



# SUSTAINABLE GROUNDWATER MANAGEMENT IN SOUTHERN LOS ANGELES COUNTY

Industry Advisory Council  
March 26, 2019

*SECURING OUR WATER FUTURE TODAY*

# Los Angeles Area Water Supplies

## Imported River Water from Northern California & Colorado River

- Less availability during drought & for environmental concerns
- Subject to failure during natural disaster
- **49% of supply in 2017**



## Recycled Wastewater

- Growing uses for irrigation, industrial applications, groundwater recharge
- Upstream facility capacities almost entirely allocated to reuse
- Treatment facility effluent has decreased due to conservation
- **7% of supply in 2017**

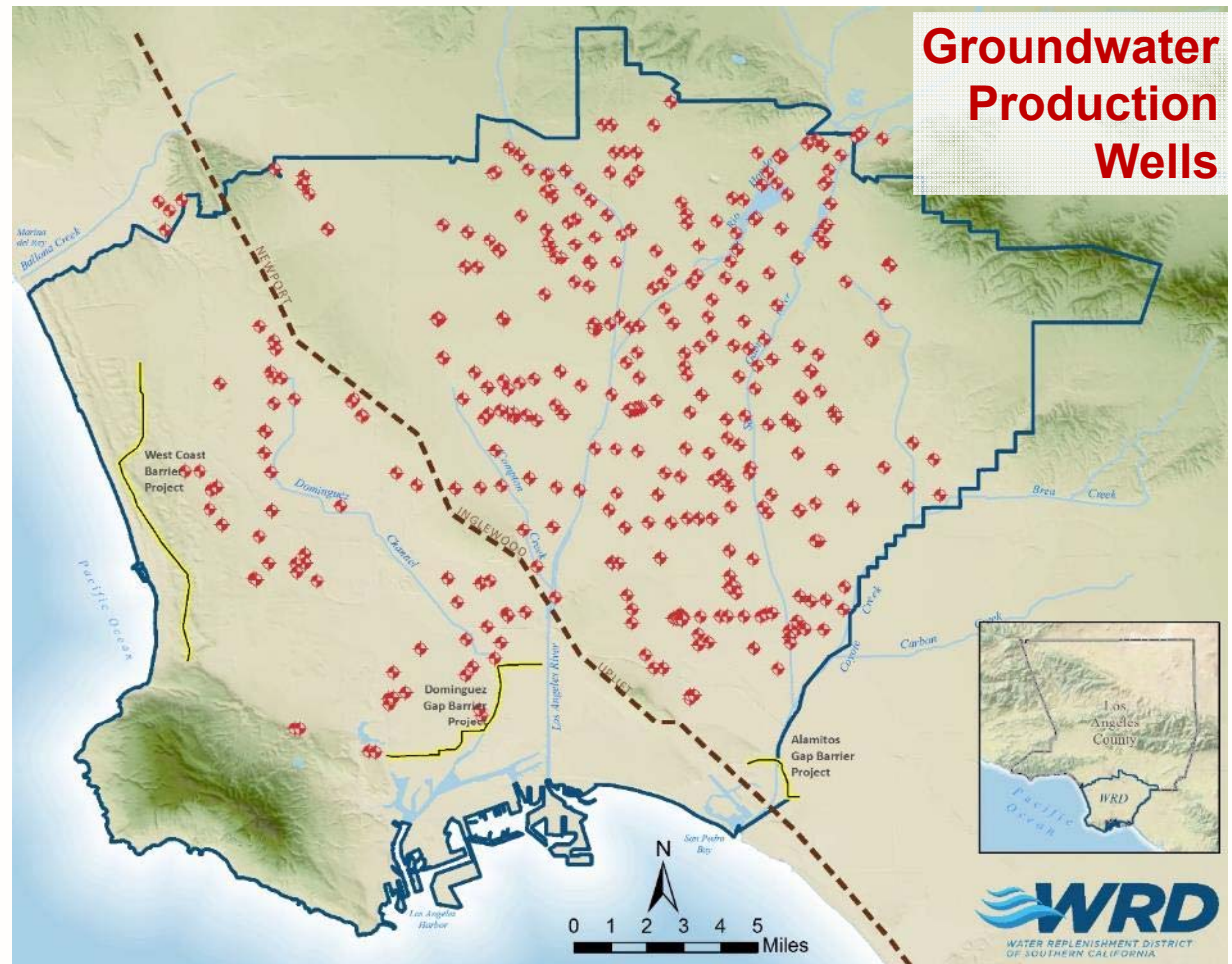


# Groundwater is 40-50% of Local Supply

~225,000 Acre-feet  
per year

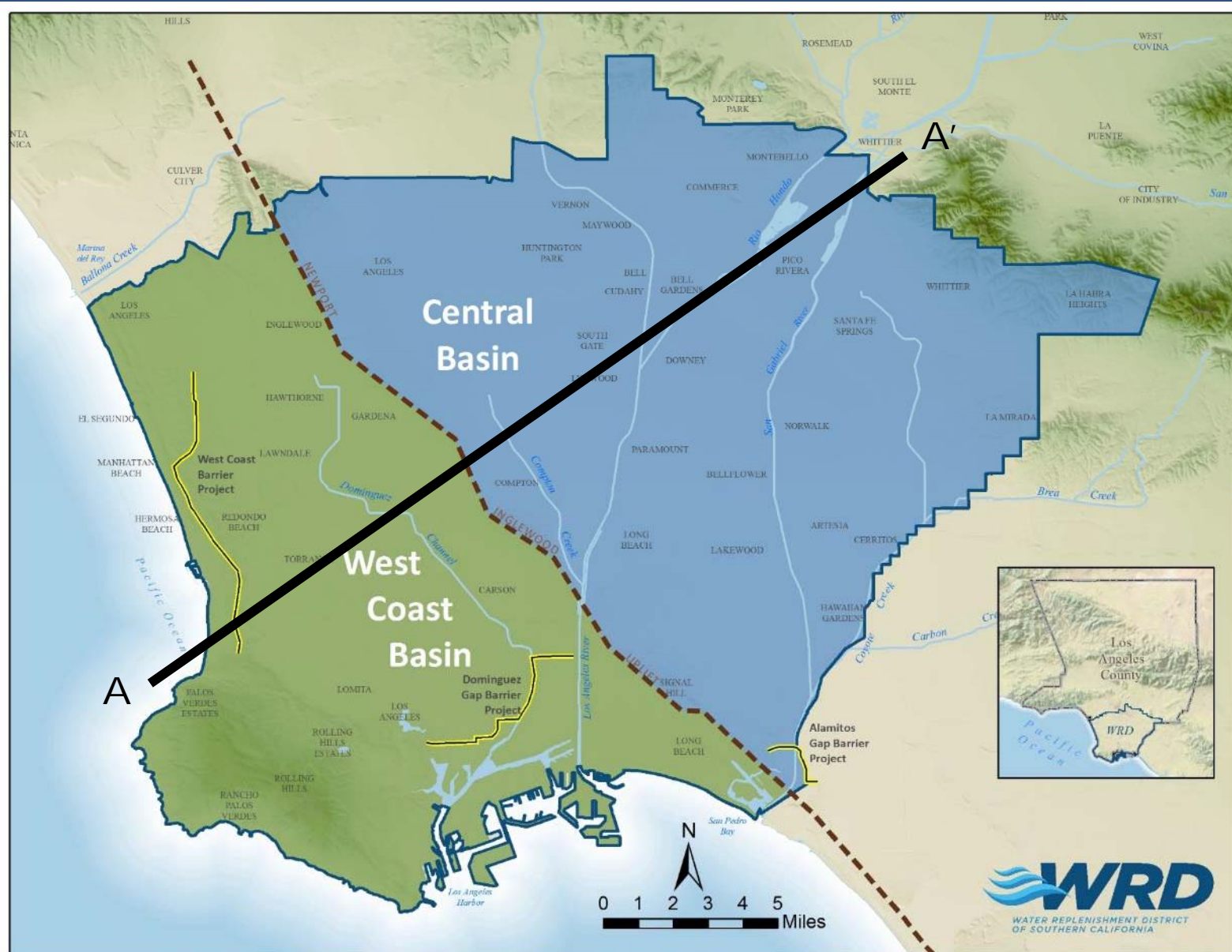


73 Billion Gallons  
Of Groundwater  
Used Annually



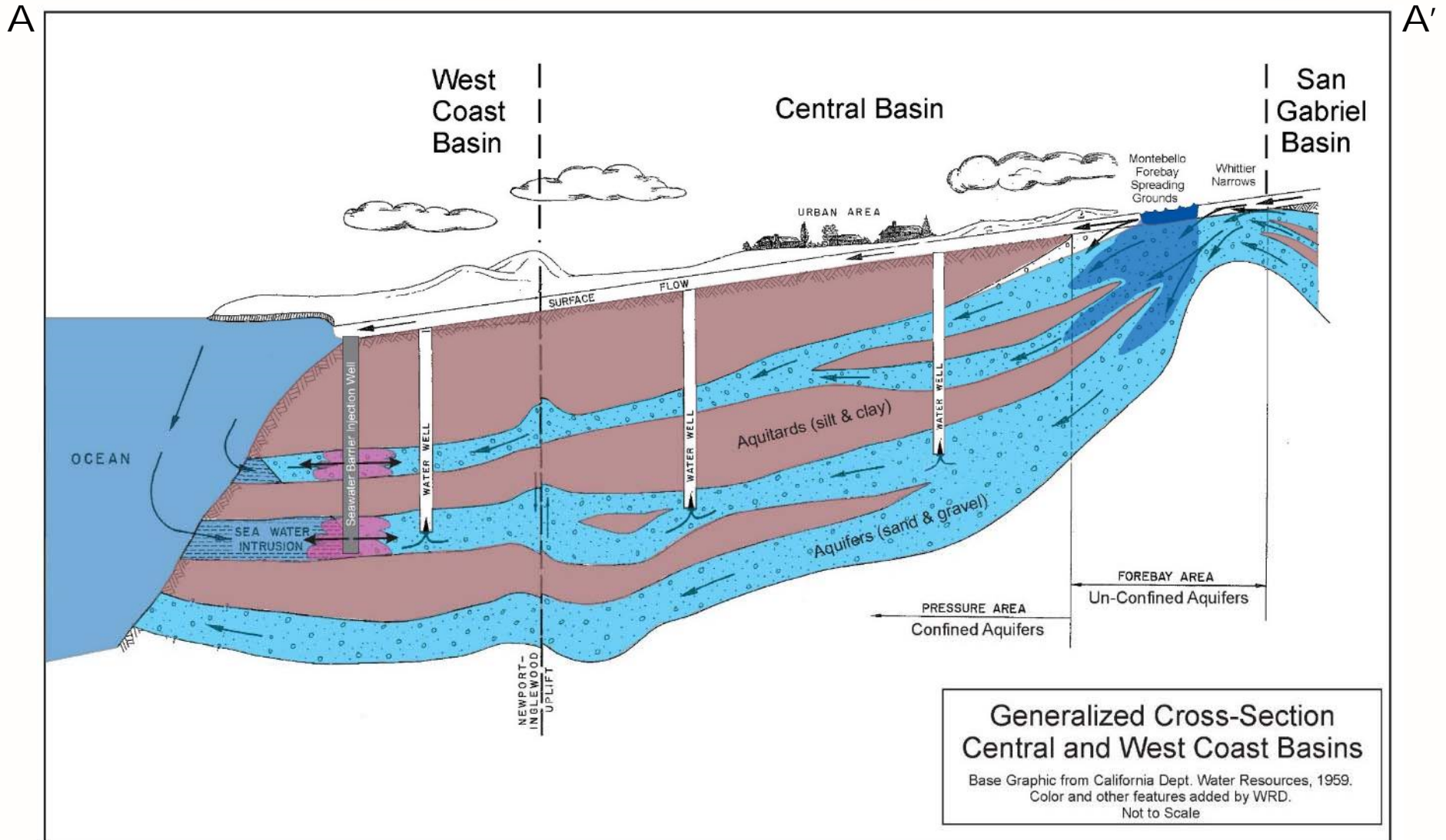


# Groundwater in WRD Service Area

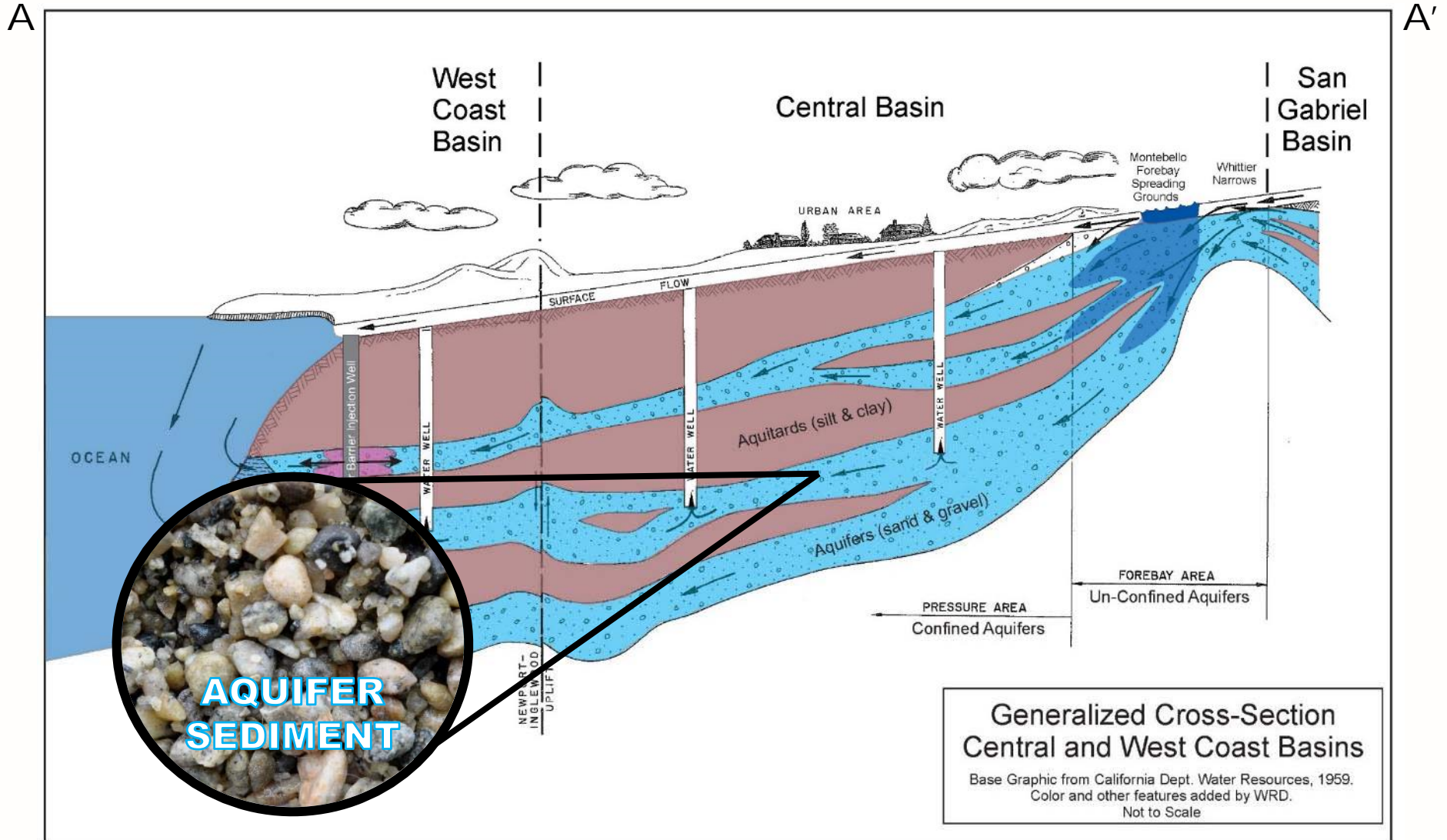




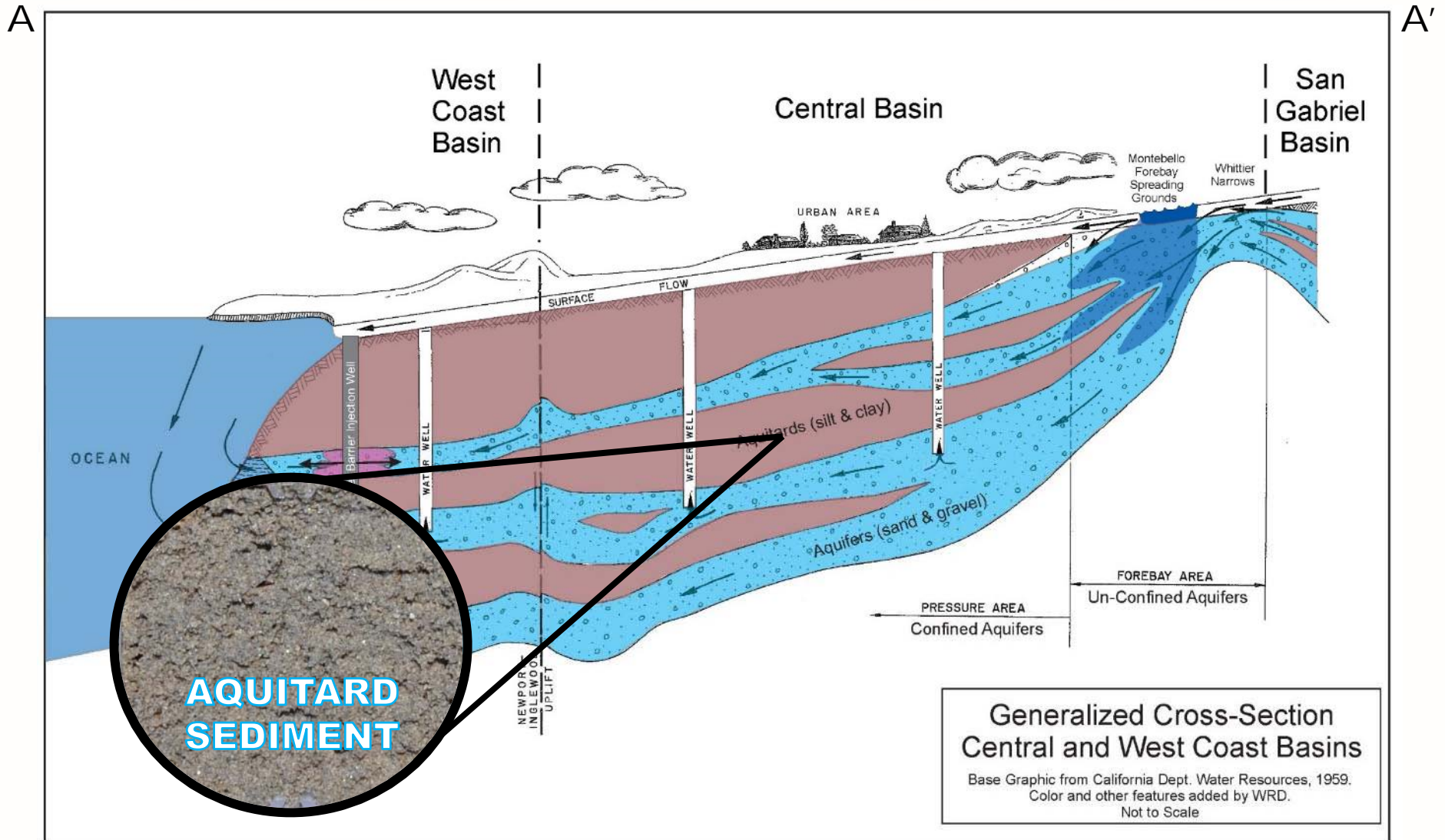
