San Diego County Water Authority: Regional Conveyance System

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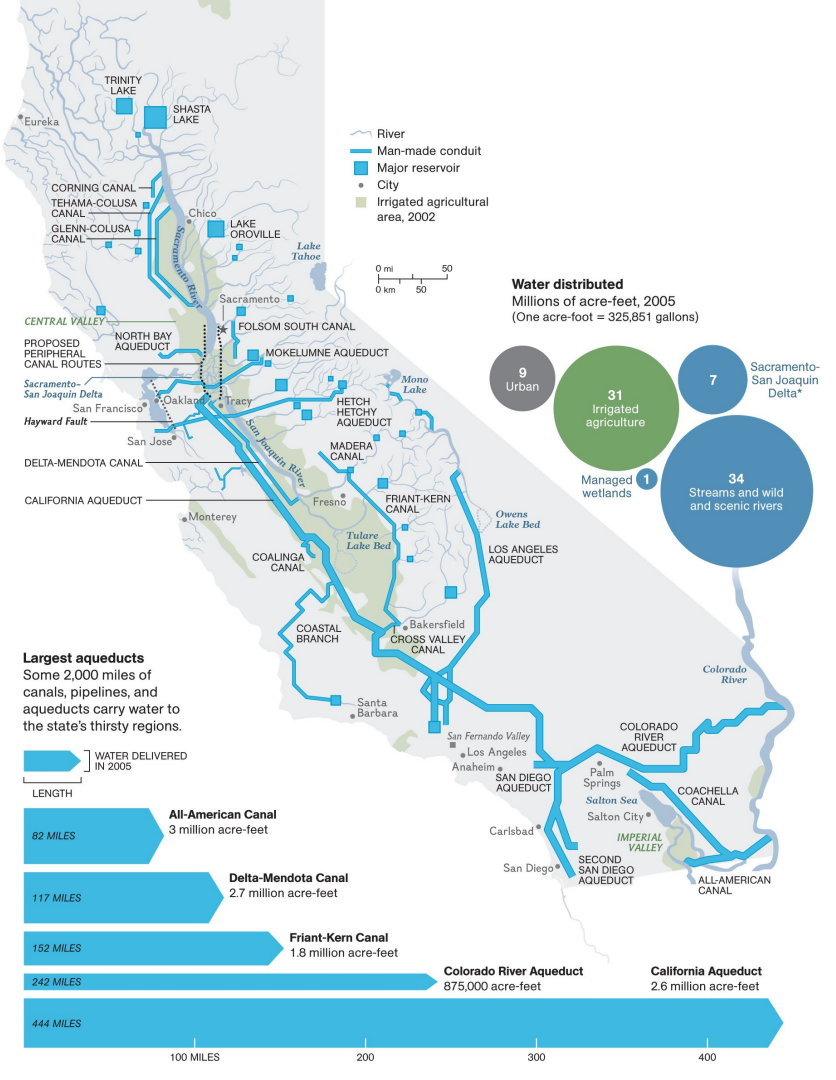
Project Overview

Purpose

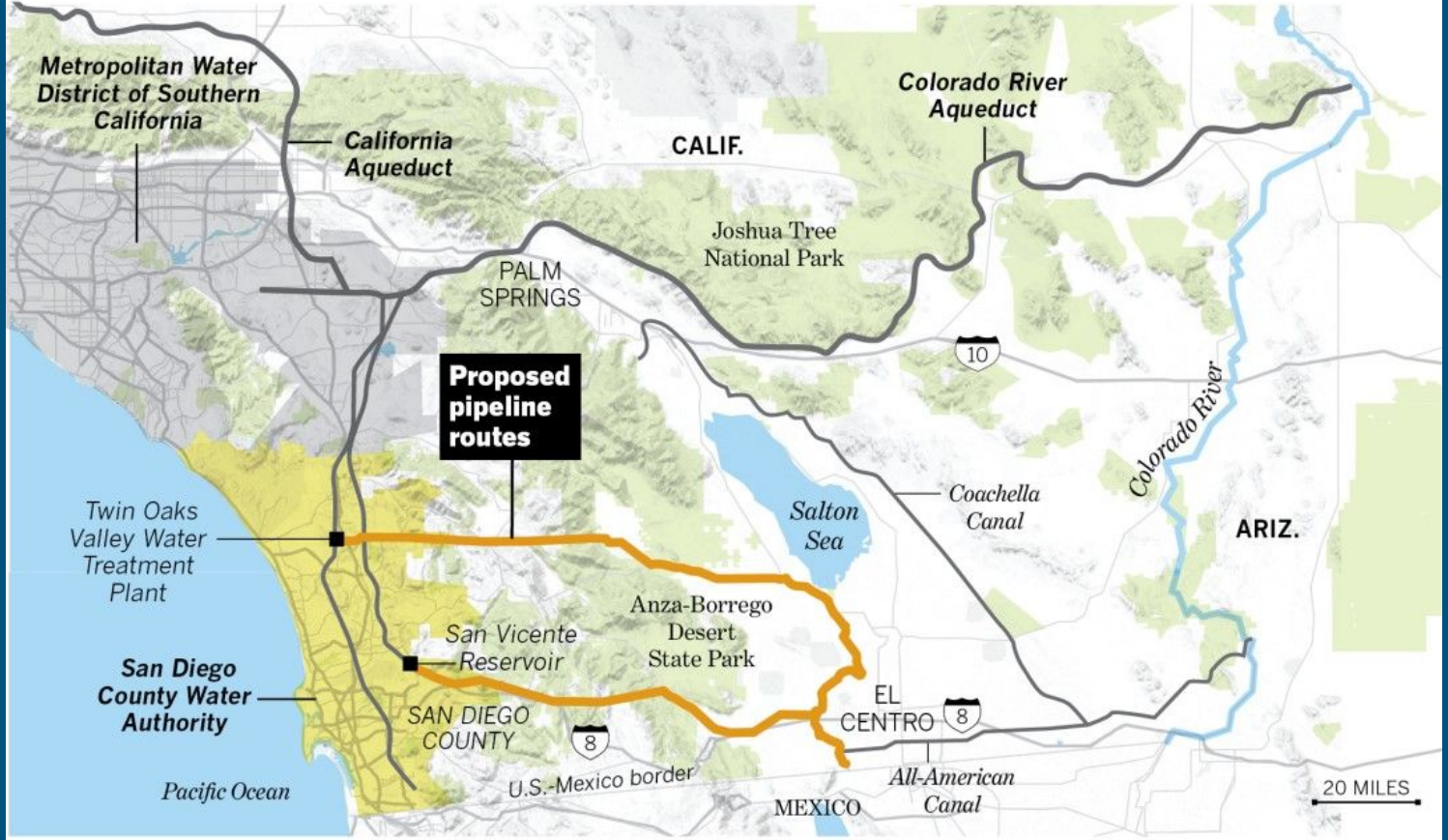
- San Diego County boasts a population of over 3.3 million people and a $245 billion economy
- Like the rest of Southern California, San Diego heavily relies on imported water
- The Colorado River supplies roughly 2/3 of the County's water supply, all of which is directed through the Metropolitan Water District of Southern California



Sources: Los Angeles Times, San Diego County Water Authority, National Geographic

Proposed $5 billion water pipeline routes

The San Diego County Water Authority is exploring ways to import Colorado River water through Imperial Valley. Both possible alignments would require a massive tunneling operation through the Cuyamaca Mountains.



