzles	300	\$265
CII Clothes Washer Rebates	200	\$158
CII Toilet Installs	300	\$347
System Efficiency	1,000	No Change
SFR Surveys (5-10%)	300	\$630
SFR Clothes Washer	300	\$575
CII Surveys & Controllers (5%)	300	\$801
CII Performance Based Program	700	\$782
	7,000	\$350 (weighted)

A lot of little things add up!

Resource Costs

Resource Costs \$/af



Water Supply Assessment

- Demand Uncertainty
- Current supply adequate for current need
- Projects identified for future needs
 - Consider projects that cost less than imported water
- New projects increase reliability
- \$102-\$124 Million
 - Cost sharing and Grants
 - Reduce risk by monetizing excess water supplies

ROAD MAPS – INFRASTRUCTURE IMPROVEMENT –
WATER SUPPLY

INFRASTRUCTURE IMPROVEMENT – SUPPLY
OPTIONS

WORKFORCE DEVELOPMENT

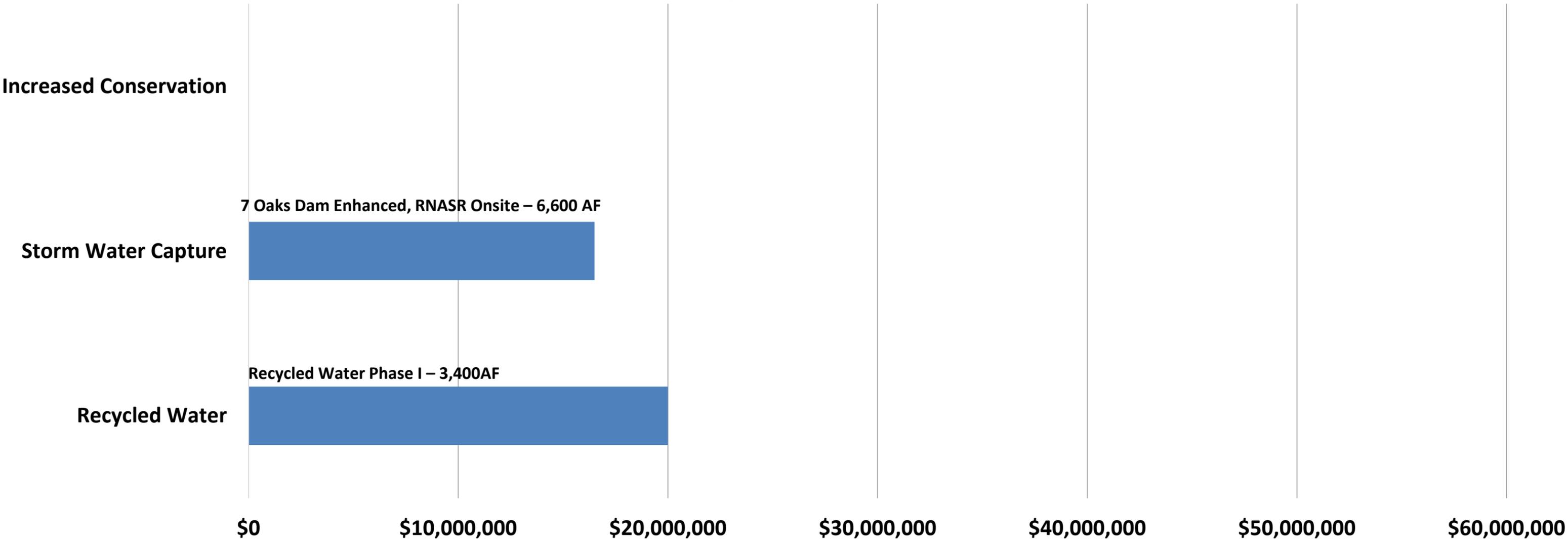
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ADVANCED TECHNOLOGIES