# Groundwater in WRD Service Area



# Groundwater in WRD Service Area



# Groundwater in WRD Service Area





# Natural Recharge to Groundwater Basins

LA area receives only **15 inches (38 cm) rainfall / typical year**

Rivers are dry except after infrequent storms or wastewater treatment plant discharges

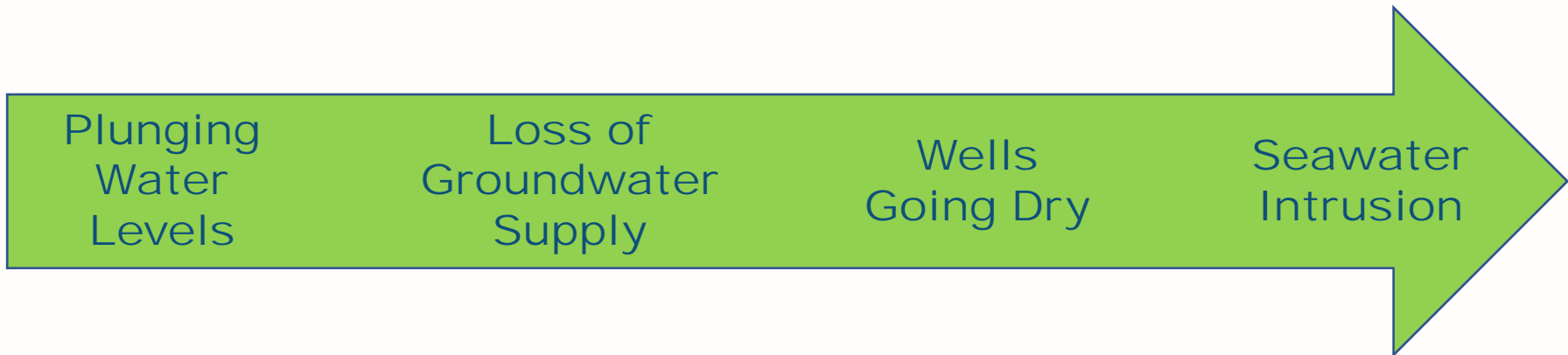
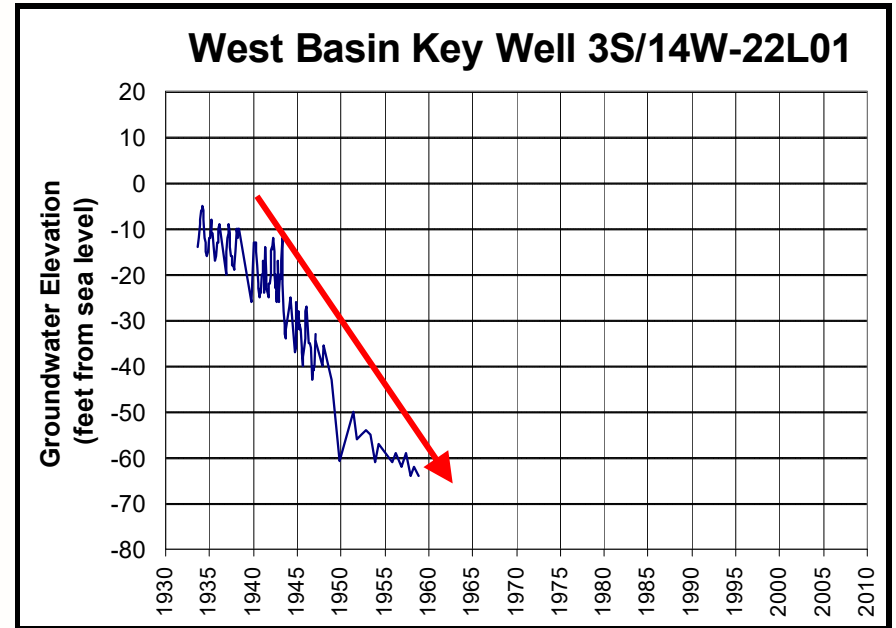
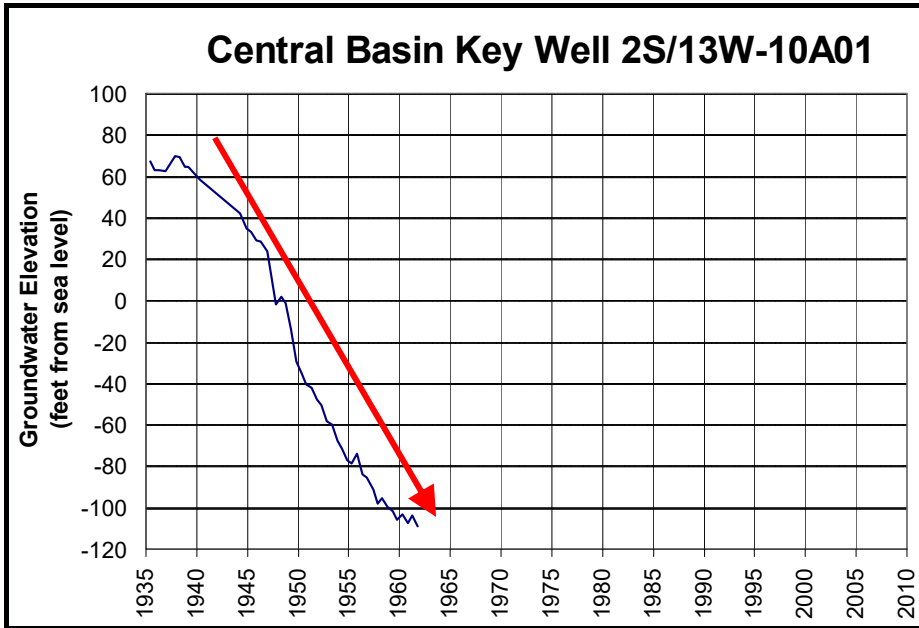









San Gabriel River (typically dry)



Treated Wastewater in San Gabriel River

# Overdraft of Basins in 1900-1950s



-  **SERVICE AREA = 420 SQUARE MILES**
-  **43 CITIES**
-  **POPULATION > 4 MILLION**
-  **550,000 ACRE FEET USED PER YEAR**
-  **50% GROUNDWATER FROM LOCAL WATER WELLS**
-  **50% IMPORTED WATER**
-  **WRD SUPPLEMENTS NATURAL GROUNDWATER RECHARGE**



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# Managed Aquifer Recharge

Since WRD's Formation (1959)

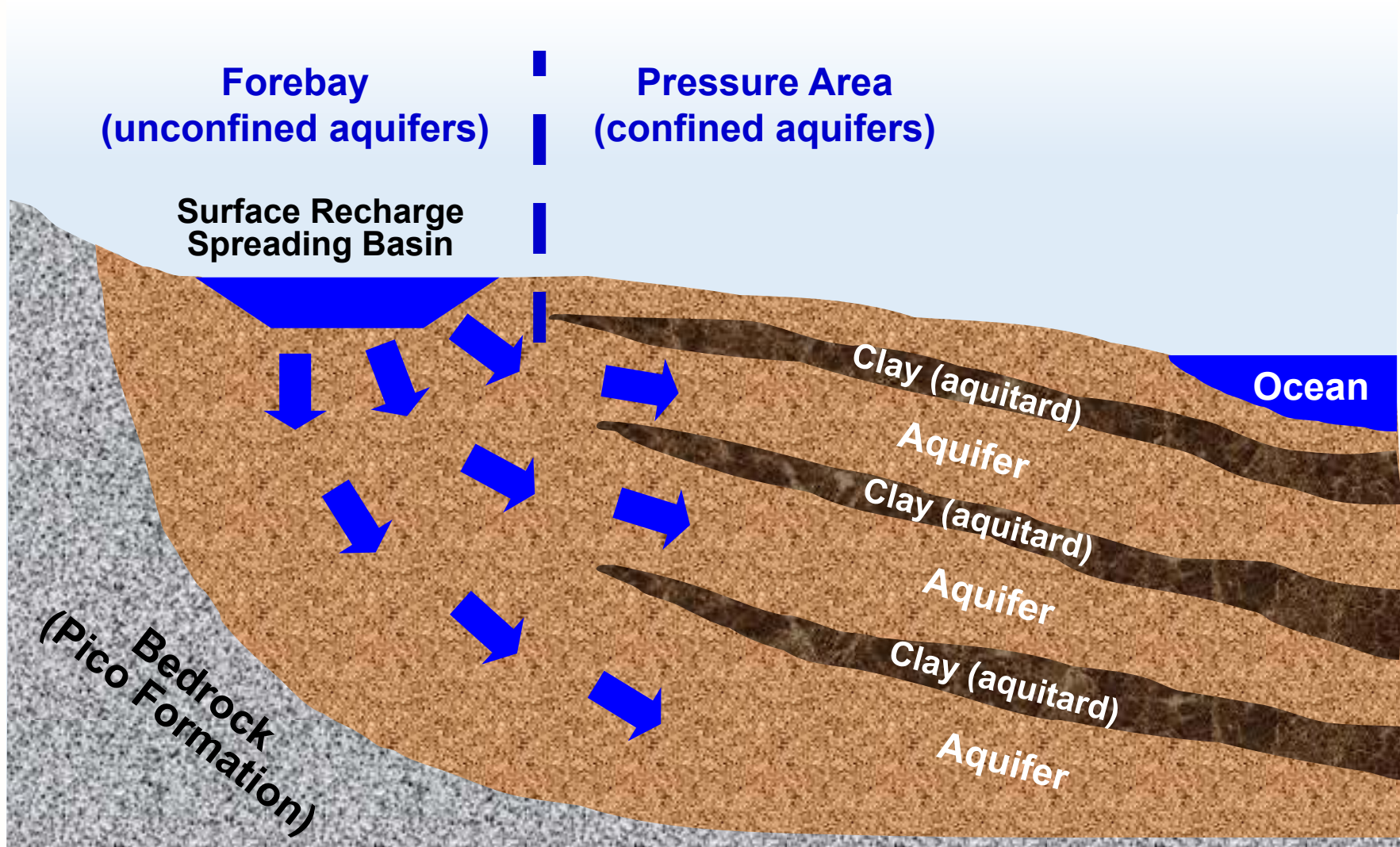
**~8 Million AF at the spreading grounds**