Sources: San Diego County Water Authority; Nextzen; OpenStreetMap

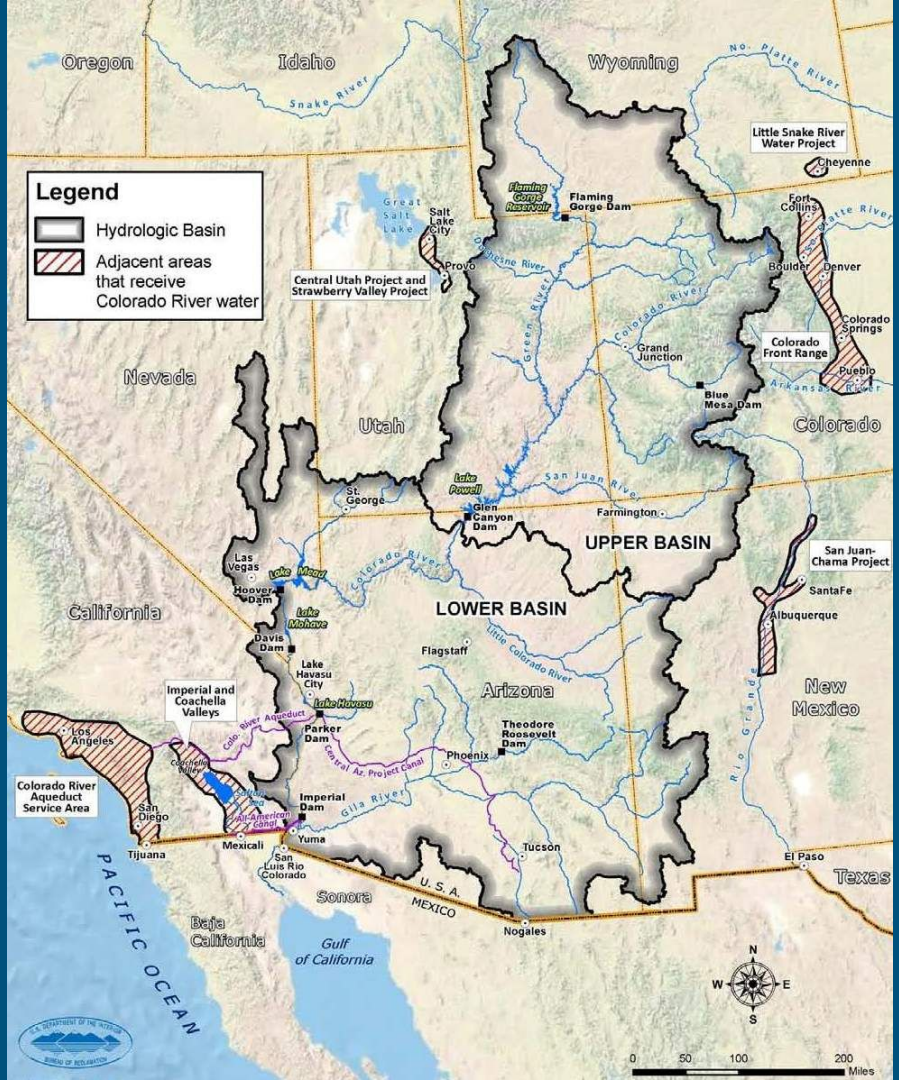
CRISTINA BYVIK & MICHELLE GUERRERO U-T

Purpose

In 2003, California participated in the Colorado River Quantification Settlement Agreement

- California agreed to use its annually apportioned 4.4 million acre-feet
- Required reduced consumption and conservation within the state
- Led to Imperial Irrigation District conservation and transfer agreement with the San Diego County Water Authority (~160,000 acre-feet)
- Now transfers 280,000 acre-feet of Colorado River water annually (~250 MGD) to San Diego County

Sources: San Diego County Water Authority

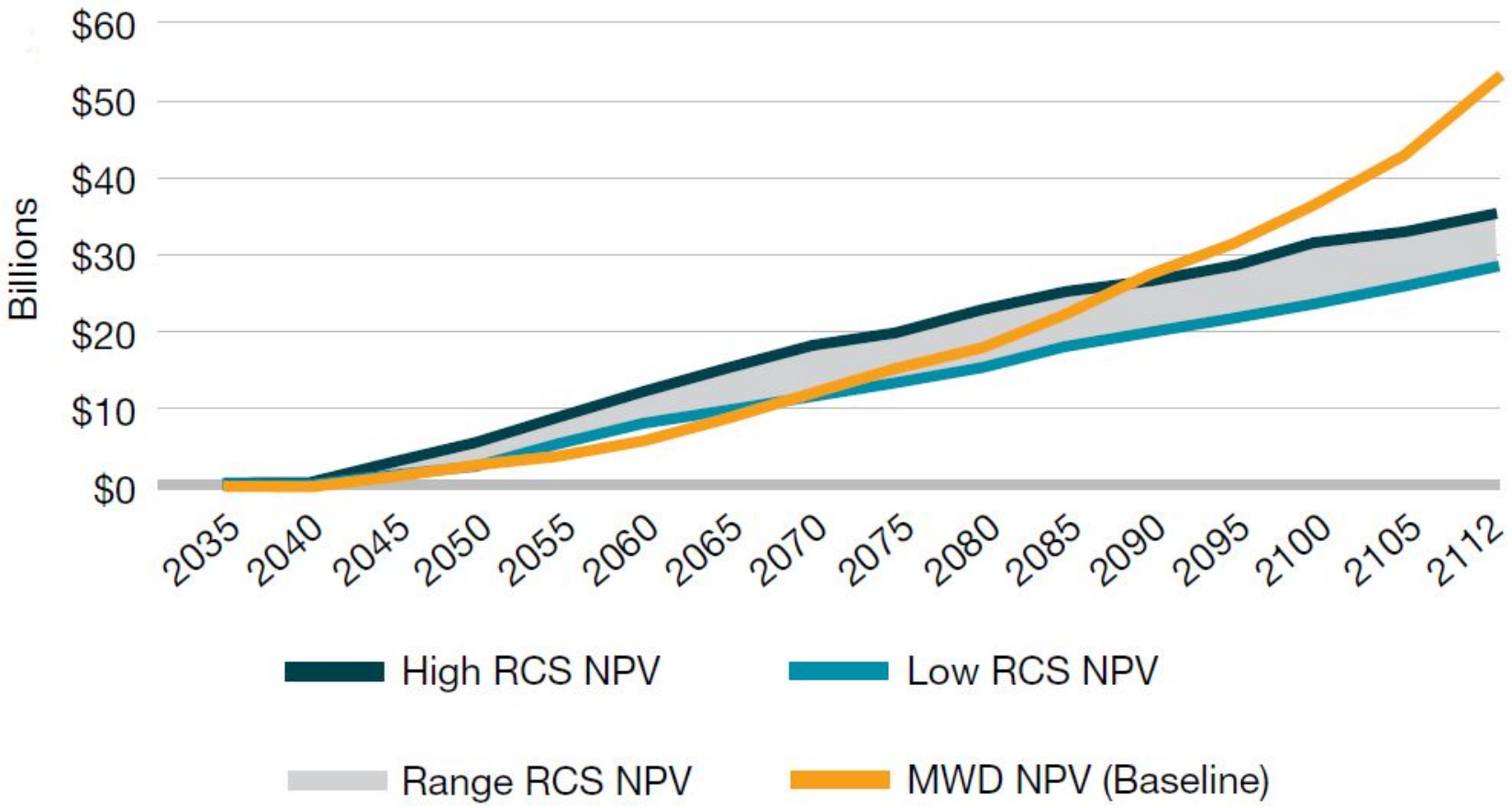

Legend
Hydrologic Basin
Adjacent areas that receive Colorado River water
Oregon
Idaho
Wyoming
Nevada
Utah
Colorado
California
Arizona
New Mexico
Texas
Snake River
No. Platte River
Little Snake River Water Project
Cheyenne
Flaming Gorge Reservoir
Flaming Gorge Dam
Great Salt Lake
Salt Lake City
Provo
Central Utah Project and Strawberry Valley Project
Duchesne River
Green River
Colorado River
Fort Collins
Boulder
Denver
Colorado Springs
Colorado Front Range
Pueblo
Arkansas River
Grand Junction
Blue Mesa Dam
Lake Powell
San Juan River
St. George
Glen Canyon Dam
Farmington
UPPER BASIN
LOWER BASIN
San Juan-Chama Project
SantaFe
Albuquerque
Las Vegas
Lake Mead
Hoover Dam
Lake Mohave
Davis Dam
Flagstaff
Little Colorado River
Lake Havasu City
Lake Havasu
Parker Dam
Imperial and Coachella Valleys
Colo. River Aqueduct
Los Angeles
Coachella Valley
Theodore Roosevelt Dam
Phoenix
Central Az. Project Canal
Gila River
Rio Grande
Colorado River Aqueduct Service Area
San Diego
Imperial Dam
All American Canal
Mexicali
Yuma
Tijuana
San Luis Rio Colorado
Tucson
El Paso
U. S. A.
MEXICO
Sonora
Nogales
Baja California
Gulf of California
PACIFIC OCEAN
N
W
E
S
0
50
100
200
Miles

