

Regional Conveyance System Study

Phase A



Executive Summary

August 2020

Prepared for:

Prepared by:



Charting the Future of Water Supply Reliability

In June 2019, the Water Authority’s Board of Directors approved \$3.9 million for a new two-phase study to build on and augment past studies of alternate conveyance systems to deliver the region’s independent, low-cost, and reliable Colorado River Quantification Settlement Agreement supplies. The study was structured in phases to provide “offramps,” or decision points, for the Board.

The study concept was both simple and significant. While San Diego County’s water supplies are solid for the next few decades, the region needs to start making decisions to ensure long-term water stability because key options would take decades to develop. By vetting alternatives today, decision-makers can determine the best way to leverage 20 years of infrastructure investments for a sustainable supply mix far into the future.

The study compares the long-term economic viability of a new conveyance system to other options for providing necessary untreated water supplies to San Diego County into

the next century. And, this study provides a more detailed evaluation of three Regional Conveyance System (RCS) alternatives – 3A, 5A and 5C – that were previously assessed at a very high level.

In addition, the study was designed to explore potential partnerships and compatible multi-use projects that could reduce cost and risk to the Water Authority and its member agencies while providing strong support for the State of California’s Water Resilience Portfolio Initiative.

The study was a collaboration by Black & Veatch Corp. (B&V), which performed the technical and financial/cost analysis, and Water Authority staff, who supported B&V’s work and performed the economic analysis. Hunter Pacific Group was retained to provide an independent, third-party review of B&V’s cost projections. Additionally, Water Authority staff consulted with the agency’s financial advisor, Montague DeRose and Associates, LLC, to validate key economic assumptions.

Table of Contents

Securing Water Resiliency for Future Generations	2
Future Water Demands in San Diego	4
Three Alternative Alignments for the RCS	6
Integrating the RCS into Existing Facilities	8
Reducing Salinity of QSA Water with a Treatment Facility	10
Meeting RCS Energy Demands	12
Navigating Risks in an Uncertain World	14
Refining Costs to Provide More Project Clarity	15
Building the RCS is Cost-Competitive with Other Options	16
Permits and Environmental Approvals	18
Potential Partnerships Would Enhance Project Value	19
RCS Could Leverage Several Funding Opportunities	20
Initial Screening Analysis Produces Competitive Alternatives	21
Next Steps Needed to Maintain RCS Viability	22

Securing Water Resiliency for Future Generations

Decades of investments in water supply reliability by the San Diego County Water Authority and its 24 member agencies mean the San Diego region is well-positioned to face a future full of uncertainties about water in the West. A new Regional Conveyance System (RCS) is a technically feasible, cost-competitive option that would build on past investments to secure additional water management flexibility and provide other benefits. It's not the only option – but for the RCS to remain a viable alternative, further study (Phase B) would need to continue on schedule.



Background

The Water Authority sustains more than 3.3 million people and a \$245 billion economy by providing safe and reliable supplies to its retail agencies. Since the early 1990s, the agency's Board of Directors – representing each of its 24 member agencies – has directed staff to diversify the region's water portfolio and improve regional water reliability during droughts and natural disasters, such as earthquakes that could sever aqueducts. Today, that approach is a national model that aligns with state mandates to reduce reliance on the Sacramento-San Joaquin Bay-Delta, increase water-use efficiency, and improve water supply resiliency.

Thirty years ago, almost all of San Diego County's water was supplied by the Metropolitan Water District of Southern California (MWD). Today, the Water Authority's portfolio includes local

supplies from a variety of sources; imported supplies from MWD; and imported supplies from the landmark 2003 Colorado River Quantification Settlement Agreement (QSA). When it ramps up to full deliveries in 2021, the QSA will give the Water Authority access to approximately 280,000 acre-feet of Colorado River supplies each year from a conservation-and-transfer agreement with the Imperial Irrigation District (IID) and the water conserved by lining the All-American and Coachella Canals. The terms of the IID Transfer Agreement and Canal Lining Agreement are up to 75 years and for 110 years, respectively.