**~2 million AF at the seawater barrier injection wells**

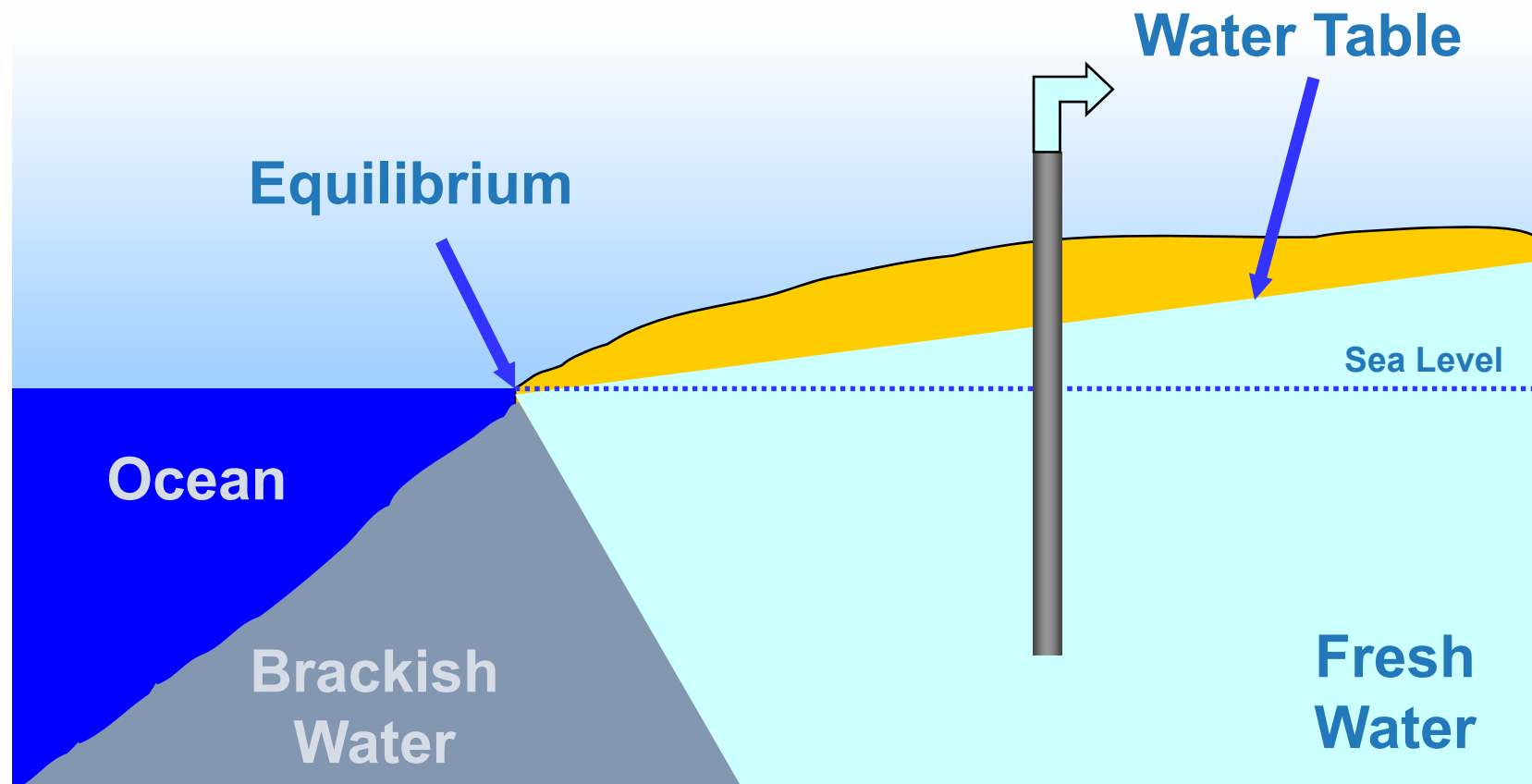


# Surface Recharge Spreading Basin



# Seawater Intrusion

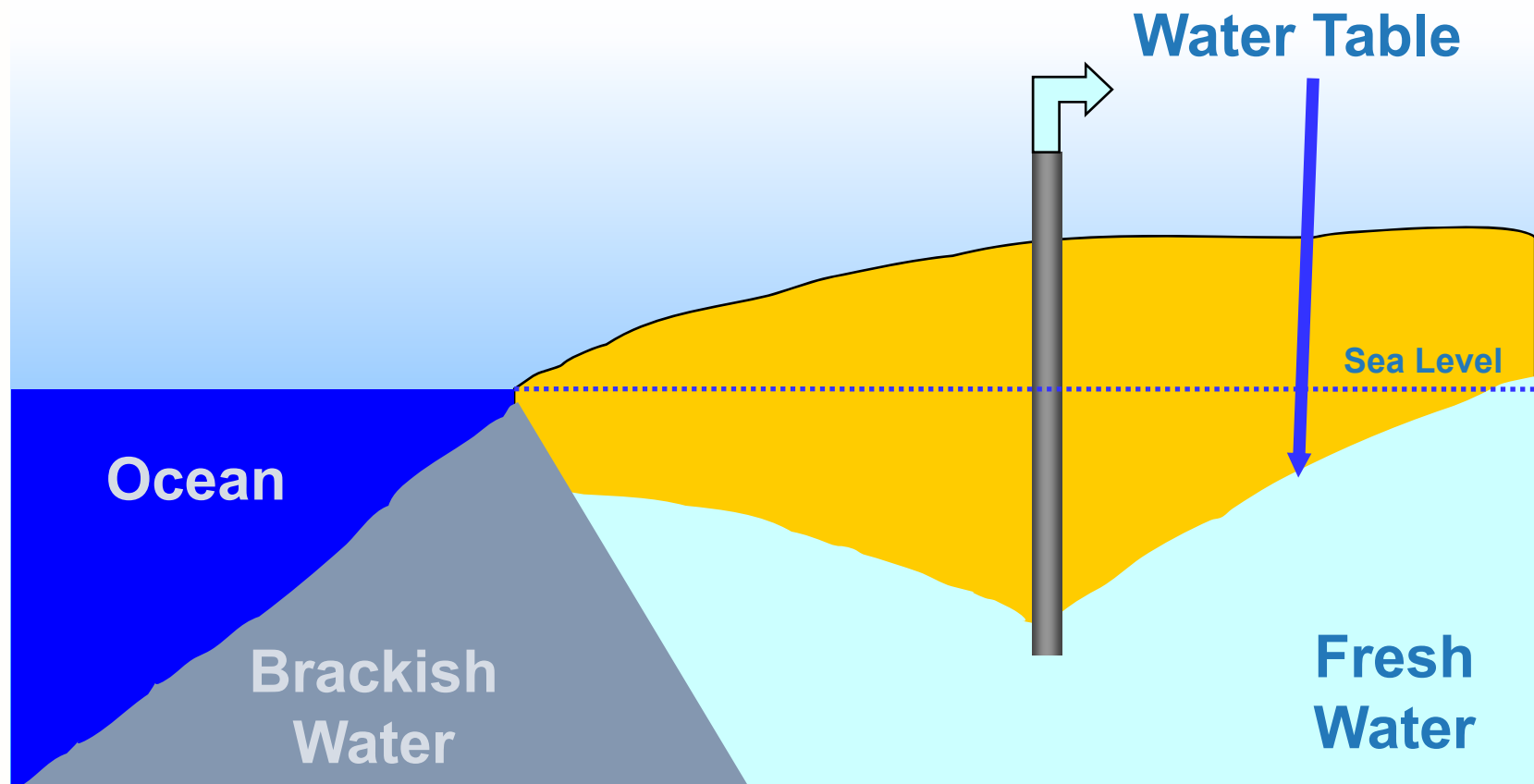
## Coastal Aquifer - No Over-Pumping





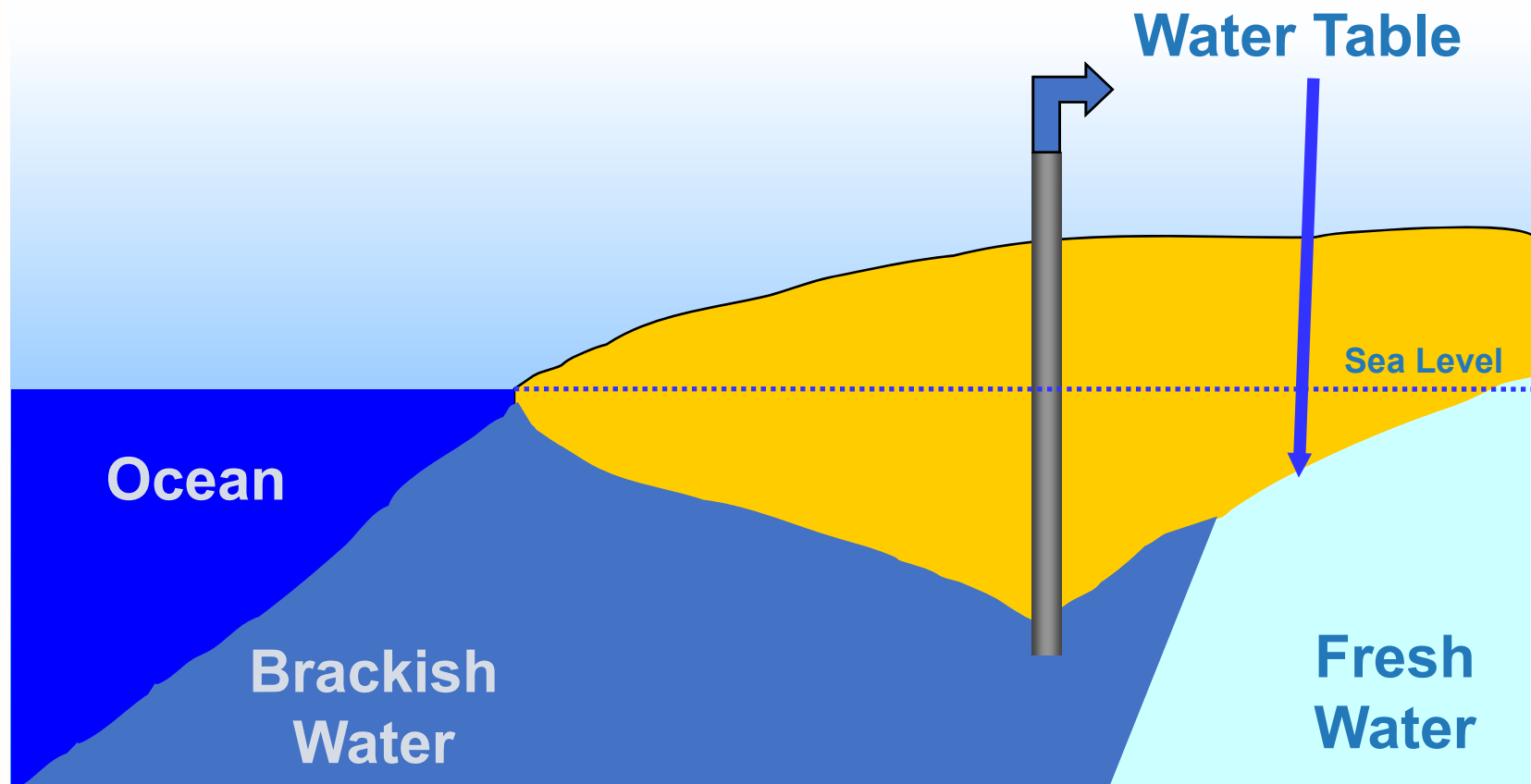
# Seawater Intrusion

## Coastal Aquifer - With Over-Pumping



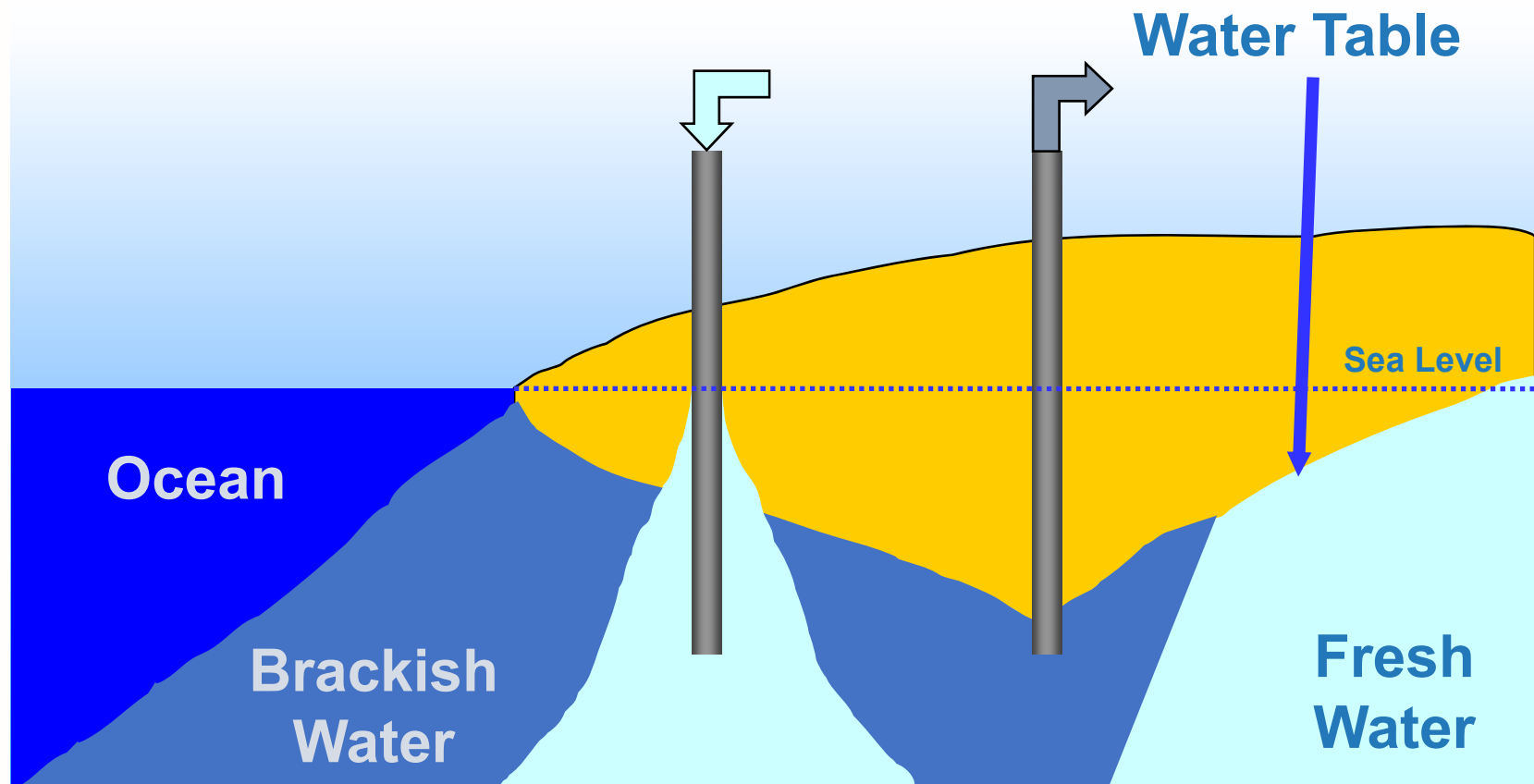
# Seawater Intrusion

## Coastal Aquifer – Seawater Intrusion



# Seawater Intrusion Barrier – Direct Injection

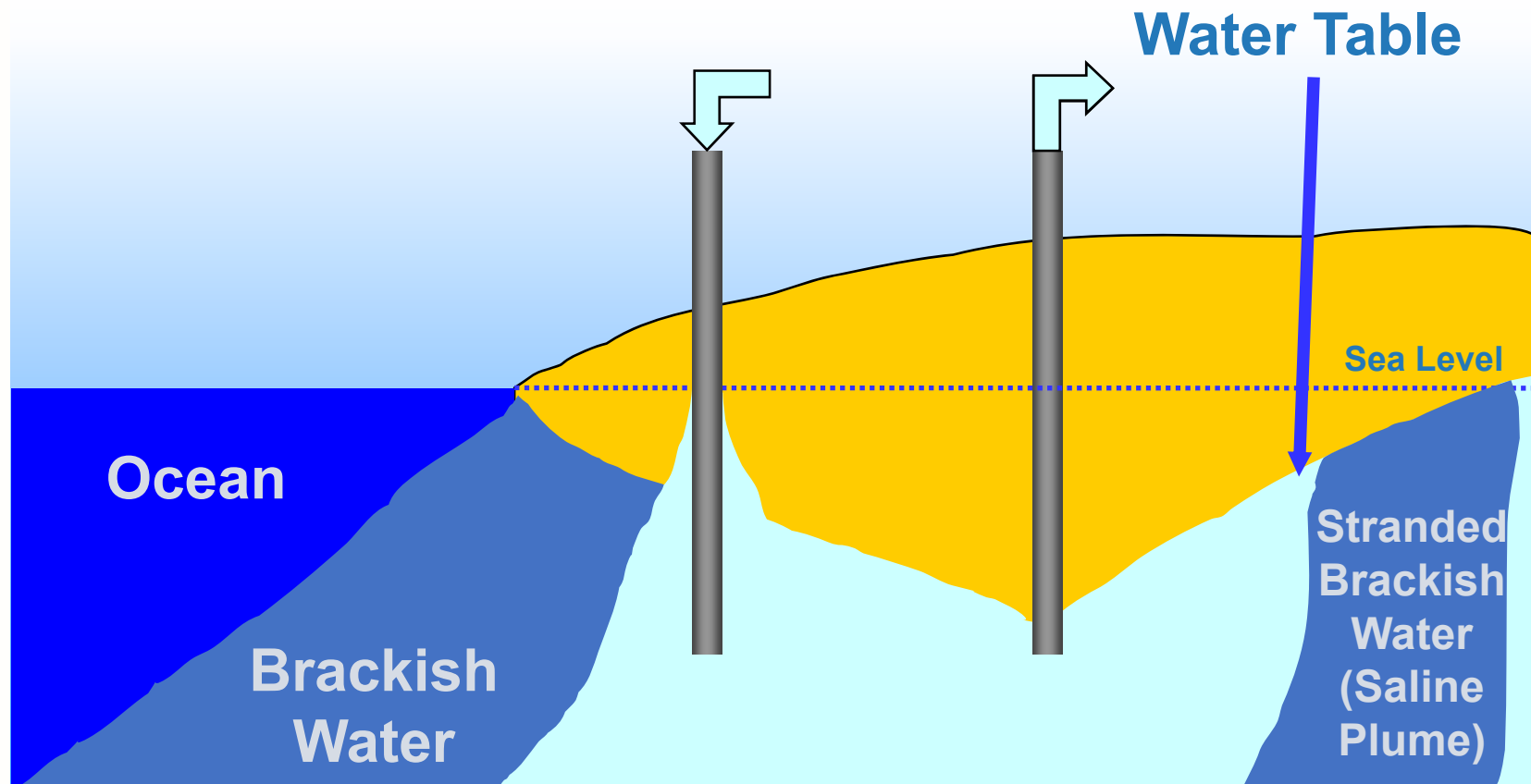
## Coastal Aquifer – Pumping and Injection