Purpose

- It has been estimated that San Diego County will continue to rely on Colorado River supplies until 2112
- Currently, the San Diego County Water Authority (SDCWA) relies on the Metropolitan Water District of Southern California (MWD) to convey these supplies
- The MWD, however, charges transportation and treatment fees to the SDCWA, and they increase every year (30% over the last 5 years)
- In order to ensure long-term, cost-effective delivery of these supplies, the SDCWA is studying the feasibility of a direct-access regional conveyance system owned operated by the SDCWA to convey these supplies directly from the All American Canal

Sources: Los Angeles Times, San Diego County Water Authority

Long-Term MWD Costs Exceed RCS Costs




Borrego Springs
Salton Sea
Lake Henshaw
Northern Alignment (3A)
Twin Oaks WTP
Ranchita
Escondido
Julian
Carlsbad Desal Plant
Ocotillo Wells
Westside Main Canal
San Vicente Reservoir
Southern Alignment (5A)
Mt Laguna
Loveland Reservoir
Seeley
All American Canal
Jamul
Barret Lake
Southern Alignment (5C)
Campo

Location

- The project will consist of 85-132 miles of conveyance that runs from Imperial County to San Diego County
- Each route will cross through important land uses such as Bureau of Land Management Land, National Forest, State Parks, County Preserves, highways, and railroads
- Crosses important wildlife habitat and in the proximity of Indigenous reservations

Sources: San Diego County Water Authority

Location (3A- Northern Alignment)

- 132 miles of conveyance
- Pipes and tunnels passing under Anza-Borrego Desert State Park, the Cleveland National Forest, adjacent to San Pasqual Reservation
- Ends at Twin Oaks Valley Water Treatment Plant

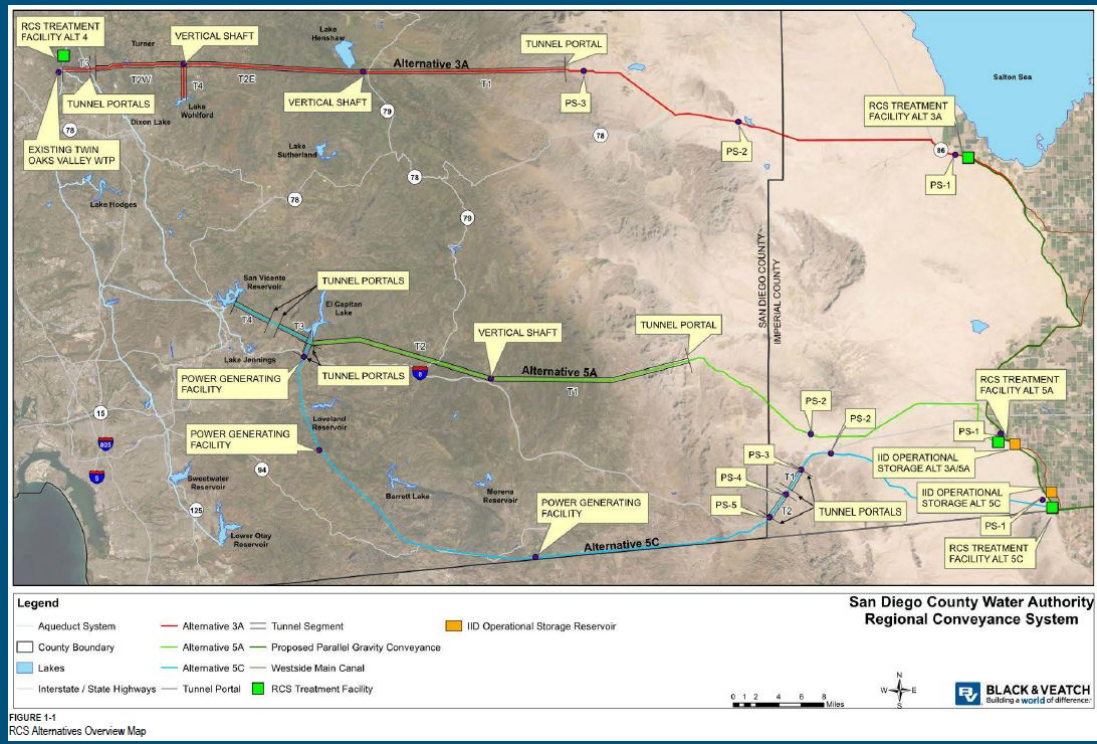
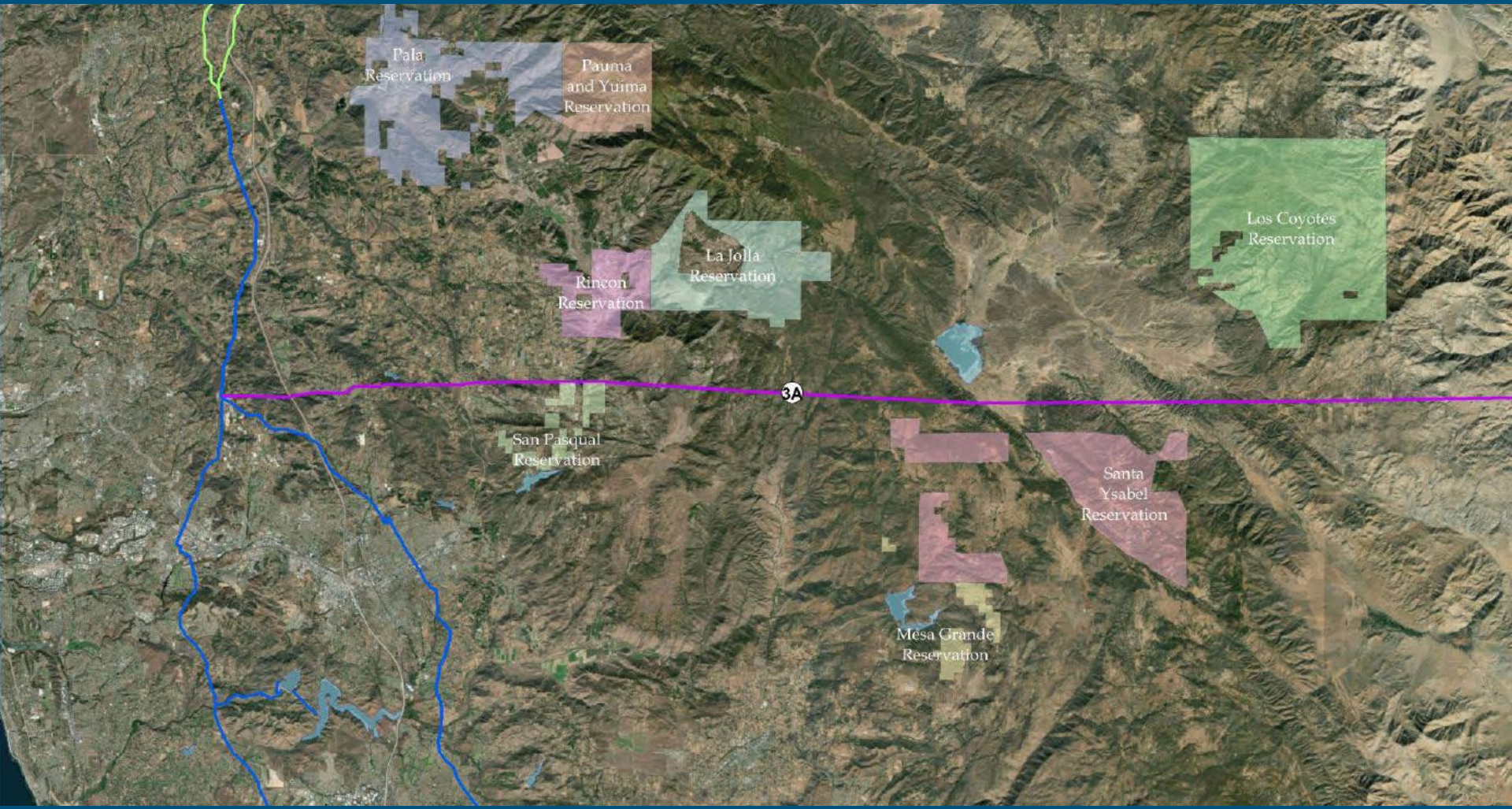