Tier 1: In-Flight Projects, First 1/3 of New Supply

10,000 afa



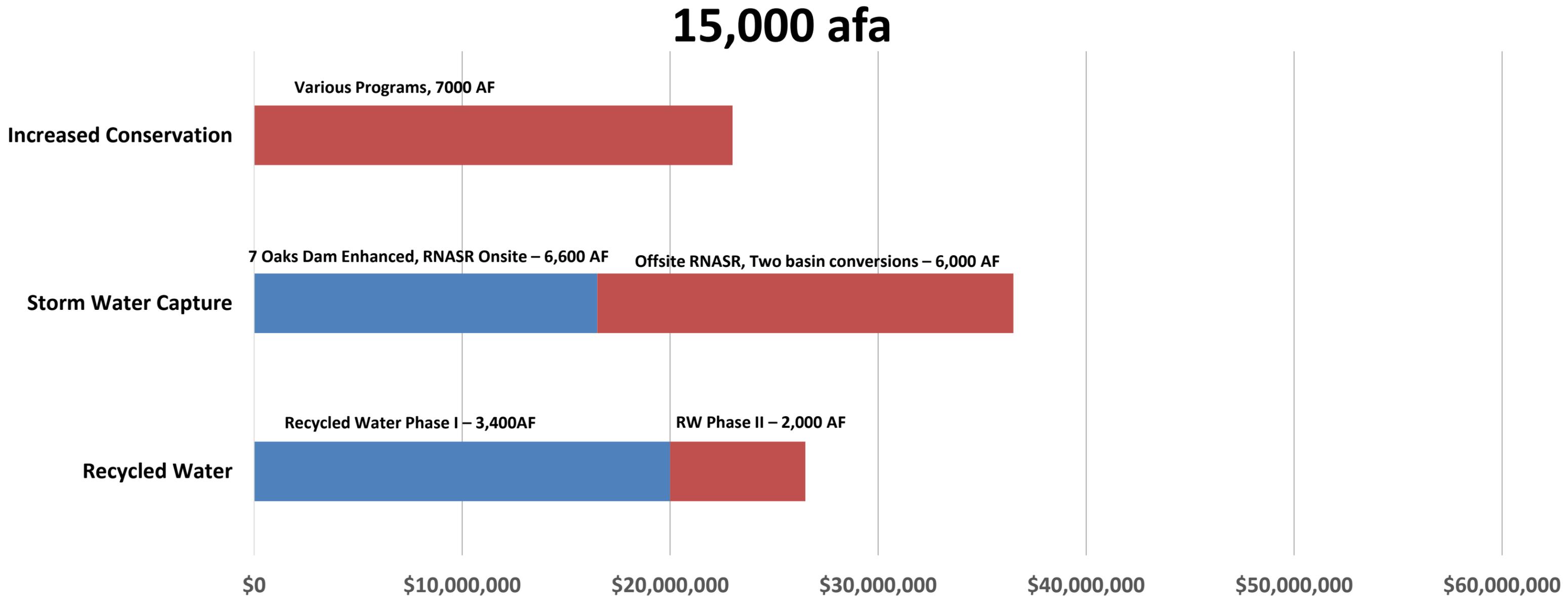
Tier 1: \$34-38 Million

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Tier 2: Next ½ of New Water Supply Projects