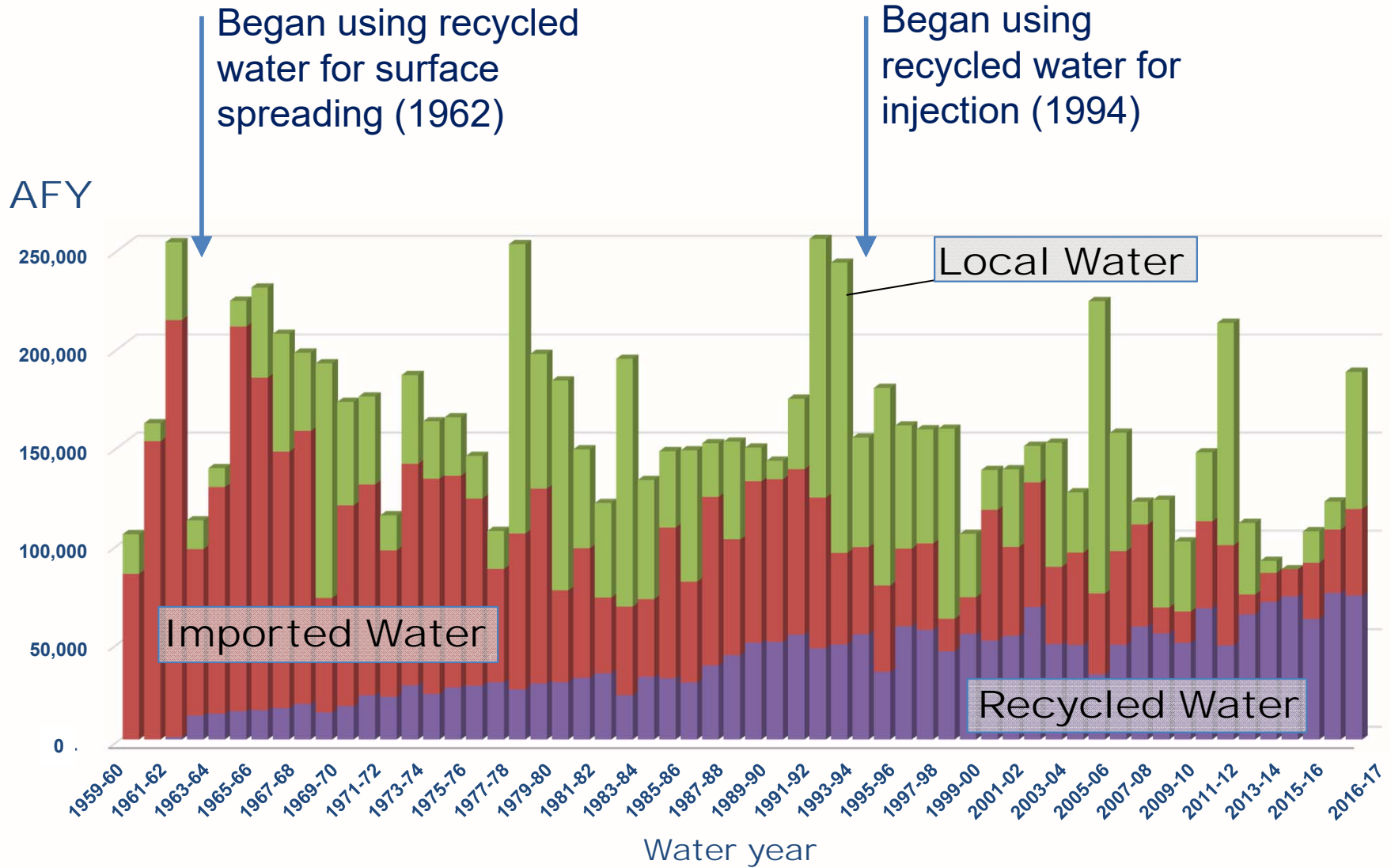


# Seawater Intrusion Barrier – Direct Injection

## Coastal Aquifer – Pumping and Injection



# Replenishment Water Sources



**COLLECTION OF PROJECTS  
TO ELIMINATE REMAINING  
DEMAND FOR IMPORTED WATER**

*A key to developing  
independence from  
imported water is the  
development of local  
recycled water sources.*



**WATER INDEPENDENCE NOW**

**PROJECTS TO:**



**CAPTURE AND CONSERVE  
ADDITIONAL STORMWATER**



**INCREASE USE OF RECYCLED  
WATER FOR GROUNDWATER  
REPLENISHMENT**

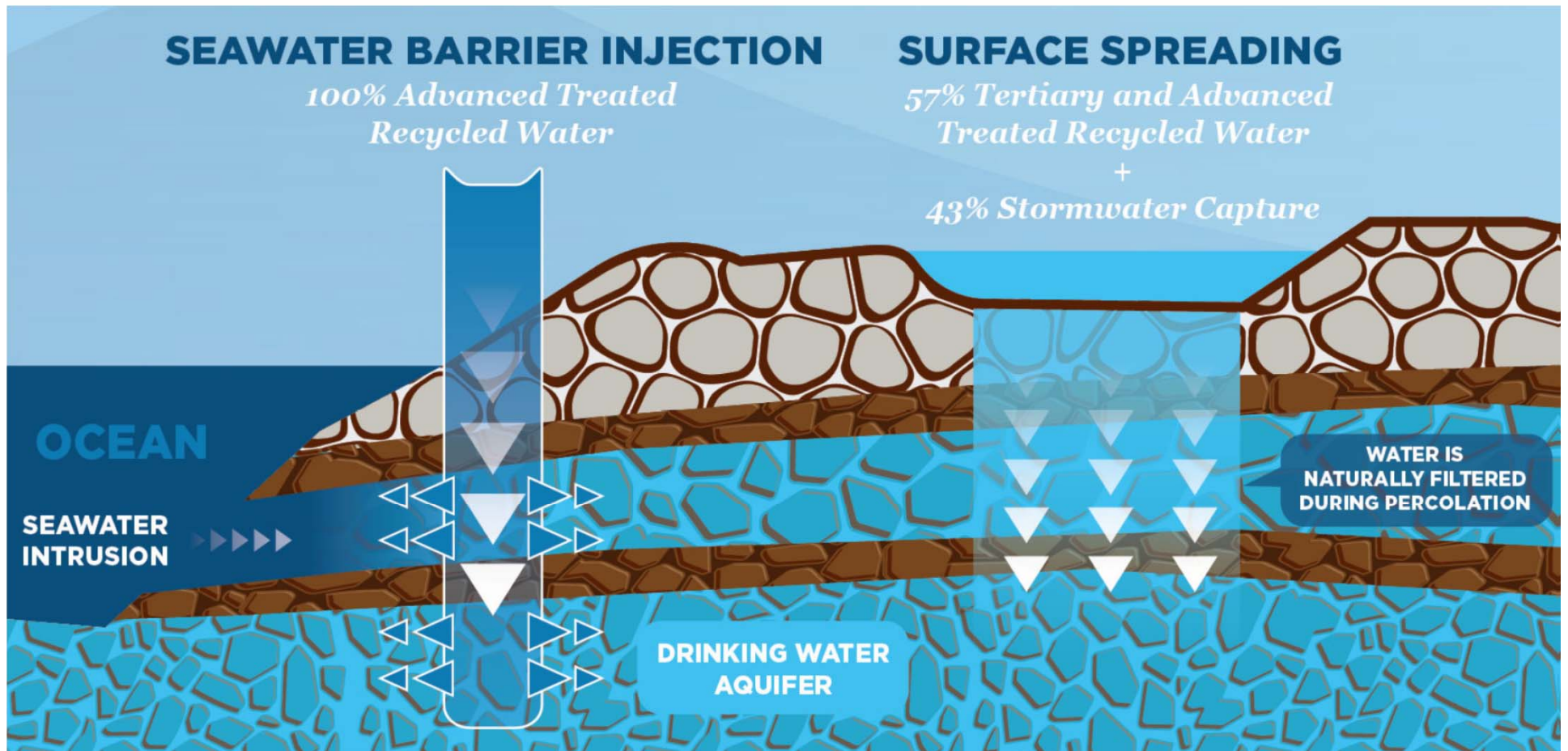
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# How WIN Works





# Key WIN Projects



West Basin MWD  
Edward C. Little  
Water Recycling  
Facility



Increased  
Stormwater Capture



WRD  
Leo J. Vander Lans  
Advanced Water  
Treatment Facility



City of LA  
Terminal Island  
Water Reclamation  
Plant





## ALBERT ROBLES CENTER FOR WATER RECYCLING AND ENVIRONMENTAL LEARNING ADVANCED WATER TREATMENT FACILITY

**ARC IS THE CORNERSTONE OF WRD'S WIN PROGRAM**

**ALBERT  
ROBLES  
CENTER**

**WATER RECYCLING &  
ENVIRONMENTAL LEARNING**



**ARC WILL PROVIDE 21,000 ACRE-FEET PER YEAR OF RECYCLED WATER IN PLACE OF IMPORTED WATER.**



**UPON COMPLETION, GROUNDWATER BASINS WILL BE COMPLETELY LOCALLY SUSTAINABLE**

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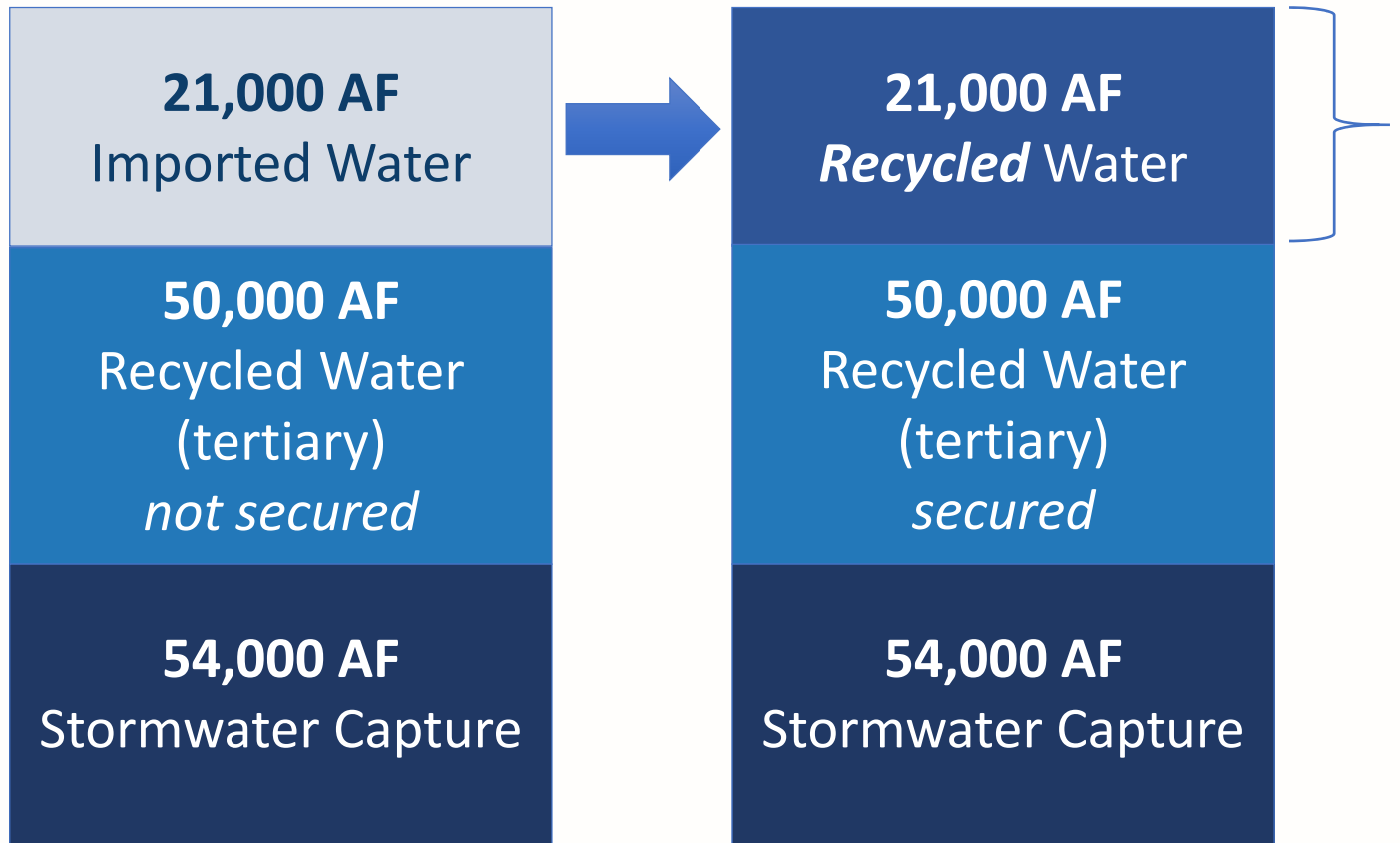


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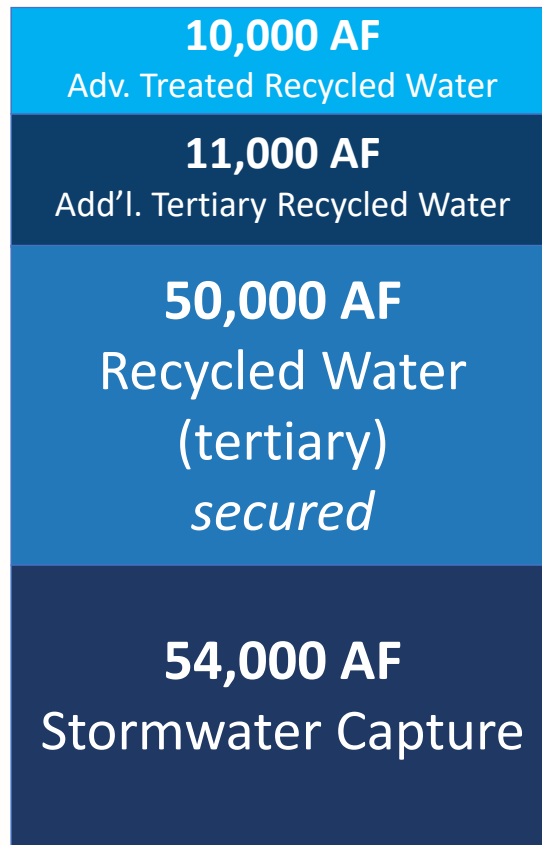
# What is ARC?