FIGURE 1-1
RCS Alternatives Overview Map

Sources: San Diego County Water Authority

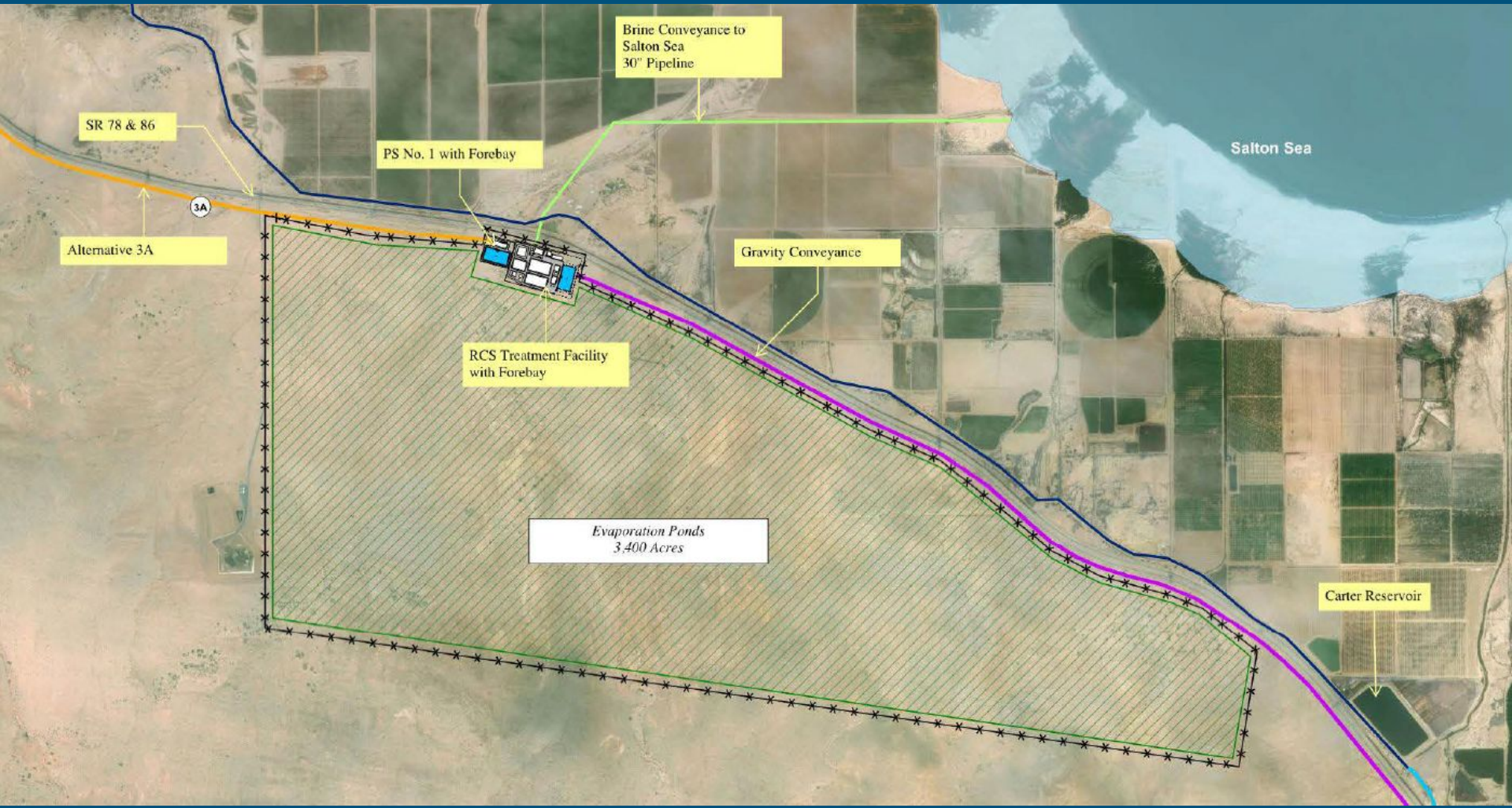

Pala Reservation
Pauma and Yuima Reservation
Rincon Reservation
La Jolla Reservation
Los Coyotes Reservation
S3
San Pasqual Reservation
Santa Ysabel Reservation
Mesa Grande Reservation

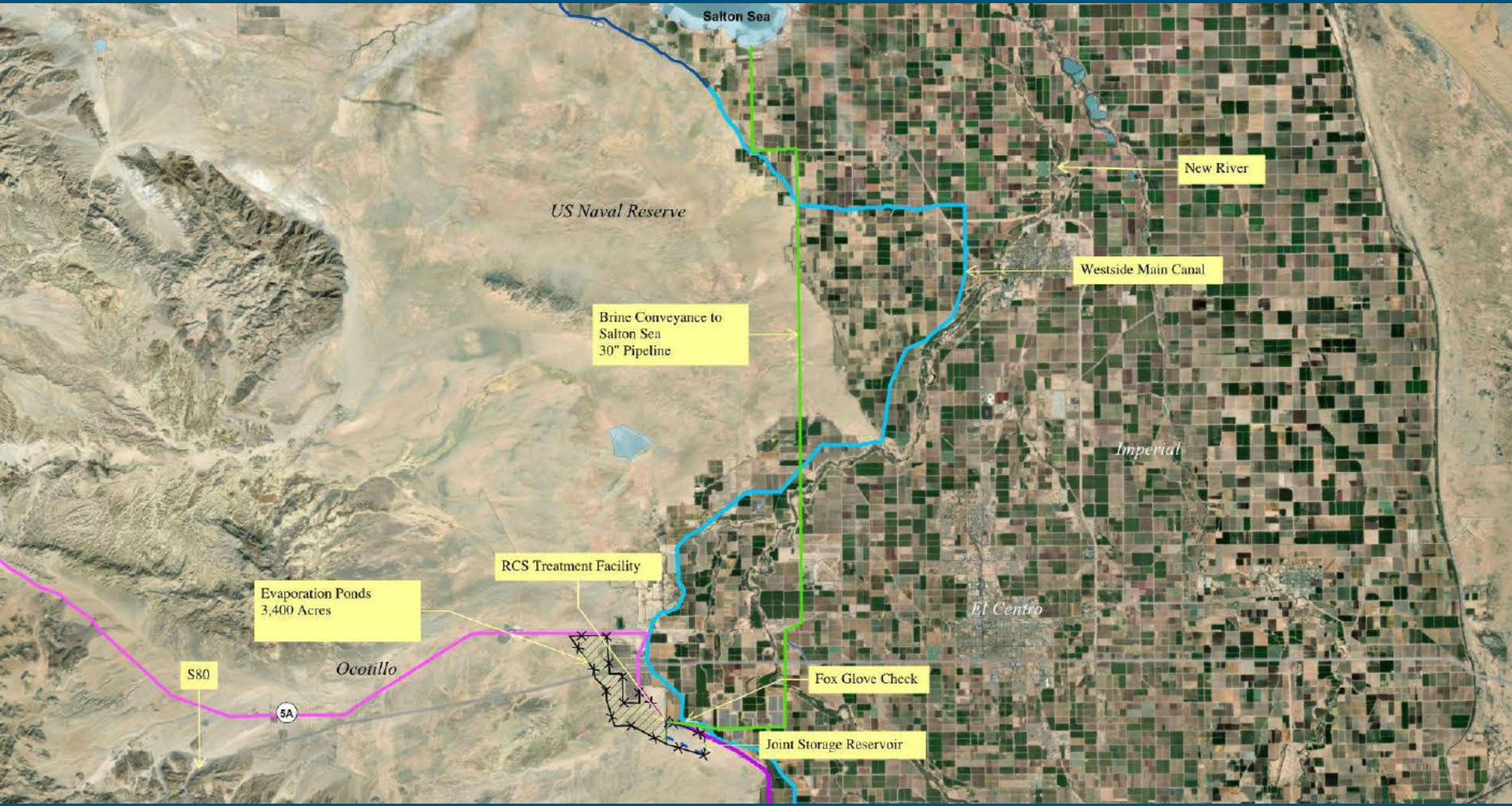
Location (5A- Southern Alignment)