The Water Authority does not have a pipeline or aqueduct to the Colorado River to directly convey its QSA supplies to the San Diego region. As such, the Water Authority pays MWD to deliver these supplies through its Colorado River Aqueduct via an Exchange Agreement, which expires in 2047, for the transfer water. However, the Exchange Agreement covers the entire 110-year term of the canal lining water.

As part of its due diligence to ensure the Water Authority continues to receive these highly reliable supplies cost effectively, the agency has periodically studied a new conveyance system to deliver its independent QSA supplies directly from the Colorado River. This concept remains on the table due to MWD's large and growing annual transportation fees that are beyond the Water Authority's control.

Alternatives 3A and 5A are economically competitive and provide long-term reliability and low-cost water to the region.



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Key Findings

- The region will continue to need QSA water through 2112.
- All three RCS alternatives are viable from a technical and engineering perspective.
- Alternatives 3A and 5A are economically competitive and provide long-term reliability and low-cost water to the region.
- Alternative 5C is not economically competitive with Alternatives 3A and 5A and will not be recommended for further study.
- Alternatives 3A and 5A could be integrated without major changes to current Water Authority operations.
- Potential multi-agency, multi-use partnerships and other agreements could significantly reduce the cost and enhance the value of each RCS alternative and provide regional benefits to San Diego, California and the Southwest.
- Blending RCS deliveries with other supplies in existing reservoirs is no longer feasible, and treatment of RCS supplies would be necessary to match the salinity of water currently delivered by MWD.
- Due to the decades-long process for designing, permitting, and building a major conveyance system, continuing to Phase B of the current study is necessary to retain the RCS as a viable option.

Future Water Demands in San Diego

Since 2007, demand for untreated water in San Diego County has declined due to periodic drought restrictions, an expanding conservation ethic and other factors. However, the Water Authority's 2015 Urban Water Management Plan (2018 Reset) forecasts a long-term ramp up in demand such that QSA supplies will be needed to meet those demands through 2045. In addition, the region is projected to need all planned local supply development – including Pure Water San Diego, Pure Water Oceanside, the East County Advanced Water Purification Program, Otay Water District's Desalination Project, and Fallbrook Public Utility District's Groundwater Recovery Project. The 2018 Reset also shows the continued need for MWD supplies through 2045 and beyond. If the RCS study advances to Phase B, it would include a water demand update based on the 2020 Urban Water Management Plan that is currently under development.

The Water Authority's 2015 Urban Water Management Plan (2018 Reset) forecasts a long-term ramp up in demand such that QSA supplies will be needed to meet those demands through 2045.

Decisions are on the Horizon

Even though San Diego County's water future is secure for the next few decades, the region must start making decisions now to ensure long-term stability because key options would take decades to develop.

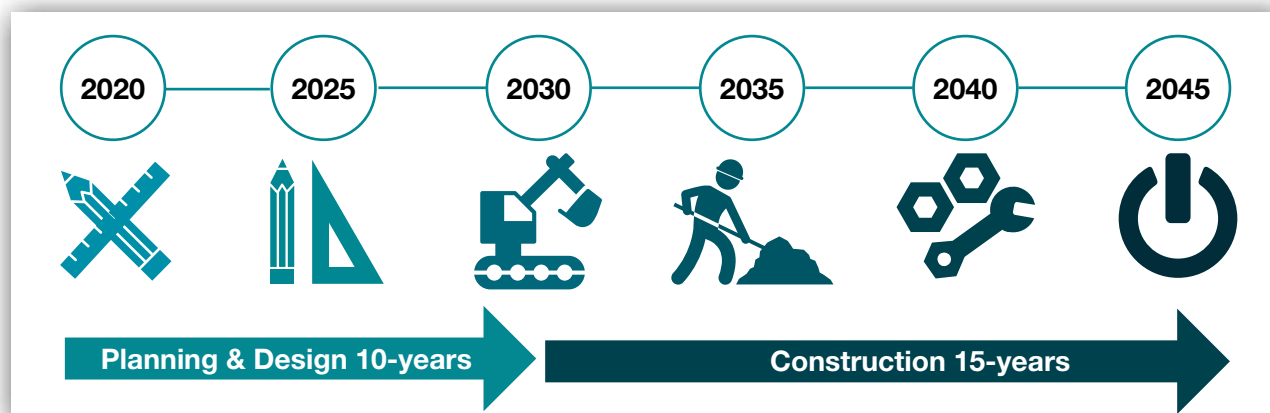
Four main options were considered in this study's economic analysis:

- Continued reliance on QSA supplies transported to San Diego County through MWD's Colorado River Aqueduct
- Continued reliance on QSA supplies transported to San Diego County through the RCS

- Replacing approximately 200,000 acre-feet per year (AF/y) of QSA supplies with MWD supplies
- Replacing approximately 200,000 AF/y of QSA supplies with additional local supply development, such as recycled water and/or seawater desalination.

Maintaining local supply development and regional conveyance as viable alternatives requires a phased approach with offramps for the Board to adjust course as more information becomes available.

Project Schedule Overview



Northern Alternative Added to Phase A

The RCS concept was developed as an alternate way to transport QSA water to the Water Authority service area, starting in 2045. Instead of continuing to rely on MWD to move that water, the Water Authority could build its own conveyance system from the All-American Canal in Imperial Valley to the Water Authority's aqueduct system in San Diego County.

In 1996, five RCS alternatives were conceived. Two southern alternatives (5A and 5C) were studied in more detail in 2013 and 2017. Since the initial study in 1996,

many new facilities have been developed and incorporated into the Water Authority's aqueduct system, including the Twin Oaks Valley Water Treatment Plant (TOWWTP) and numerous components of the Emergency & Carryover Storage Program. These facilities make a northern RCS alternative operationally attractive, and this study includes a northern alternative – 3A – along with southern alternatives 5A and 5C. Since 3A hadn't been studied since 1996, Phase A of the current study was designed to provide more details about that option.

Comparison of Three RCS Alternatives

Facility Description	Alternative 3A	Alternative 5A	Alternative 5C
Storage Facility in Imperial Valley	900 acre-feet	900 acre-feet	900 acre-feet
Canals	Length: 46.7 miles Width (top): 17.75 ft Water Depth: 4.5 ft	Length: 8.8 miles Width (top): 17.75 ft Water Depth: 4.5 ft	Length: 2 miles Width (top): 17.75 ft Water Depth: 4.5 ft
Pipelines	Length: 38.8 miles Diameter: 102 inches	Length: 34.8 miles Diameter: 102 inches	Length: 81.2 miles Diameter: 102 inches
Tunnels	Length: 46.5 miles Diameter: 14 ft	Length: 41.4 miles Diameter: 14-15 ft	Length: 11 miles Diameter: 12-15 ft
Pump Stations	Number: 3 Flowrate: 396 cfs, 423.5 cfs Size: 12,500 hp, per pump	Number: 2 Flowrate: 396 cfs Size: 14,100 hp, per pump	Number: 5 Flowrate: 396 cfs Size: 14,100 hp, per pump
Hydroelectric Facilities	NA	NA	Number: 3 Size: 20 MW
Treatment Plant	Flowrate: 134 mgd Influent TDS: 600 to 879 mg/l Effluent TDS: 500 mg/l	Flowrate: 134 mgd Influent TDS: 600 to 879 mg/l Effluent TDS: 500 mg/l	Flowrate: 134 mgd Influent TDS: 600 to 879 mg/l Effluent TDS: 500 mg/l
Brine Management	Length: 2.4 miles Diameter: 30 inches	Length: 27.5 miles Diameter: 30 inches	Length: 31.7 miles Diameter: 30 inches
Regulatory Storage in San Diego County	Capacity: 40 MG Type: Covered Tank	Capacity: 40 MG Type: Covered Tank	Capacity: 40 MG Type: Covered Tank
Storage Reservoir in San Diego	Capacity: 3,500-4,000 AF	NA	NA
Aqueduct System Pump Station	NA	Flowrate: 220 cfs Hp: 5,000 hp per pump	Flowrate: 220 cfs Hp: 5,000 hp per pump
Aqueduct System Pipelines	NA	Length: 12.5 miles Diameter: 72 inches	Length: 12.5 miles Diameter: 72 inches