## Status Quo

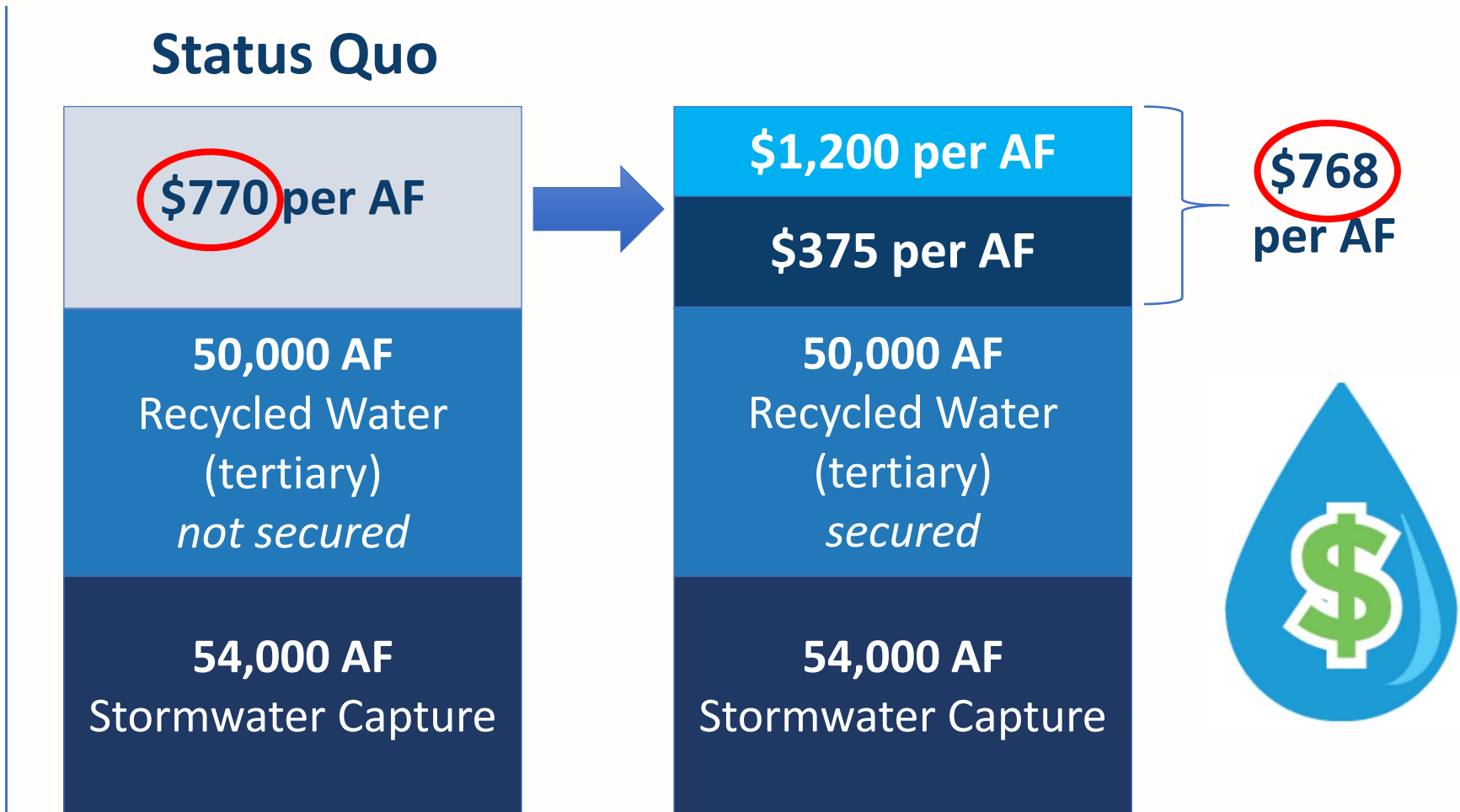


# What is ARC?

## Status Quo



# What is the Cost of ARC?





# ALBERT ROBLES CENTER FOR WATER RECYCLING AND ENVIRONMENTAL LEARNING ADVANCED WATER TREATMENT FACILITY



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**FULLY ADVANCED TREATMENT  
(FAT) PROCESS**

**ULTRAFILTRATION**



Water is filtered through a fine membrane to remove bacteria and other organisms.

**REVERSE OSMOSIS**



Water is directed through high pressure membranes to eliminate salts, viruses, pesticides and most organic compounds.

**ULTRAVIOLET LIGHT  
AND SODIUM HYPOCHLORITE**



The combination accelerates the breakdown of organic compounds.



**PROCESS FACILITY**

MICROFILTRATION REVERSE OSMOSIS UV/AOP

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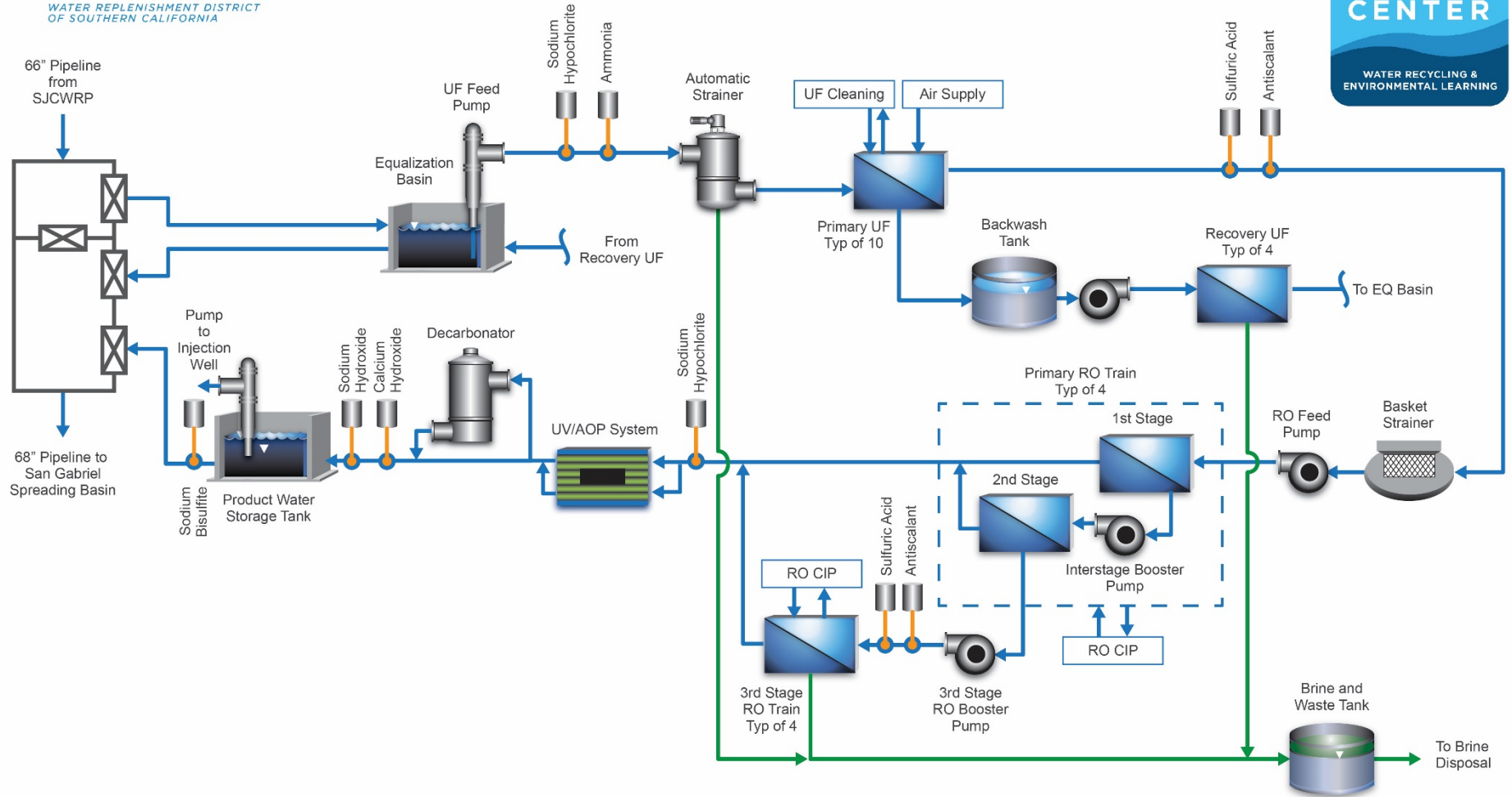


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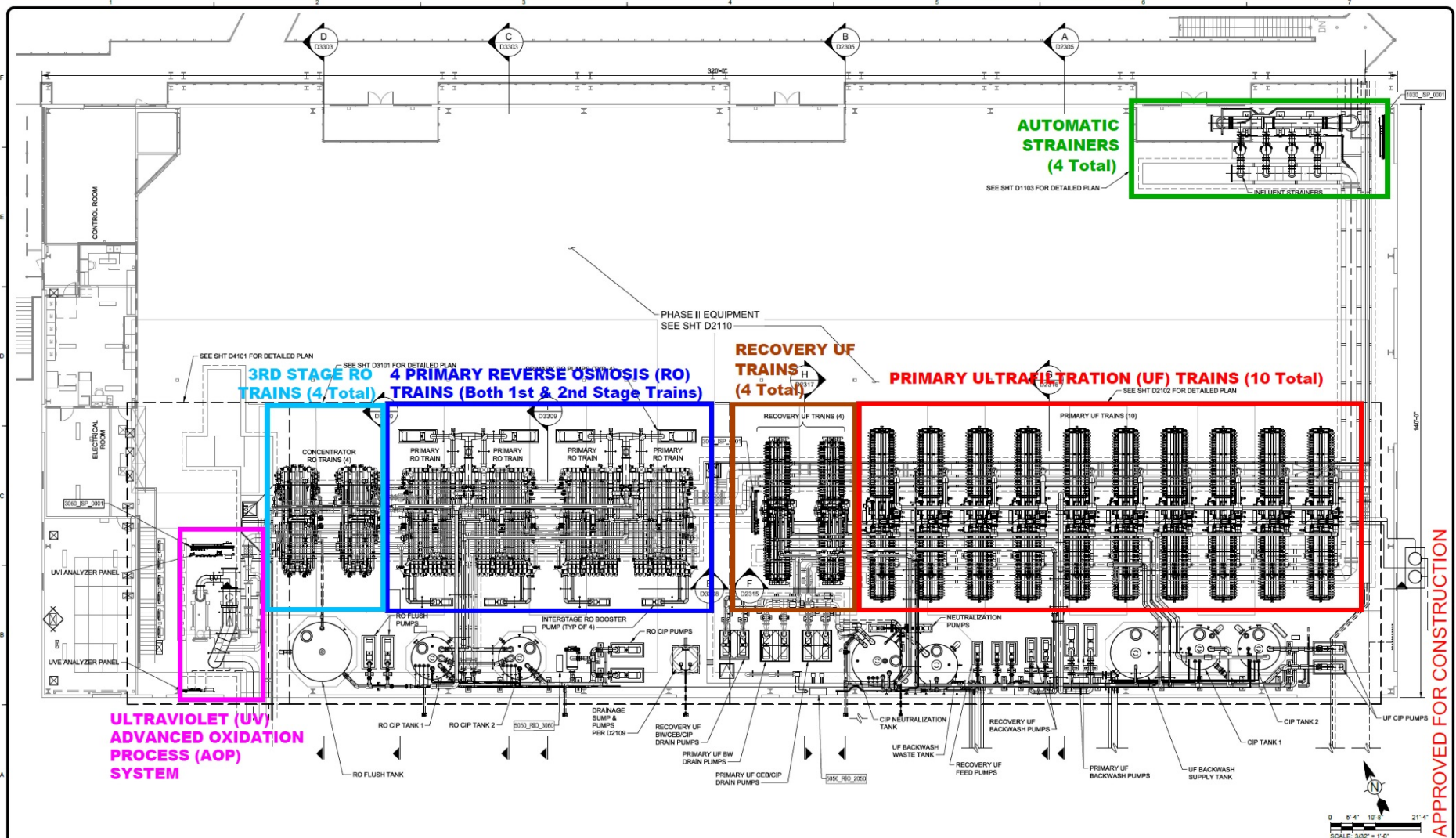
www.wrd.org

# PROCESS FLOW DIAGRAM

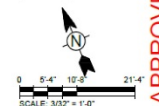




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APPROVED FOR CONSTRUCTION



**TETRA TECH**  
www.tetrattech.com  
17885 Von Karman Avenue, Suite 500  
Irvine, CA 92614-6213  
Tel: (949) 808-5000 Fax: (949) 808-5010



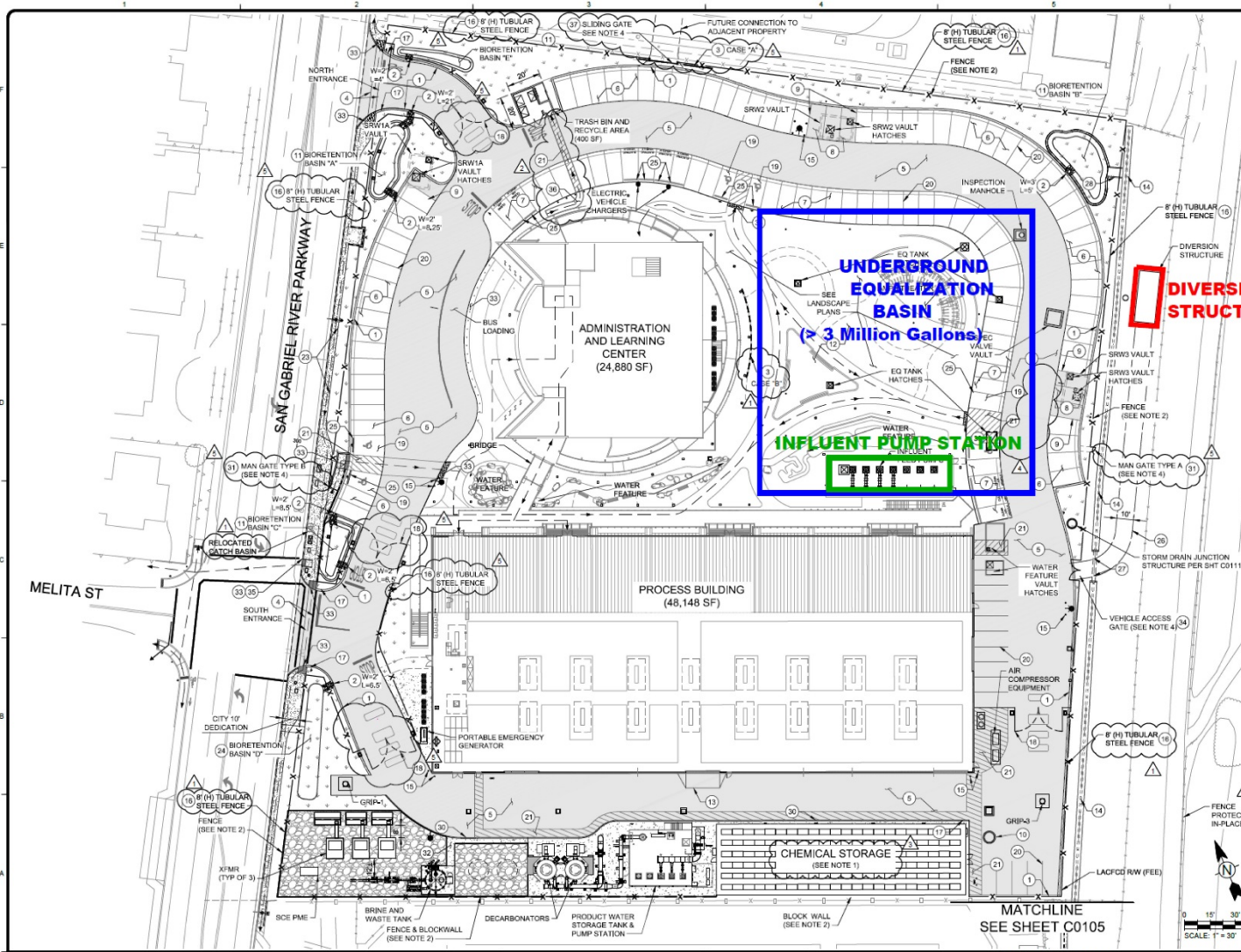
**WRD**  
WATER REPLENISHMENT DISTRICT  
OF SOUTHERN CALIFORNIA  
9/20/17

MARK	DATE	DESCRIPTION	BY

WATER REPLENISHMENT DISTRICT OF SOUTHERN CALIFORNIA  
GRIP - ADVANCED WATER TREATMENT FACILITY  
4320 SAN GABRIEL RIVER PARKWAY, PICO RIVERA, CA 90660  
**PROCESS BUILDING PLAN**