- 85 miles of conveyance + 27.5 miles for brine management
- Pipes and tunnels passing under Anza-Borrego Desert State Park, the Cleveland National Forest, adjacent to Ewiiaapaayp, Capitan Grande, Viejas, and Barona reservations

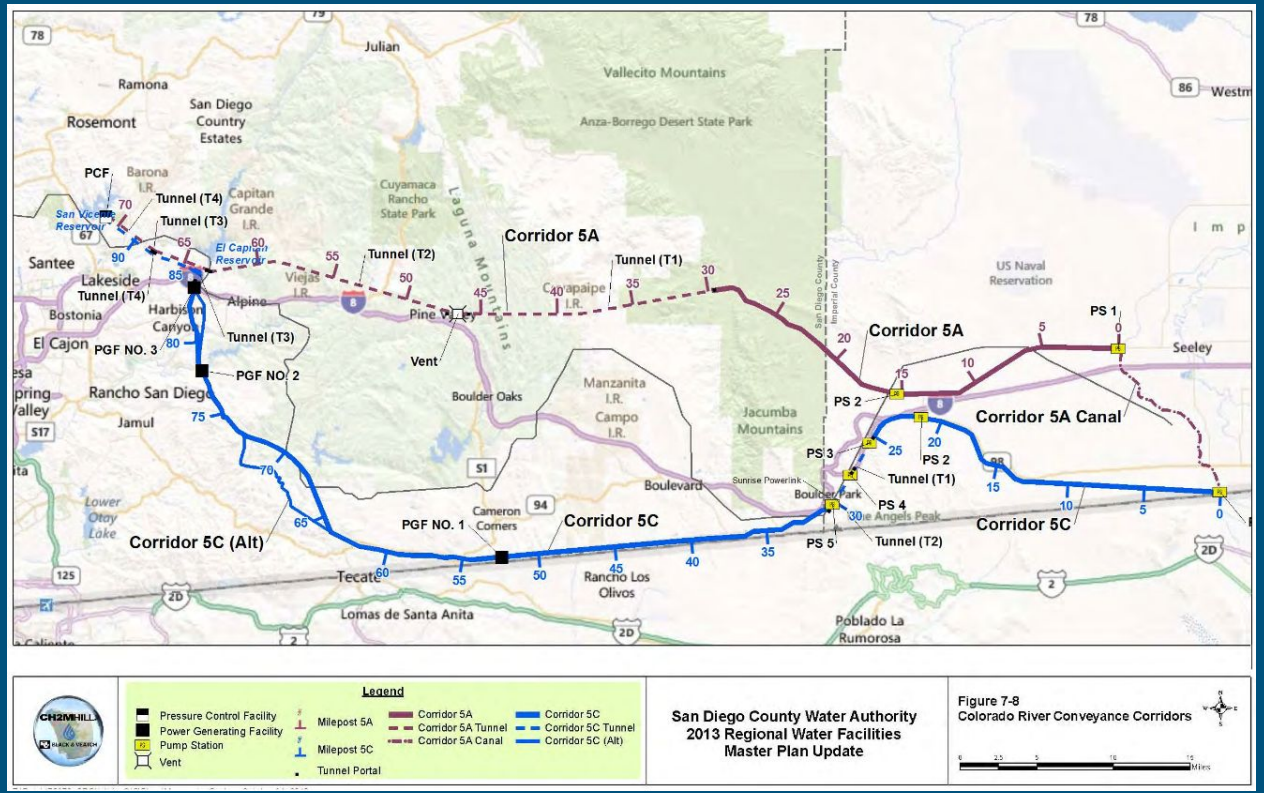
Sources: San Diego County Water Authority


Barona Reservation
Capitan Grande Reservation
Viejas Reservation
Cuyapaipe Reservation
Sycuan Reservation
Manzanita Reservation
La Posta Reservation
Campo Reservation
Jamul Indian Village
5A
5C


Brine Conveyance to
Salton Sea
30" Pipeline
SR 78 & 86
PS No. 1 with Forebay
Salton Sea
3A
Alternative 3A
Gravity Conveyance
RCS Treatment Facility
with Forebay
Evaporation Ponds
3,400 Acres
Carter Reservoir


Salton Sea
New River
US Naval Reserve
Westside Main Canal
Brine Conveyance to
Salton Sea
30" Pipeline
Imperial
RCS Treatment Facility
Evaporation Ponds
3,400 Acres
El Centro
S80
Ocotillo
5A
Fox Glove Check
Joint Storage Reservoir

Location (5A- Southern Alignment)



Construction

Online date for the RCS is assumed to be 2045, with constructed expected to occur over 15 years starting in 2030.

Machinery will be needed for open cut trench construction for buried pipe, tunnel boring machines, possible use of blasting, and a large amount of soil and earth will need to be disposed of.

Unknown amount of manpower required, but estimate ~10,000 workers in total

Sources: San Diego County Water Authority, Water and Power Associates

Construction

Construction will occur in many sensitive areas of importance such as federal and state forests and parks, as well as adjacent to indigenous reservations and across interstate highways and railroad crossings.

Every significant land use that was studied (besides BLM land) scored a moderate to high relative impact to the land use, and would be difficult to get approval/ permitting for

These land uses include:

- Private Property
- Area of Critical Environmental Concern
- State Park
- National Forest
- Endangered Species Critical Habitat
- Military Bases

Operations

The gravity flow canals will likely by jointly owned and operated by the IID and the SDC Water Authority, with the rest of the infrastructure owned and operated by the SDC Water Authority

Energy demand will be substantial (72-108 MW for major infrastructure) but the two electric utilities serving the regions (IID and San Diego Gas & Electric) will be able to match the demand with only distribution infrastructure needed

The salinity treatment plant would discharge and convey approximately 20,000 acre-feet of brine (5,000 mg/L) to the Salton Sea each year (~18 MGD).

Sources: San Diego County Water Authority

Operations

The Regional Conveyance System will redirect San Diego County's QSA apportionment directly to the water authority instead of through the MWD of Southern California.

The All-American Canal has existing capacity to manage the QSA apportionment to its terminus.

A new parallel gravity flow system is required to be built along existing IID canals that will carry the flow to the beginning of the RCS pipeline

FIGURE 2-8
Proposed Gravity Conveyance Alignment with Siphon Locations

Sources: San Diego County Water Authority

Visual Impact

Environmental Setting - Introduction

This section covers the aesthetic (visual) impacts regarding the RCS project. These impacts include the construction of portals and tunnels, the implementation of open-channel aqueducts, the creation of treatment facilities, the impact on the Salton sea, and other water bodies along both alternatives.