Three Alternative Alignments for the RCS

The three RCS alternatives studied in Phase A include some similar components: each connects to the All-American Canal at the same location; each requires a water treatment plant to reduce salt content and an operational storage reservoir in Imperial County; and each incorporates a system of pump stations, canals and pipelines connecting to the Water Authority's aqueduct system. There are also significant differences between the three alternatives.

Alternative 3A – Northern Alignment

3A is the northernmost alternative, and it terminates near the TOVWTP. It includes a 46-mile tunnel, three pump stations and a 3,500 acre-foot (AF) reservoir in San Diego County. 3A terminates near the north end of the Water Authority aqueduct system, allowing water to flow south from the connection point by gravity, much like current deliveries from MWD.

Alternative 5A – Southern Alignment

5A terminates at San Vicente Reservoir. It includes a 41-mile tunnel and two pump stations to convey water to San Diego County. This alternative includes an additional pump station and pipeline to convey water to the northern portion of the Water Authority's untreated water system. (See p.8.)

Alternative 5C – Southern Alignment

5C is the southernmost alternative, and it also terminates at San Vicente Reservoir. 5C does not include long tunnels like 3A and 5A. Instead, 5C includes pipelines and five large pump stations to move water over the mountains into San Diego County, a design that provides opportunities for three energy-recovery facilities. This option also includes an additional pump station and pipeline to convey water to the northern portion of the Water Authority system. (See p.8.)

Options for Addressing All-American Canal Constraints

The All-American Canal (AAC) has capacity for constant delivery of RCS supplies until it reaches a bottleneck at the New River Siphon. To move RCS supplies through this constraint, two options were evaluated: Option 1 is a parallel pipeline system and Option 2 is a shared storage system.