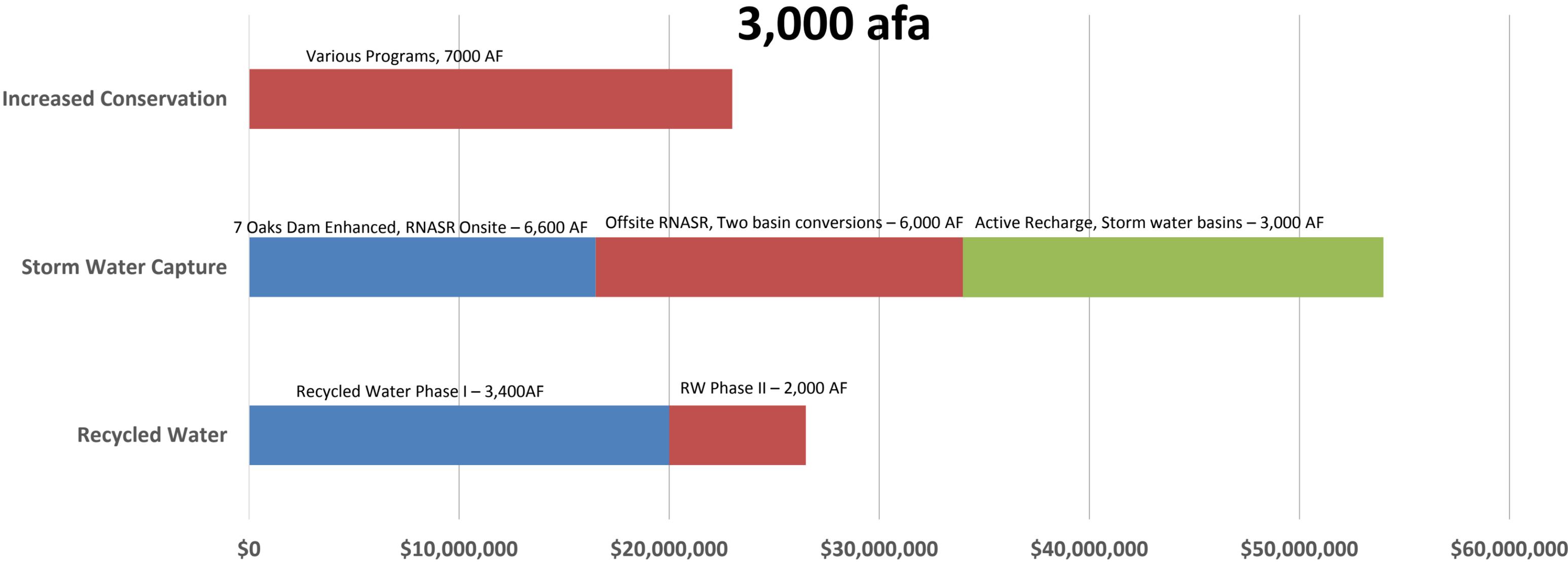
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Includes various water conservation programs, Recycled Water Phase B, RNASR (Rubber Dam) offsite storage and conversion of two storm water retention basins to storm water capture.

Tier 3: Last 10% of New Water Supply



3,000 afa

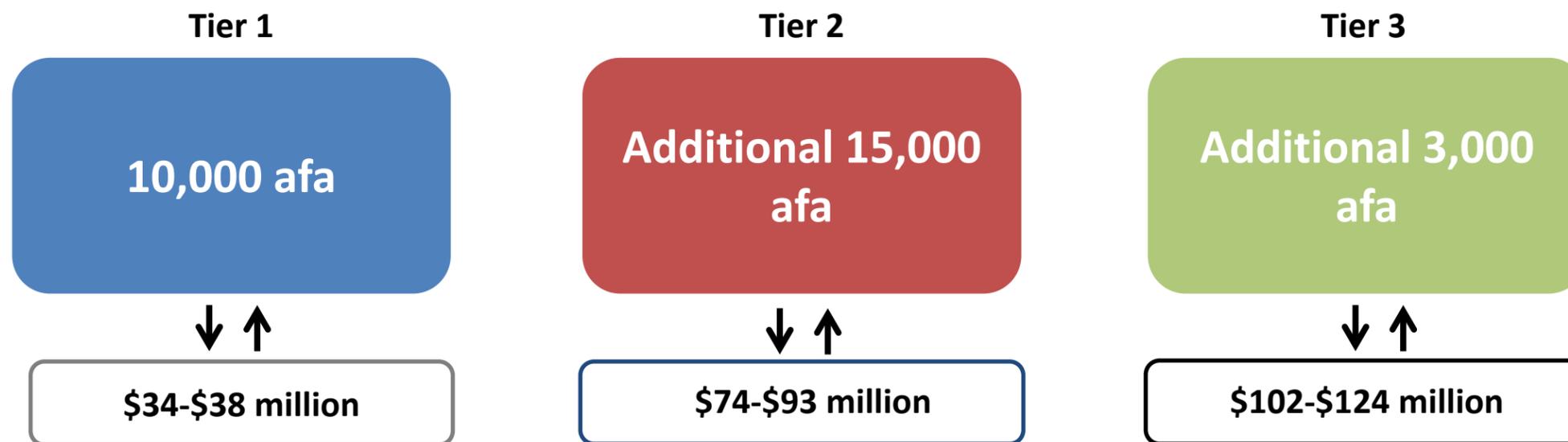
Tier 1: \$34-38 Million
 Tier 2: \$74-93 Million
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Includes Active Recharge program, conversion of two storm water retention sites to storm water capture and the creation of two storm water capture sites.