Visual Impact

Environmental Setting - RCS Detailed Project Mapping

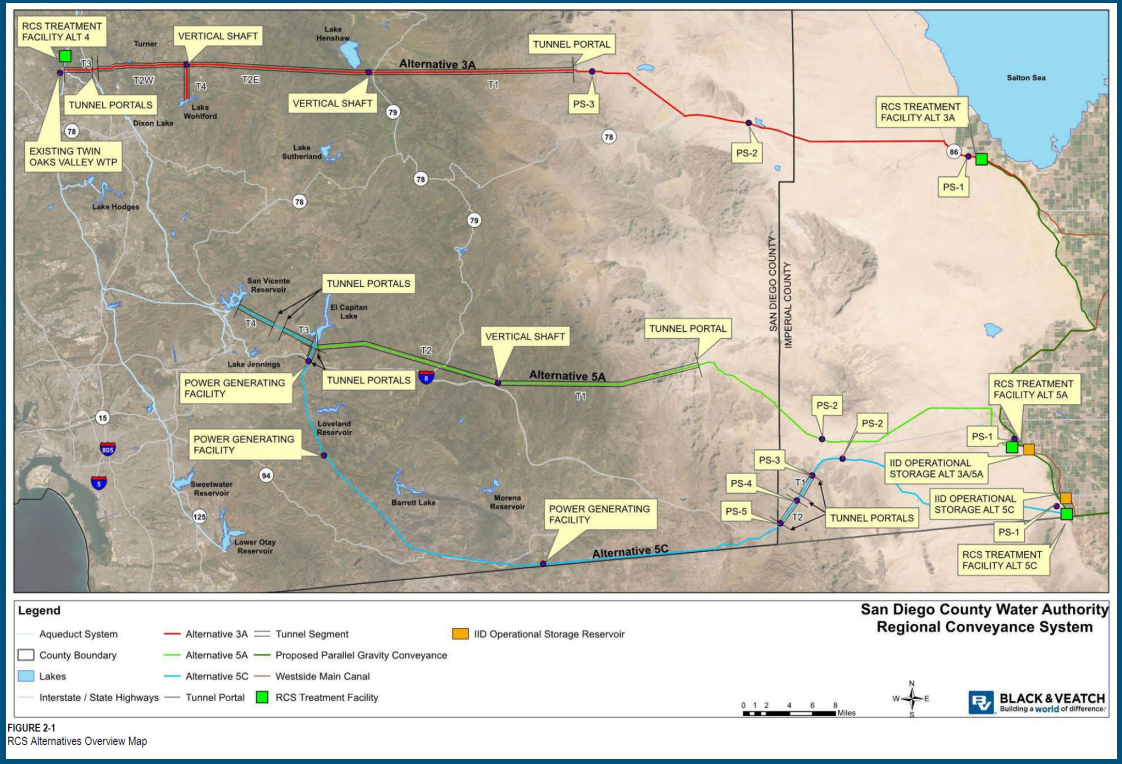


FIGURE 2-1
RCS Alternatives Overview Map

Visual Impact

Environmental Setting - Photos (Alternative 3.A.)

Imperial County (Salton sea) - Proposed Treatment Facility + Pump Station 1
California 92227
33.106225, -115.818598

Photo 1.

San Diego County - Potential Pump Station 2
California
33.150069, -116.158849

Photo 3.

Visual Impact

Environmental Setting - Photos (Alternative 3.A.)

CA-76 (Lake Henshaw) - Potential Vertical Shaft
Santa Ysabel, CA 92070
33.213999, -116.739553

Photo 6.

25878-25590 Lake Wohlford Rd - Potential Portal
Valley Center, CA 92082
33.177606, -116.988779

Photo 9.

Visual Impact

Environmental Setting - Photos (Alternative 3.A.)

San Diego County (I-15) - Potential Portals
California
33.214066, -117.137653

Photo 10.

Photo 11.

Visual Impact

Environmental Setting - Photos (Alternative 5.A.)

Imperial County - Potential WTP + Pump Station 1
California
32.743691, -115.761655

Photo 12.

I-8 - Potential Vertical Shaft
Pine Valley, CA 91962
32.818502, -116.531835

Photo 13.

Visual Impact

Environmental Setting - Photos (Alternative 5.A.)

El Capitan Reservoir - Tunnel Portals

Photo 15.

I- 8 - San Diego County - Potential Power Generating Facility.
California
32.851473, -116.809908

Photo 16.

Visual Impact

Environmental Setting - Photos (Alternative 5.A.)

San Vicente Reservoir - Tunnel Exit

California

32.915555, -116.915861

Photo 17.

Visual Impact

Construction Impacts - Introduction

Visual construction impacts will include:

- Construction grading, and excavation;
- Night lightning (if needed);
- Equipment conveyance and usage;
- Traffic re-routing.

Visual Impact

Construction Impacts - Key Points

- Movement of equipment over the 15-year period of projected construction (machinery, debris haul, and increased traffic).
- Aesthetically disruptive incomplete buildings (Mitigation Measure AMM - 1) and vandalism (Mitigation Measure AMM - 2)
- Heavy-duty equipment that is unaligned with the viewshed in recreational areas (AAM - 3)
- Night construction in specific locations (AAM- 4)
- Construction along important highways

Visual Impact

Operational Impacts - Introduction

5 parameters on a scale from 1 - 5:

- Past and present viewshed;
- Perturbation of surrounding area;
- Public opinion;
- Impact on light-sensitive features;
- Vegetation removal.

3 Weighting factors (α) on a score from 1 - 10:

1. Population (P);
2. Attendance (daily) (A) or Traffic (T);
3. Visibility (V).

Total score:

$$S = \frac{\sum(Parameters\ score) * (\frac{P * A|T * V}{30})}{25\ (\max score)}\ so\ 0 < S \leq 1$$

Visual Impact

Operational Impacts - Results

Alternative 3.A. Impact score.

Location	Structure	Relevant impact					Weighting factor (α)				Score
		Past and present viewshed	Pertrutbation of surrounding area	Public opinion	Impac on light-sensitive features	Vegetation removal	P	A	T	V	
Salton Sea	Salton Sea*	-	-	-	-	-	-	-	-	-	-
	WTP	5	5	2	1	2	4	-	5	10	0.38
	PS 1	5	5	2	1	3	4	-	5	10	0.41
CA - 78	PS 2	5	5	2	1	3	4		6	10	0.43
Borrego Springs	RHGC	1	2	1	1	1	1	4	-	9	0.09
Lake Henshaw	Shaft	1	3	4	1	5	1	7	-	6	0.22
Lake Wohlford	Portal	2	1	4	1	1	1	5	-	10	0.16
I-15	Portal	1	1	1	1	3	5	-	9	8	0.17

Alternative 5.A. Impact score.

Location	Structure	Relevant impact					Weighting factor (α)				Score
		Past and present viewshed	Pertrutbation of surrounding area	Public opinion	Impac on light-sensitive features	Vegetation removal	P	A	T	V	
Agricultural land (South of I-8)	WTP + PS 1	4	5	2	1	3	6	-	8	2	0.32
Pine Valley (I-8)	Shaft	1	3	3	1	5	3	-	8	10	0.36
El Capitan Reservoir	Portal	3	5	5	1	1	1	6	-	10	0.34
I-8 SD County	PGF	5	5	2	2	3	8	-	9	10	0.61
San Vicente Reservoir	Tunnel exit	1	2	3	1	1	1	6	-	10	0.18

Visual Impact

Operational Impacts - Key Points

- Most developments do not present significant impacts - but for the Power Generating Facility by the I-8 in San Diego County (Mitigation Measure AMM - 5).
- Developments with a score close to the threshold are Pump Station 1 and Pump Station 2 for Alternative 3.A., and this is because of the visual impact they could generate.
- The vertical shafts and the portals will not produce major impacts since they do not affect the viewshed, and are usually out of sight.
- The Salton Sea is left out of the analysis. This is because there are no actual structures or visual impacts regarding the Salton Sea.
- No shadow analysis is required and light and glare is not of concern.

Visual Impact

Mitigation

Mitigation Measure AMM - 1: Fencing will be provided to prevent the disruption in the viewshed for those structures where construction can lead to increased impacts in the scenery

Mitigation Measure AMM - 2: Fencing, monitoring, and maybe surveillance might be used in order to prevent the illegal vandalization of the premises.