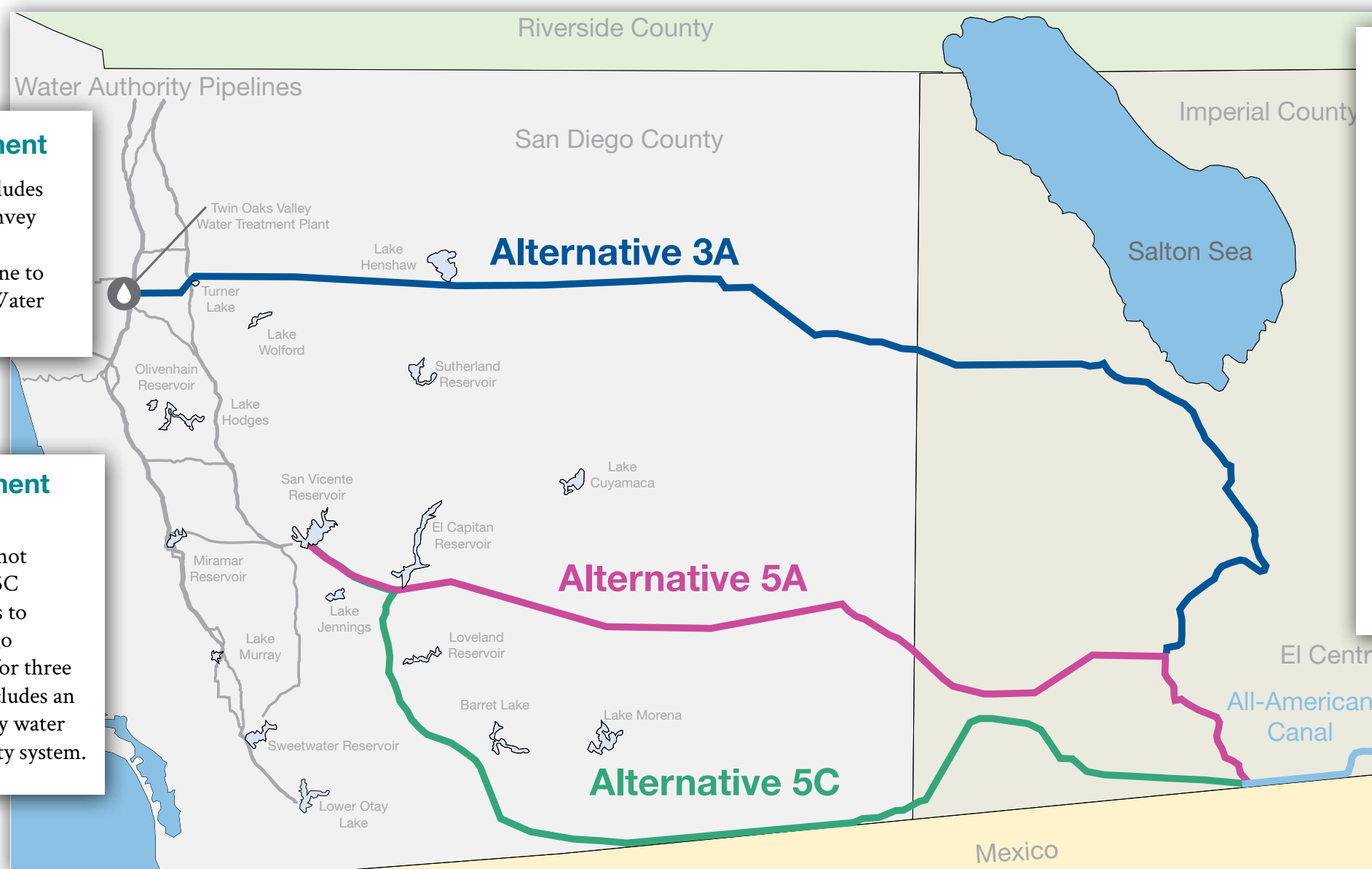
Option 1 consists of approximately 8 miles of canals and pipelines that parallel the AAC. This option is more expensive than Option 2. Option 2 includes a new 900 AF reservoir on the west side of the Westside Main Canal near the Fox Glove Check. This reservoir – shared

by the Water Authority and IID – would serve as a forebay for RCS water treatment facilities. It would allow the AAC to accommodate deliveries from both agencies by optimizing delivery timing. IID could move water at a more consistent rate, relying on the storage to meet peak demands, and freeing up capacity for the Water Authority's QSA flows. Storage on the west edge of IID's service area would provide benefits for IID to improve customer service with more flexible water delivery schedules and conservation opportunities. Option 2 is included in the Phase A cost estimates and economic analysis.

RCS Facility Sizing

The size of RCS facilities depends on the QSA flowrate, operational uptime and treatment losses (described in RCS Treatment). The QSA comprises approximately 280,000 AF/y of supplies from the IID water transfer and canal lining projects. For this study, that annual flowrate was used, less treatment losses (about 20,000 AF/y). The facilities are designed to move approximately 414 cfs, and provide flexibility for annual maintenance.