Project No: 135-7401-18001  
Designed By: BSE  
Drawn By: WWPJ  
Checked By: KAB  
**D2101**

Bar Measures 1 inch



- LEGEND**
- CONCRETE PAVING
  - LANDSCAPING
  - GRAVEL
  - CONCRETE
  - POROUS PAVEMENT (PARKING)
  - RIGHT-OF-WAY
  - CONSTRUCTION NOTES
- CONSTRUCTION NOTES**
- CONSTRUCT 6" ROLLED CURB PER DETAIL 8, SHEET C0501
  - CONSTRUCT CURB OPENING PER DETAIL 8, SHEET C0501
  - CURB OPENING WIDTH PER PLAN
  - CONSTRUCT RETAINING WALL PER DETAIL 4, SHEET C0504 (PER SEPARATE PERMIT)
  - CONSTRUCT DRIVEWAY PER SPPWC STD PLAN 110-2, TYPE C
  - CONSTRUCT CONCRETE PAVEMENT IN DRIVE AISLE PER DETAIL 5 ON SHEET C0501
  - CONSTRUCT PERMEABLE CONCRETE AND PAVERS IN PARKING STALL PER DETAIL 1, SHEET C0501
  - CONSTRUCT PERMEABLE CONCRETE AND PAVERS IN PARKING STALL PER DETAIL 2, SHEET C0501
  - CONSTRUCT PORTLAND CEMENT CONCRETE AND PAVERS IN PARKING STALL PER DETAIL 3, SHEET C0501
  - CONSTRUCT PERMEABLE CONCRETE PAVEMENT TRANSITION SECTION PER DETAIL 4, SHEET C0501
  - STORM DRAIN CDS UNIT. SEE SHT C0112 AND DTL 7 ON SHT C0502
  - CONSTRUCT BIORETENTION BASIN PER DETAIL 6, SHEET C0502
  - CONSTRUCT LANDSCAPE AND INTERIOR HARDSCAPE PER LANDSCAPE PLANS
  - CONSTRUCT CONCRETE ACCESS RAMP PER DETAIL 2, SHEET C0504
  - CONSTRUCT CONCRETE DRAINAGE SWALE PER DETAIL 3, SHEET C0504
  - CONSTRUCT BOLLARD PER DETAIL 2, SHEET C0505
  - CONSTRUCT FENCE PER DETAIL 1, SHEET C0505
  - CONSTRUCT 5" TRANSITION FROM 6" CURB TO 0" CURB.
  - CONSTRUCT SWINGING GATE PER DTL 1 ON SHT C0507
  - ACCESSIBLE PARKING STRIPING AND SIGNING PER DETAIL 6, SHEET C0503
  - STANDARD PARKING STALL STRIPING PER DETAIL 3, SHEET C0503
  - NO PARKING ZONE STRIPING. 4" WHITE LINE DIAGONALS AT 45° AT 3' MAX CENTERS. PROVIDE 12" HIGH WHITE PAINTED LETTERS PER DETAIL 2, SHEET C0503
  - TRAFFIC STOP STRIPING AND SIGNING PER DETAILS 4 & 5, SHEET C0503
  - REMOVE EXISTING DRIVEWAY. CONSTRUCT CURB, OUTER AND SIDEWALK TO MATCH EXISTING.
  - CONSTRUCT BIORETENTION BASIN BOTTOM PER DETAIL 6, SHEET C0502.
  - INSTALL WHEEL STOP PER DETAIL 9, SHEET C0503
  - CONSTRUCT 9" THICK BY 15' WIDE CMB ACCESS ROAD
  - CONSTRUCT ACCESS ROAD PIPE CULVERT PER DETAIL 1, SHEET C0504
  - CONSTRUCT CONCRETE SPILLWAY IN BIORETENTION AREA PER DETAIL 5 CASE D, SHEET C0505
  - CONSTRUCT PARKWAY DRAIN OVERFLOW IN BIORETENTION AREA PER DETAIL 5 CASE B, SHEET C0504
  - CONSTRUCT 6" CURB PER SPPWC STD. PLAN 120-2-A1-8 (150)
  - CONSTRUCT GATE PER DTL 3 ON SHT C0507.
  - CONSTRUCT 6" P.C. SIDEWALK.
  - TRUNCATED DOMES (COLOR: YELLOW, MATERIAL: COMPOSITE TILE) PER DTL 7 ON SHT C0516
  - 12" WIDE ACCESS GATE PER DTL 2 ON SHT C0507
  - CURB RAMP. PER STREET IMPROVEMENTS PLAN SET, SHT. C-101
  - CONSTRUCT 6" P.C. SIDEWALK
  - CONSTRUCT SLIDING GATE PER DTL 4 ON SHT C0507.
- NOTES**
- CHEMICAL STORAGE FACILITY AREA AND ASSOCIATED AREAS ARE COVERED BY A CANOPY.
  - SEE DETAILS 1, 2 AND 3 ON SHT C0505 FOR FENCE AND WALL SECTIONS AND DETAILS.
  - SEE SHT C0103 & C0104 FOR PRECISE GRADING AND SITE FEATURE DESIGN DETAILS.
  - SEE SHT C0507 FOR MAN AND VEHICLE ACCESS GATES.
  - SEE SHTS C0103 AND C0104 FOR PRECISE GRADING PLANS.
  - SEE SHT C0116 AND C0117 FOR SIGNAGE AND STRIPING PLANS.
- APPROVED FOR CONSTRUCTION**

3/15/2019 3:30:38 PM - P:\7140713\3571407-10001\CAD\3571407\1001\STEP\PLAN DWG - LEE, MICHAEL



MARK	DATE	DESCRIPTION	BY
5	2/25/19	FENCE, WALL, AND GATE REVS	CH
4	4/11/18	STREET IMPROVEMENT COORDINATION	CH
3	10/18/17	FIRE PLAN CHECK CORRECTIONS	KAB
2	10/18/17	JAS BUILDING COMMENTS	KAB
1	10/9/17	RESP TO WALL/FENCE/TRASH ENC PERMIT	CH

WATER REPLISHMENT DISTRICT OF SOUTHERN CALIFORNIA  
 GRIP - ADVANCED WATER TREATMENT FACILITY  
 4320 SAN GABRIEL RIVER PARKWAY, PICO RIVERA, CA 90660

SITE PLAN

**C0101**

Project No.: 135-71407-10001  
 Designed By: CH  
 Drawn By: RW  
 Checked By: KAB





# ALBERT ROBLES CENTER FOR WATER RECYCLING AND ENVIRONMENTAL LEARNING ADVANCED WATER TREATMENT FACILITY

## OPERATIONS AND LEARNING CENTER



**INTERACTIVE  
LEARNING  
CENTER  
EXHIBITS**



**DEMONSTRATION  
GARDEN**



**LARGE AND  
SMALL MEETING  
SPACES**



**LEED'S  
CERTIFIED**

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# Educational Exhibits: Demonstration Gardens

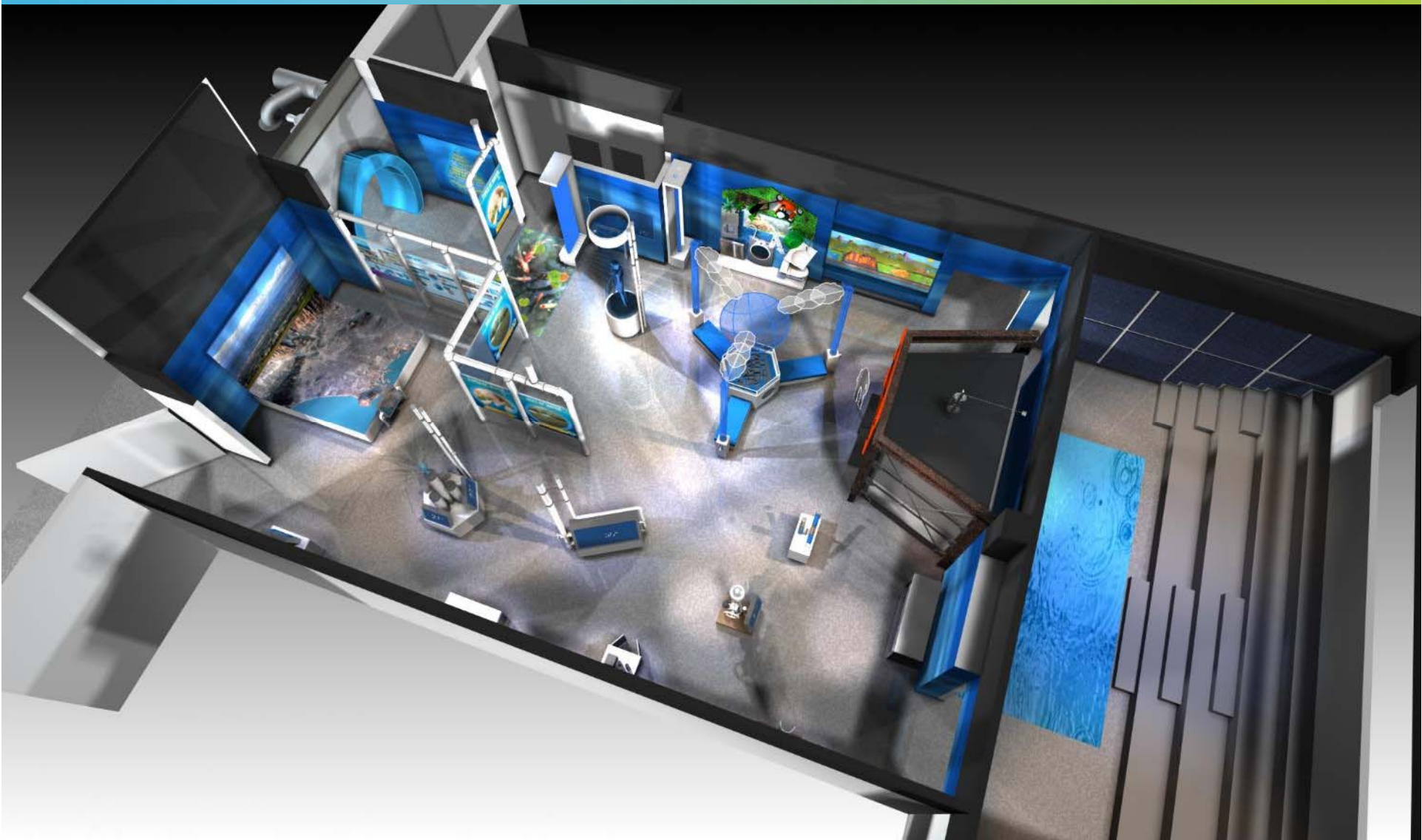


Plants from San Gabriel River Watershed  
California Native Plants  
Global drought-tolerant Plants  
Butterfly Garden  
Shadow Garden  
Bioswale Plantings





# Educational Exhibits: Learning Center



# Educational Exhibits: Learning Center





# Educational Exhibits: Process Treatment Building

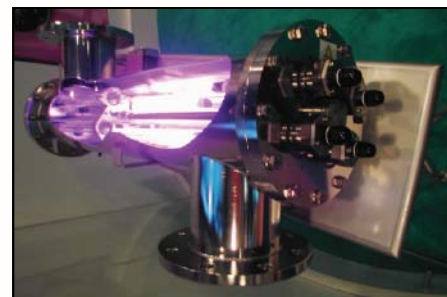


Viewing / Informational Exhibits in Laboratory & Testing Room

Final Product Water Tasting "Experience"



Hands-on Exhibits on Balconies Overlooking Treatment System



# Engaging Local Residents




WATER REPLENISHMENT DISTRICT OF SOUTHERN CALIFORNIA

## COMING IN 2018



### CONSTRUCTION NOTICE

The Water Replenishment District of Southern California (WRD) will begin deconstruction of the site at 4320 San Gabriel River Parkway to make way for the new Groundwater Reliability Improvement Project's (GRIP) Advanced Water Treatment Facility.

**TIMELINE:** This project should be completed within 90 days from the start date.

**WORKING HOURS:** 7:00 am to 5:00 pm, Monday through Friday, weather permitting. Weekend work may be allowed depending on scheduling delays.

For more information, questions, or concerns, please call:  
**1-888-WRD-5-WRD**



WATER REPLENISHMENT DISTRICT OF SOUTHERN CALIFORNIA

## COMING IN 2018



### NOTIFICACIÓN DE CONSTRUCCIÓN

El Distrito de Reabastecimiento de Agua del Sur de California (WRD) comenzará la deconstrucción del sitio localizado en el 4320 San Gabriel River Parkway para dar paso a la nueva planta de tratamiento de agua avanzada, llamado GRIP (Groundwater Reliability Improvement Project).

**DURACION:** Este proyecto debe ser terminado dentro de los 90 días a partir de la fecha de inicio.

**HORAS DE TRABAJO:** De 7 am a 5 pm de Lunes a Viernes. Trabajo de fin de semana puede ser permitido pero dependiend de los retrasos de programación.

Para más información, preguntas o comentarios, favor de llamar:  
**1-888-WRD-5-WRD**



GROUNDWATER RELIABILITY IMPROVEMENT PROJECT



### PLEASE JOIN US FOR A COMMUNITY UPDATE MEETING

Come learn about the future benefits of the GRIP Advanced Water Treatment Facility in Pico Rivera.

**WHEN:** Thursday August 24, 2017 6:30 pm to 8:00 pm

**WHERE:** Pico Rivera Senior Center 9200 Minus Ave. Pico Rivera, CA 90660

For more information, or to RSVP, please contact:  
 Monica Sijder at 562-275-4234 or at msijder@wrld.org  
 Kimberly Badescu at 562-275-4264 or at kbadescu@wrld.org

*(Light appetizers and soft drinks)*

**BOARD OF DIRECTORS**



[www.wrld.org](http://www.wrld.org)



WATER REPLENISHMENT DISTRICT OF SOUTHERN CALIFORNIA

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## MEET YOUR NEIGHBOR!

*¡Conozca a su Nuevo Vecino!*



GROUNDWATER RELIABILITY IMPROVEMENT PROJECT



**FOR MORE INFORMATION, PLEASE CALL 1-888-WRD-5-WRD**

*Para más información, por favor de llamar al 1-888-WRD-5-WRD*

**WHEN / CUANDO**  
**SATURDAY**  
**APRIL 2, 2016**  
**9:00 AM TO 12:00 PM**

**WHERE / DONDE**  
**FUTURE GRIP SITE**  
**4320 SAN GABRIEL RIVER PARKWAY**  
**PICO RIVERA, CA 90660**

Please stop by the future site of the Groundwater Reliability Improvement Project (GRIP) on Saturday, April 2, 2016, to meet and chat with the Water Replenishment District of Southern California (WRD).

This is your chance to meet the WRD staff as we answer your questions about the construction of the GRIP Advanced Water Treatment Facility.

*Por favor pasen a conocer el futuro emplazamiento de el Groundwater Reliability Improvement Project (GRIP) el Sábado, Abril 2, 2016, para conocer y chatear con el Distrito de Reabastecimiento de Agua del Sur de California (WRD).*

*Esta es su oportunidad de conocer el personal de (WRD). Contestaremos sus preguntas sobre la construcción de el GRIP Advanced Water Treatment Facility.*

### THE LA COUNTY FIRE DEPARTMENT WILL BE CONDUCTING FIREFIGHTER TRAINING ONSITE FROM 03/28/16 TO 04/10/16

*Departamento de Incendios del Condado de Los Angeles conducirá entrenamiento de Bomberos entre 3/28/16 a 4/10/16.*

**BOARD OF DIRECTORS**



Willard H. Murray, Jr. (Division 1)  
 Robert Katherman (Division 2)  
 John D. S. Allen (Division 3)  
 Sergio Calderon (Division 4)  
 Albert Robles (Division 5)

**Robb W. Walker**  
 General Manager



# Engaging Elected Officials & The Media

## YOU'RE INVITED

Wednesday,  
August 16, 2017

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WRD  
4040 Paramount Blvd.  
Lakewood, CA 90712  
[WWW.WRD.ORG](http://WWW.WRD.ORG)



# WATER 101 WORKSHOP

**EXCLUSIVE WORKSHOP FOR LEGISLATIVE STAFF**

The Water Replenishment District of Southern California is pleased to invite you to our Water 101 Workshop for Legislative Staff. This workshop will focus on Groundwater Storage and reducing the demand for costly imported water for our region by expanding locally sustainable projects.