Mitigation Measure AMM - 3: In order to minimize the impact, working in highly densely visited recreational areas will be halted during the weekend, and machinery will be accommodated to decrease visual disturbance.

Mitigation Measure AMM - 4: Nighttime construction will be carefully supervised and deployed according to regional and local requirements, such as noise laws.

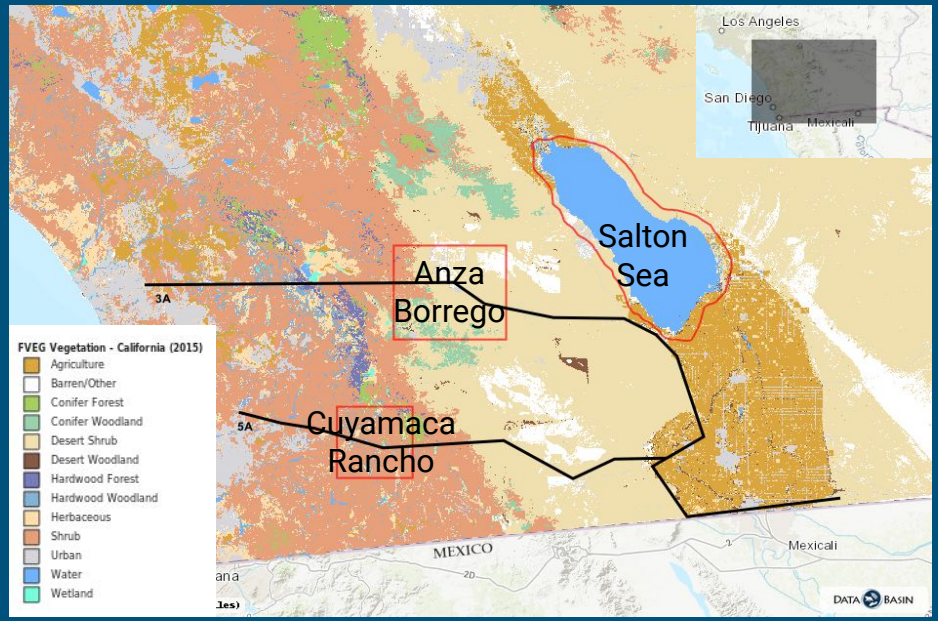
Mitigation Measure AMM - 5: In order to minimize the impact from the Power Generating Facility by the I-8, the design of the building will be made so it blends with the landscape, with colors and shapes that do not disturb the viewshed and can mix in naturally with the background.

Biological Resources

- Goal: Identify sensitive biological resources and potential impacts

- Impacts to sensitive species, riparian habitats, federally protected wetlands, movement of fish or wildlife, local policies, or conservation plans

- 3 significant regions identified: **Salton Sea, Anza Borrego State Park, Cuyamaca Rancho State Park**

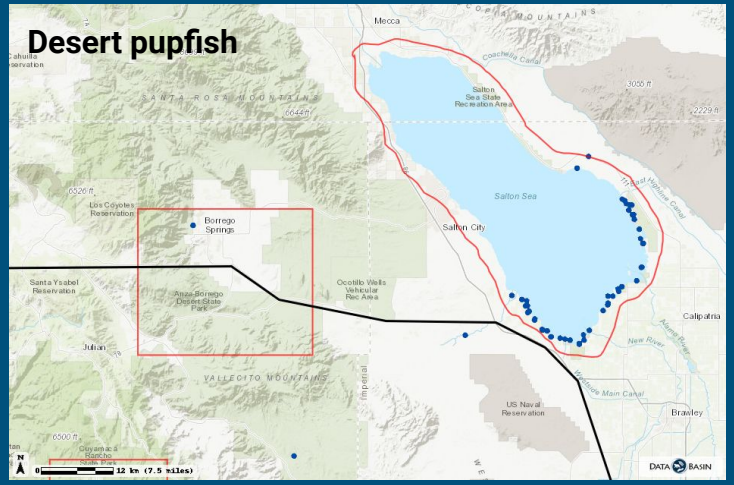


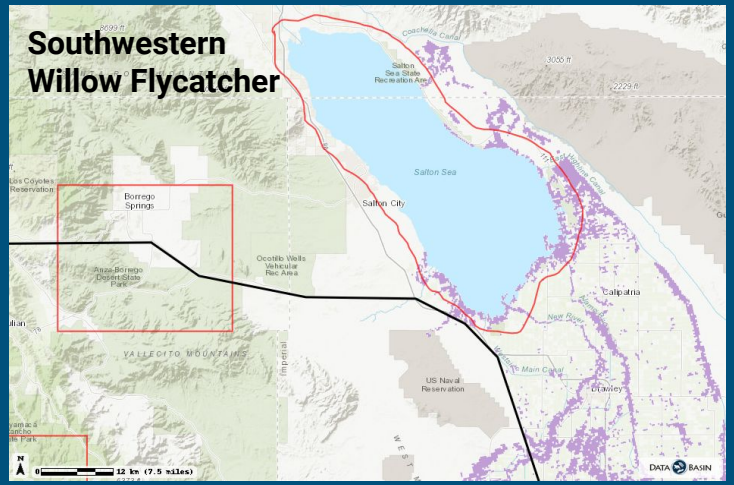
Salton Sea: Environmental Setting

- Located in Riverside and Imperial Counties of Southern California
- Man-made and artificially maintained desert saline lake
- No outlet; fed mostly by agricultural run off
- Several water quality issues threaten the lake's ecosystem
- One of most important wetlands for birds in North America

Salton Sea: Biological Resources

- Previously a popular and productive sport fishery, now 97% of fish population gone
- Tilapia and desert pupfish are only remaining species
- Several threatened and endangered bird species rely on the habitat
- 41 animal species with federal, state, or CDFW protected status
- 9 plant species with federal, state, or CA rare plant rank protected status



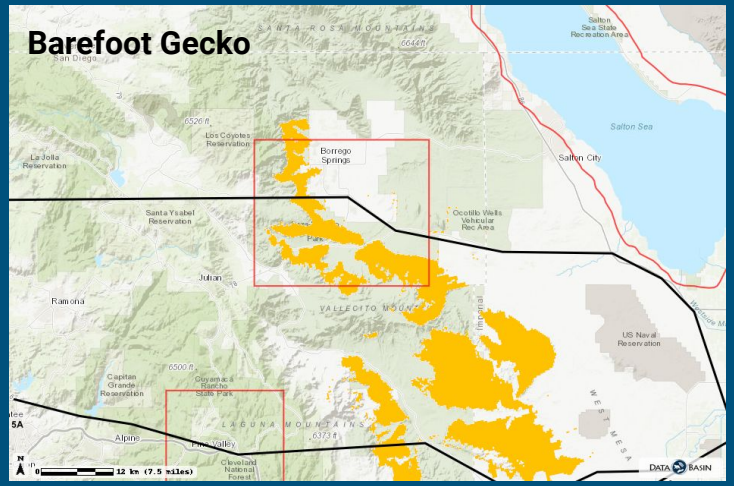


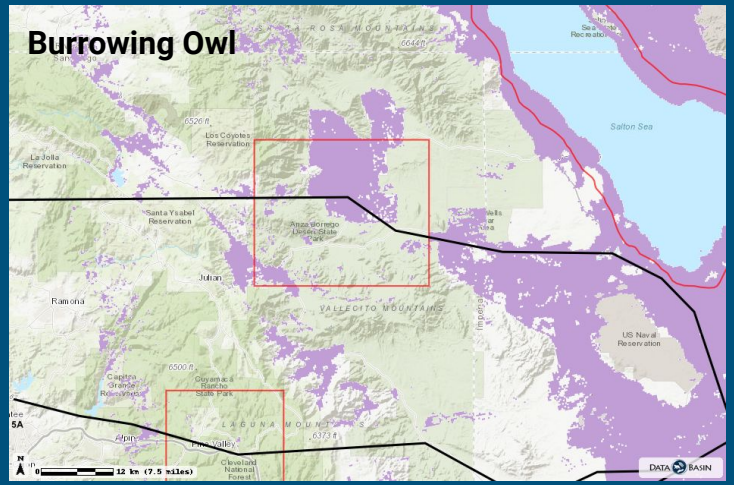
Anza Borrego State Park: Environmental Setting