Summary of Investment Options

Water Supply

- Additional financial investment is required to secure additional water supplies



ROAD MAPS – INFRASTRUCTURE IMPROVEMENT –
WATER SUPPLY

INFRASTRUCTURE IMPROVEMENT - SUPPLY
RECOMMENDATIONS

WORKFORCE DEVELOPMENT

—

THRIVING FINANCIALLY

ADVANCED TECHNOLOGIES

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100%



4,000 AF

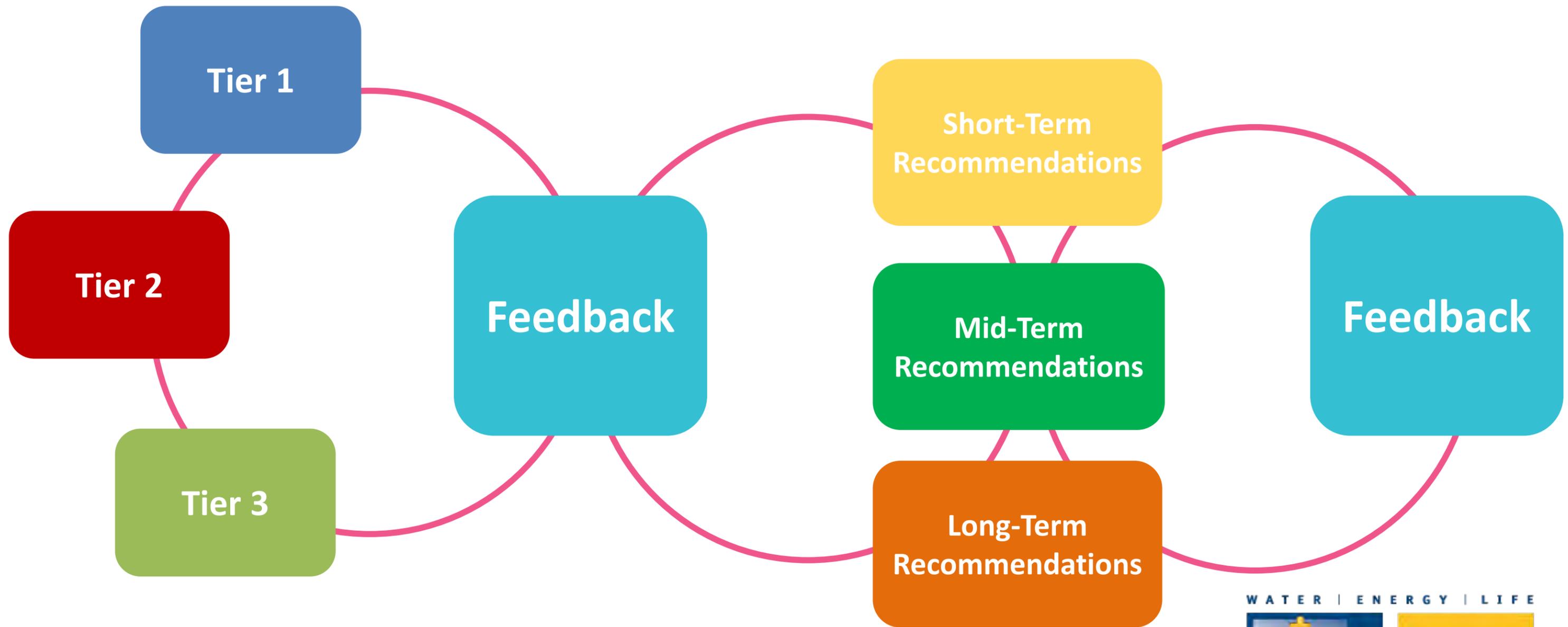


16,000 AF



10,000 AF

Options & Recommendations Decided from Feedback



Next Steps

- Incorporate Comments
- Formulate Detailed recommendations
- Review
- Report Back

ROAD MAPS –

FEEDBACK

WORKFORCE DEVELOPMENT

INFRASTRUCTURE IMPROVEMENT

THRIVING FINANCIALLY

ADVANCED TECHNOLOGIES