WRD is the largest groundwater agency in the State of California, managing and protecting local groundwater resources for four million residents. WRD's service area covers a 420-square-mile region of southern Los Angeles County, the most populated county in the United States. The 43 cities in the service area, including a portion of the City of Los Angeles, use about 250,000 acre-feet (82 billion gallons) of groundwater annually which accounts for approximately half of the region's water supply.

**WHEN:** Wednesday August 16, 2017  
10 am to 1 pm

**WHERE:** WRD Office  
4040 Paramount Blvd.  
Lakewood, CA 90712

**RSVP:** RSVP

RSVP by Wednesday, August 9, 2017 to Angie Mancillas via email at [amancillas@wrdd.org](mailto:amancillas@wrdd.org).

*Lunch Will Be Provided*

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Robert Katherman  
Director 2

  
John D. S. Allen  
Director 3

  
Sergio Calderon  
Director 4

  
Albert Robles  
Director 5

  
Robb Whitaker  
General Manager





## YOU ARE CORDIALLY INVITED TO THE



# GRIP VIP HARDHAT TOUR

*Please join the Water Replenishment District of Southern California (WRD) for a special VIP Hardhat tour of the Groundwater Reliability Improvement Project (GRIP) Advanced Water Treatment Facility.*

*This is a rare behind-the-scenes opportunity to see the up-close construction of a landmark water treatment facility that will eliminate the need for imported water for groundwater replenishment in this region of southern Los Angeles County. Groundwater makes up half the water supply in WRD's service area, which includes 43 cities and four million residents (over 10% of California's population). When this project is completed, our groundwater resources will be completely locally sustainable and drought-proof.*

*In addition to a tour of the site, there will be an interactive VR (Virtual Reality) experience of the future GRIP site.*

**WHEN**  
Friday,  
May 5, 2017  
9:30 am to 11:00 am

**WHERE**  
GRIP Site  
4320 San Gabriel River Parkway  
Pico Rivera, CA 90660

**RSVP**  
RSVP to Angie Mancillas  
at [amancillas@wrdd.org](mailto:amancillas@wrdd.org)  
or call (562) 275-4231

**BOARD OF DIRECTORS**

  
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Director 1

  
Robert Katherman  
Director 2

  
John D. S. Allen  
Director 3

  
Sergio Calderon  
Director 4

  
Albert Robles  
Director 5

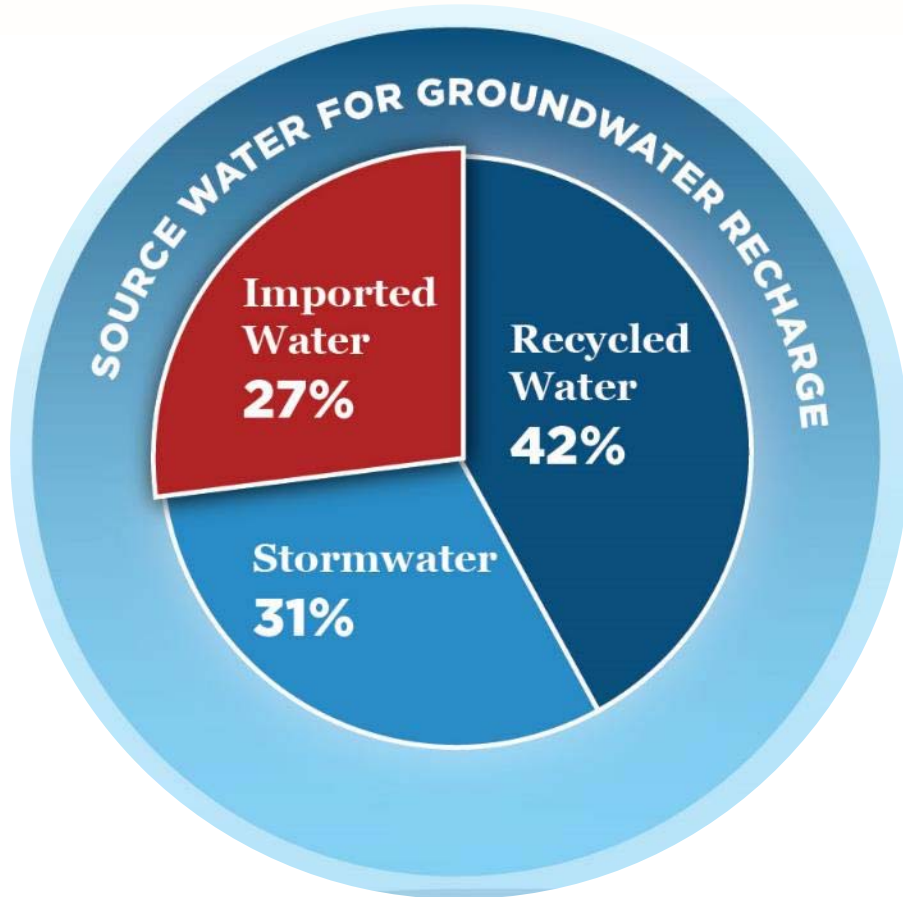
  
Robb Whitaker  
General Manager

[www.wrd.org](http://www.wrd.org)

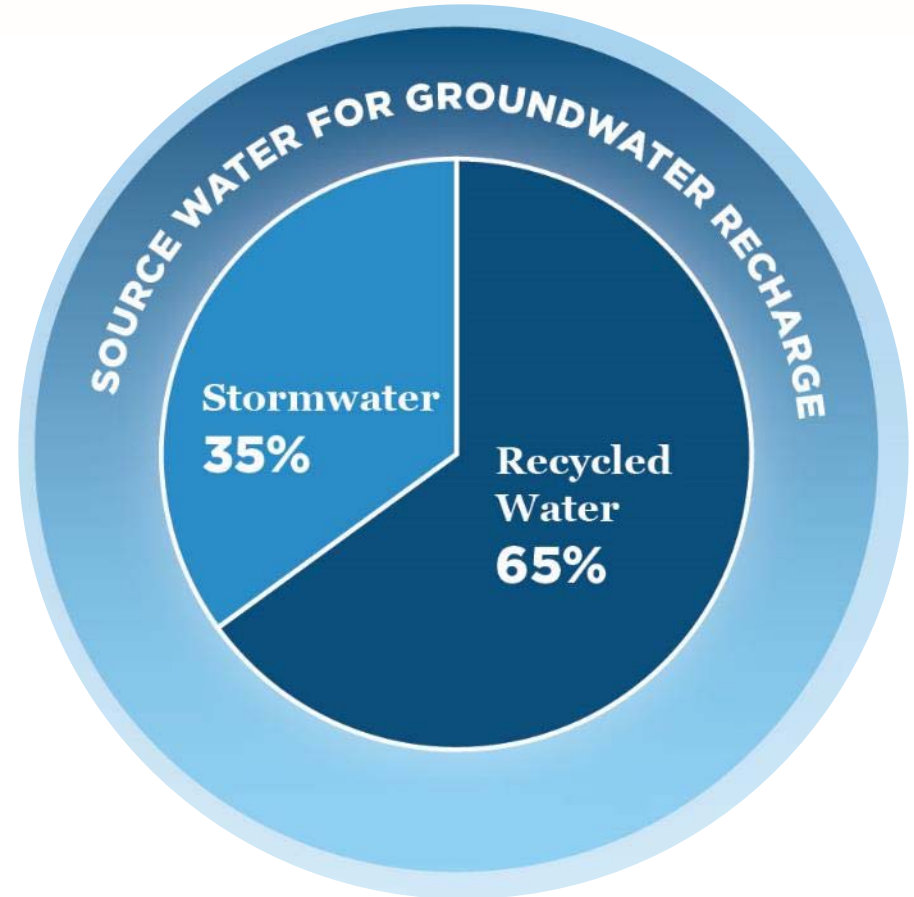
4040 Paramount Blvd., Lakewood, CA 90712

# WIN – Before & After

## BEFORE



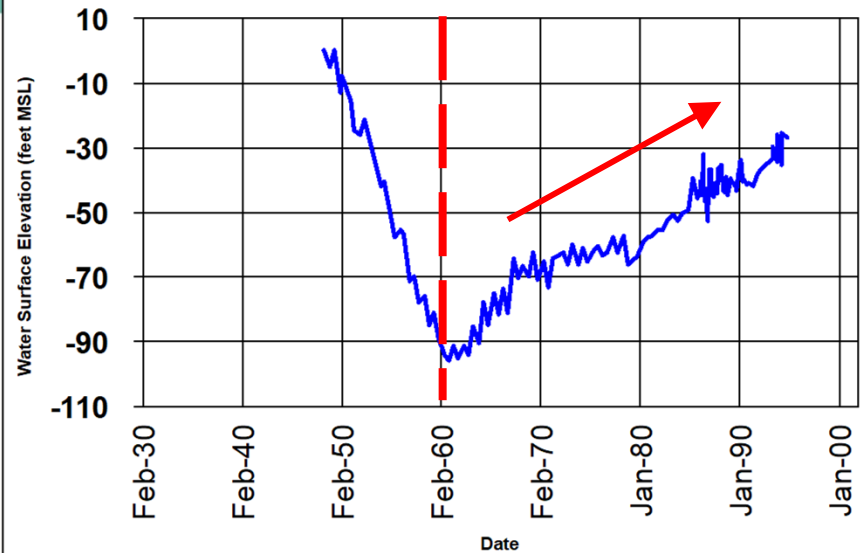
## AFTER



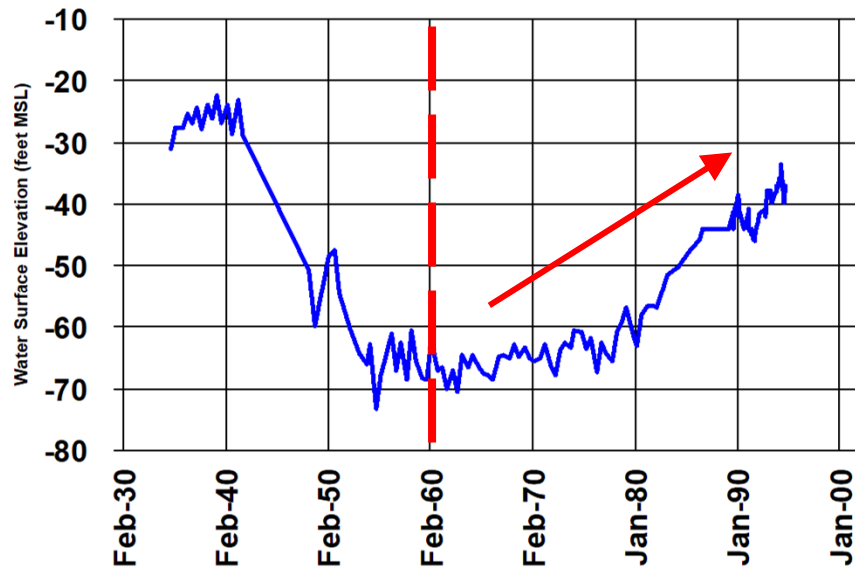


# Results of WRD Basin Management

## WEST COAST BASIN KEY WELL

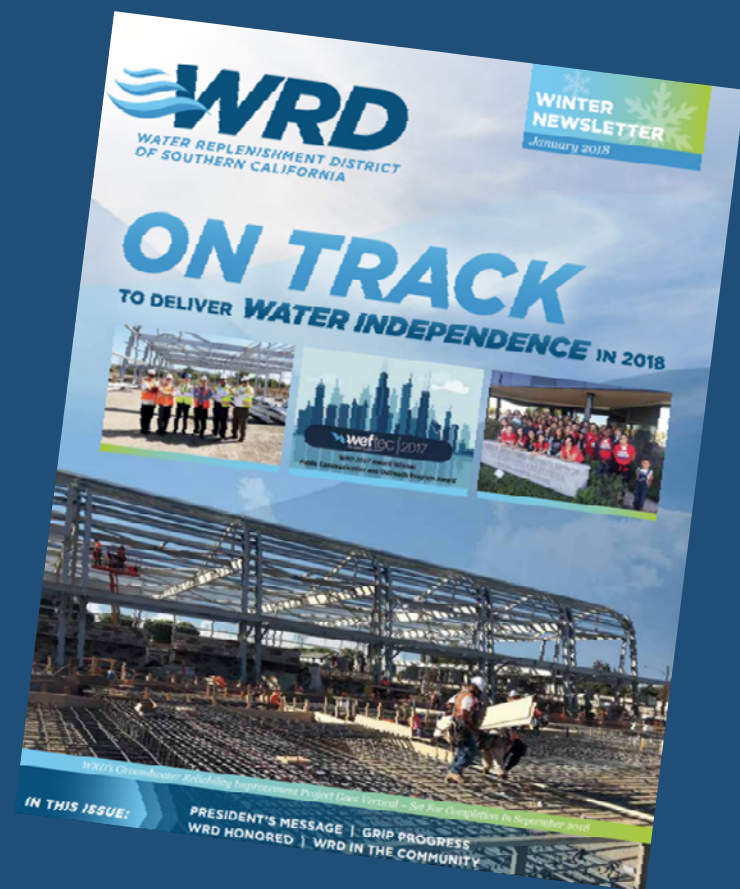
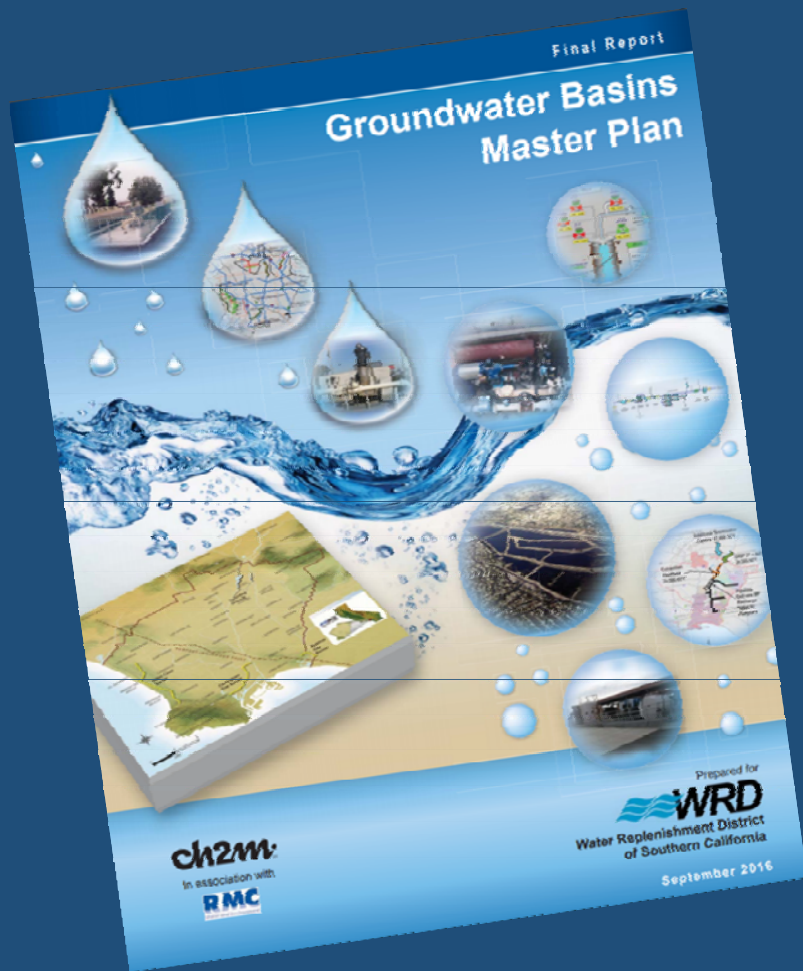