- Located in eastern San Diego County and Colorado Desert
- Largest state park in CA, over 600,000 acres
- One of the most diverse landscapes in the world
- Features dry lake beds, badlands, and mountains
- Two-thirds of the park designated as wilderness

Anza Borrego State Park: Biological Resources

- Park is known for groves of California fan palms, cacti, and wildflower blooms
- Common wildlife: deer, kit foxes, iguanas, rattlesnakes, roadrunners, eagles, and endangered desert bighorn sheep
- 52 animal species with federal, state, or CDFW protected status
- 50 plant species with federal, state, or CA rare plant rank protected status



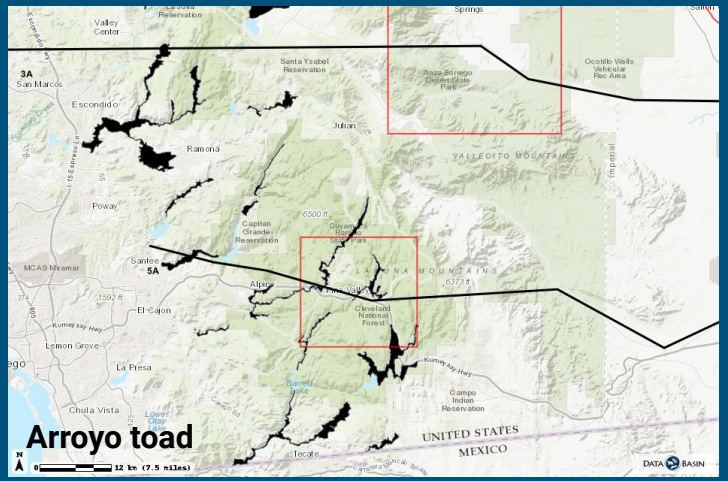


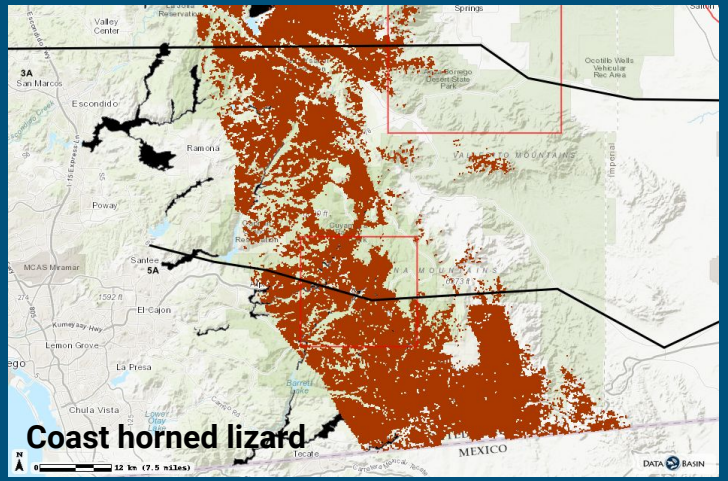
Cuyamaca Rancho State Park: Environmental Setting

- Located in unincorporated San Diego County in Lagunas and Cuyamaca Mountains
- Meditteranean climate with large valleys surrounded by mountain peaks
- Coniferous forest, meadows, and streams unlike surrounding desert region
- 2003 wildfire burned over 98% of the state park

Cuyamaca Rancho State Park: Biological Resources

- Common wildlife: southern mule deer, coyote, cougars, black-tailed jackrabbit, brush rabbit, canyon tree frog, Pacific tree frog
- Over 200 species of birds
- 37 animal species with federal, state, or CDFW protected status
- 70 plant species with federal, state, or CA rare plant rank protected status





Biological Impacts

Salton Sea

- Alternative 3A: Water treatment plant requires 50 acres of land
- Brine byproduct deposited into sea or nearby wetlands
- Salinity - Brine: 5,000 mg/l, Sea: 60,000 mg/l
- **No significant impact**
  - Construction: treatment plant not located in sensitive habitat
  - Operations: Brine can help reduce overall salinity of lake

Anza Borrego and Cuyamaca Rancho State Park

- Roughly 20 miles of pipelines run through each park
- **Impacts:**
  - Construction leads to temporary and permanent loss of habitat
  - Construction creates dust that leads to vegetation degradation
  - Construction activities create wildlife disturbance and mortality
  - COnstruction activities result in potential loss of nesting birds

Air Quality impact

- **California Emissions Estimator Model** (CalEEMod) software was used.
- The emission rate of criteria pollutants (e.g., NOx, PM10, PM2.5) related to the **construction** and **operation** phases were quantified.
- San Diego Regional Water Conveyance System will have **five main components** (i.e., canals, pipelines, and tunnels in addition to three pumping stations, a treatment plant).
- Three different routes having the above-mentioned components are suggested. However, **only one route (i.e., Alternative 3A) was investigated**.

Methodology: Construction Emissions

Open Trench

Construction Phase	Equipment	Quantity/per contractor	Total Equipment
Trenching	Dozers	1	2
	Excavators	1	2
	Tractors/loaders/backhoes	2	4
	Trenchers	1	2
Installation	Installation Crane	1	2
	Forklift	1	2
	Tractors/loaders/backhoes	1	2
Paving	Pavers	1	2
	Rollers	1	2
	Paving equipment	1	2

Methodology: Construction Emissions

Tunneling

Construction Phase	Equipment	Quantity	Total Equipment
Site preparation	Scraper	1	2
	Grader	1	2
	Tractors/Loaders/Backhoes	1	2
Excavation	Dozer	1	2
	Excavator	1	2
	Tractors/Loaders/Backhoes	1	2
	Trencher	1	2
	Crushing/Processing Equipment	1	2
Site Restoration	Tractors/Loaders/Backhoes	1	2

Methodology: Construction Emissions

Pump Station

Construction Phase	Equipment	Quantity
Site preparation/grading	Dozers	1
	Tractors/loaders/backhoes	1
Facility construction	Excavator	1
	Tractors/loaders/backhoes	1
	Forklifts	1
	Pumps	1
	Welders	2
Paving	Paving equipment	3

Methodology: Construction Emissions

Storage and treatment Facilities

Construction Phase	Equipment	Quantity
Site preparation	Dozers	2
	Tractors/loaders/backhoes	3
Grading	Excavators	2
	Tractors/loaders/backhoes	3
	Dozers	2
	Compactors	2
Facility construction	Cranes	2
	Forklifts	2
	Generator sets	2
	Tractors/loaders/backhoes	3
	Welders	3
Paving	Pavers	2
	Paving equipment	2

Methodology: Operational Emissions

- The project will result in direct emissions mainly from **treatment process** and **vehicular traffic.**
- According to similar previous projects, approximately *15 and 7 workers are required* to run the treatment and power facility, respectively.
- These workers would generate 44 one-way trips during the regular operation with about a 35-mile travel distance each.
- Annual emissions from vehicle trips and treatment process were quantified **using CalEEMod**.

Results: Construction Emissions

Overall						
Category	**ROG**	**NOx**	**CO**	**SO_2**	**PM_{10} Total**	**$PM_{2.5}$ Total**
Total (tons/yr)	12	8.06	19.38	0.05	3.71	1.71
Total (Ib/day)	**11.60**	**44.20**	**106.20**	**0.28**	**20.34**	**9.37**
Threshold	**75**	**100**	**550**	**150**	**150**	**55**

Results: Operational Emissions

Category	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Total (tons/yr)	.32	.72	.67	.01	0.91	.25
Total (lb/day)	1.76	3.97	3.65	0.07	4.98	1.38
Threshold	75	100	550	150	150	55

Thank you !

Questions?