## CENTRAL BASIN KEY WELL



**Rising water  
levels & drought  
protection**

# GROUNDWATER: planning for our water future



# Benefits of Groundwater: Cost

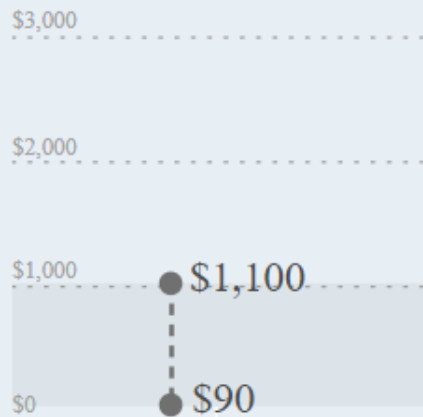
## Cost Comparison of Water Projects

### Groundwater Recharge



Replenishing groundwater by putting water back into the ground (Cost based on 25th to 75th percentiles of studied projects, 2014 USD)

COST PER ACRE-FOOT



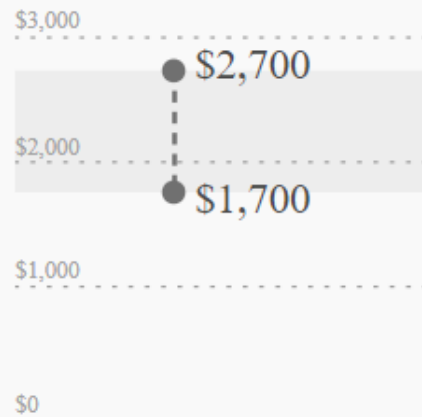
Source: *Water in the West*

### Reservoir Expansion



Raising dams to expand reservoirs, increasing their capacity to store water

COST PER ACRE-FOOT



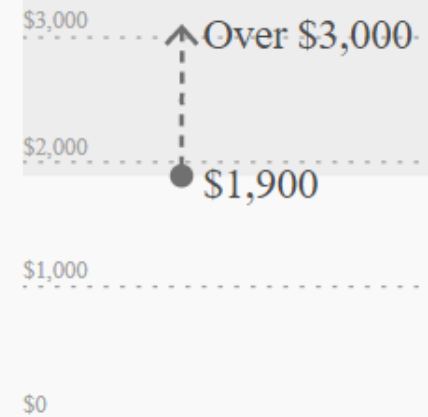
Source: *U.S. Bureau of Reclamation*

### Seawater Desalination



Removing salt from sea — or brackish — water to create a new supply

COST PER ACRE-FOOT

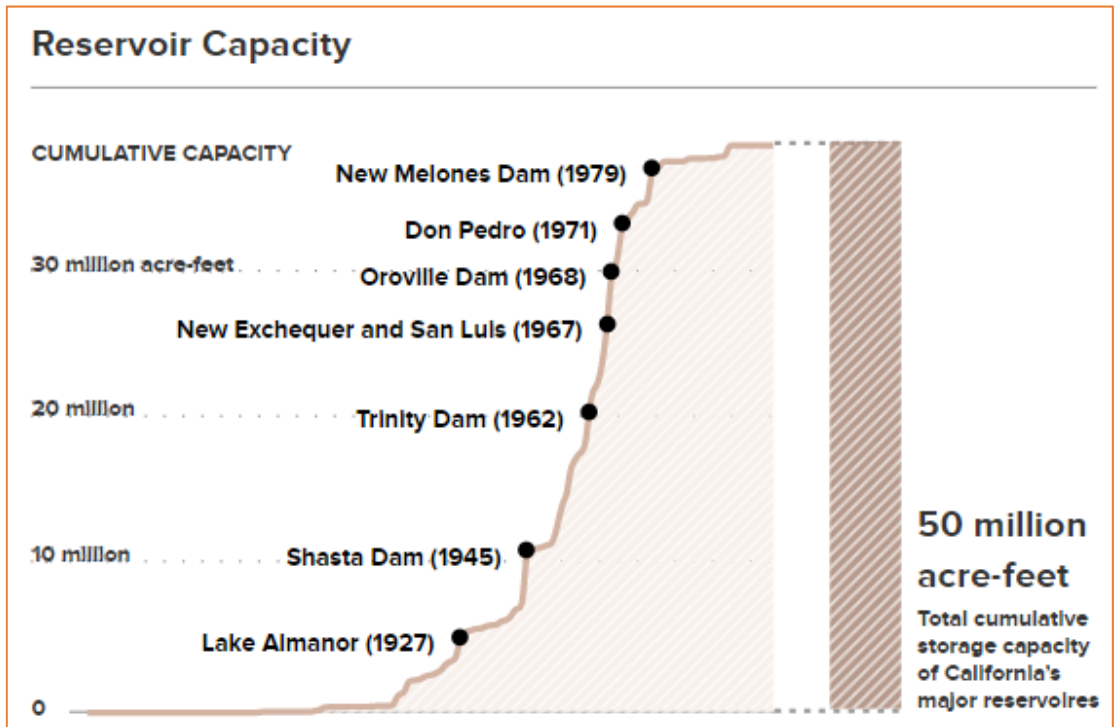
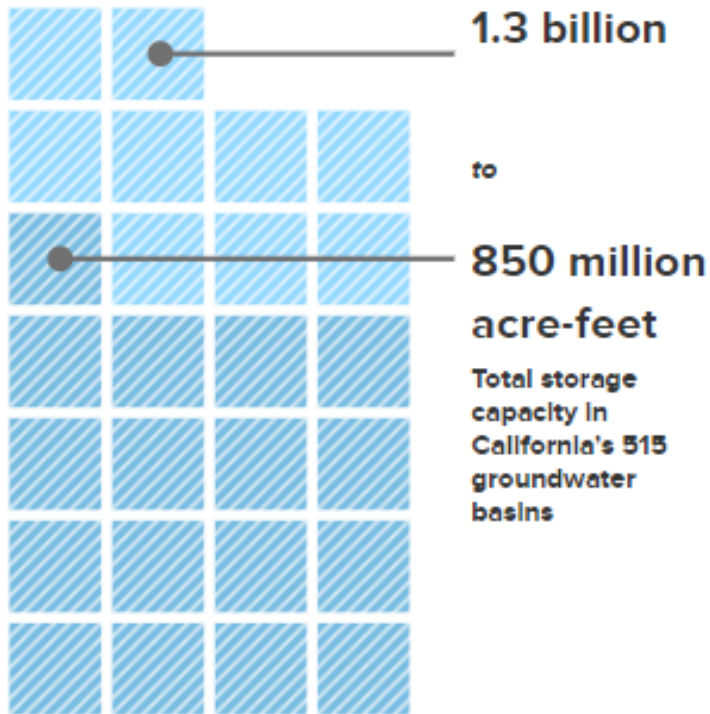


Source: *Pacific Institute*



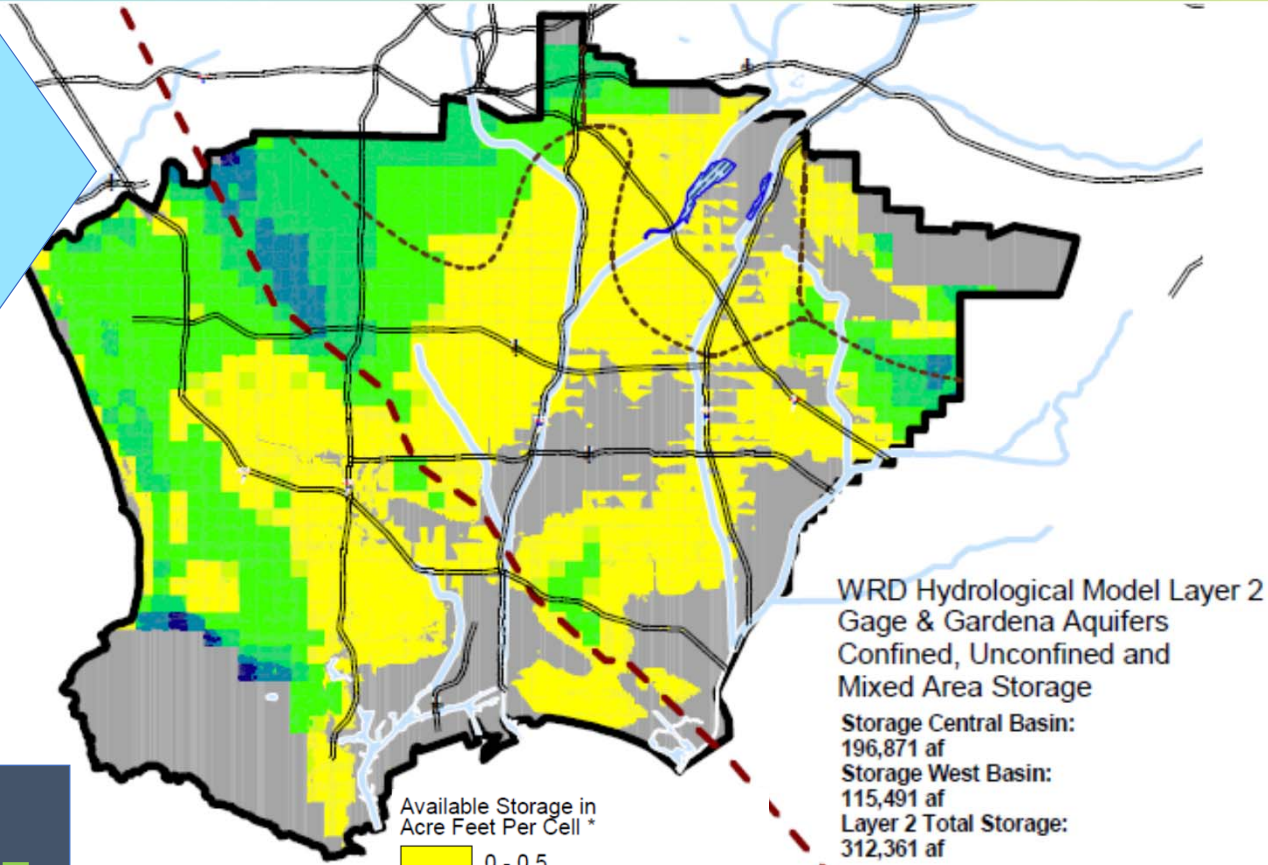
# Benefits of Groundwater: Greater Capacity

## Groundwater Basin Capacity



# Groundwater Storage Calculations

Available storage was calculated using WRD's GIS and MODFLOW groundwater model



## Results

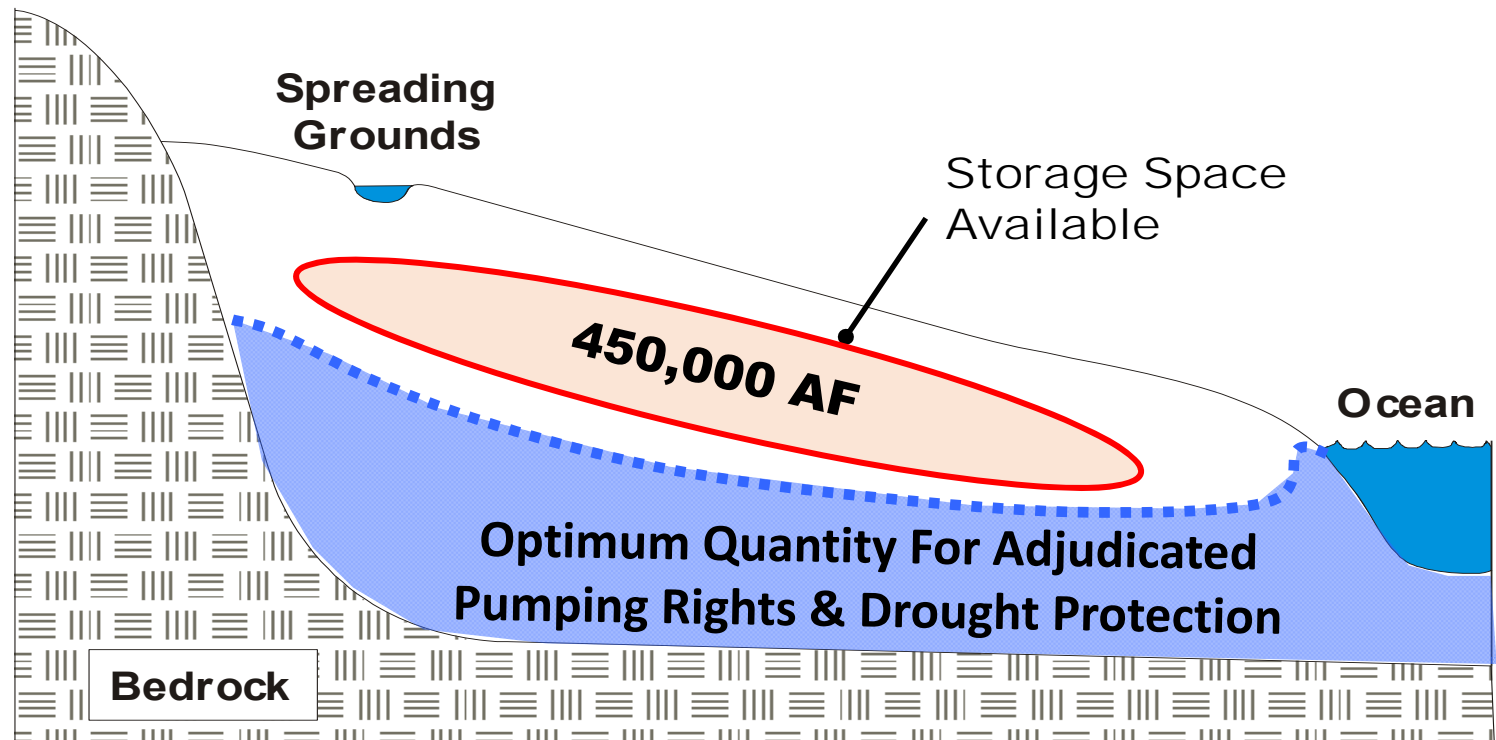
**290,000 AF - 620,169 AF**

(water levels within 50 -100 feet  
of land surface)

# Groundwater Storage

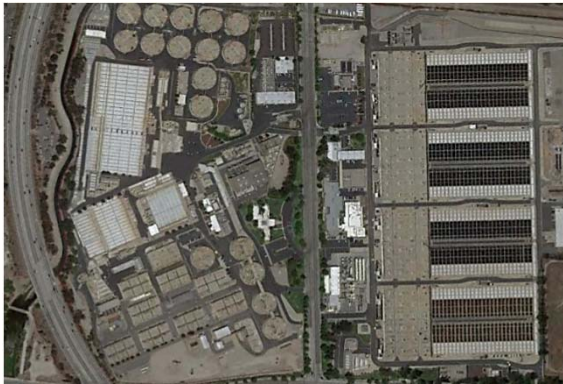
Agreement was reached during the facilitated processes that there was 450,000 acre-feet of “Available Dewatered Space” in the basins

- 330,000 acre-feet in the Central Basin
- 120,000 acre-feet in the West Coast Basin

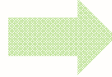




# Using Groundwater Storage: **WIN 4 ALL**



**Expanding Recycled Water Production & Usage**



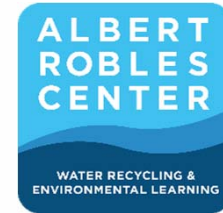
**Collaboration with:**  
Wastewater Entities  
Water Agencies/Districts  
Groundwater Pumpers  
Regulators  
Legislators  
Environmental Community  
The Public

**Increased Reliance on Sustainable Groundwater**



**Increasing Regional & Local Stormwater Capture**





# For more information:

<https://www.youtube.com/user/waterreplenishment>



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*www.WRD.org*