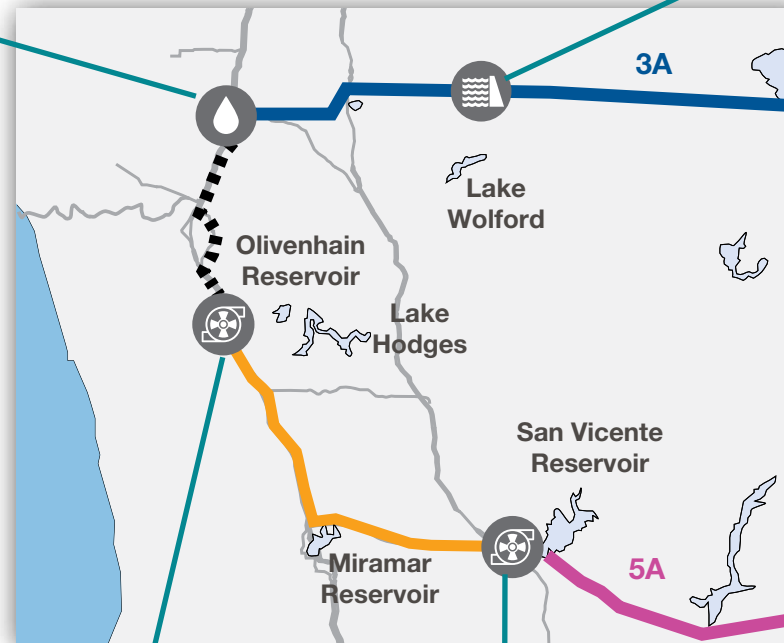
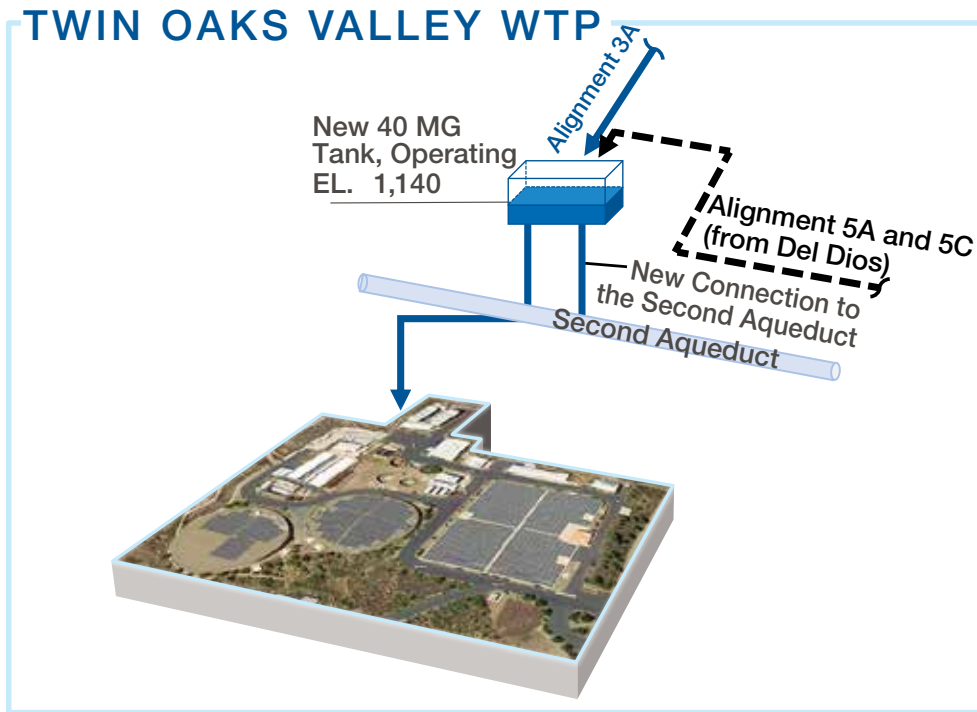
In previous studies, facilities were upsized to accommodate off-peak pumping, a strategy designed to save money through energy programs that may not exist when RCS comes online. Because the energy market continues to evolve – with time-of-use charges changing due to renewable energy mandates – off-peak pumping was not evaluated in this study.



Integrating the RCS into Existing Facilities

Earlier studies did not assess integrating the RCS into existing Water Authority infrastructure while providing seamless service to member agencies. Phase A includes a detailed evaluation of “in-system” facility needs, some of which are shared by all alternatives and some are not.

TWIN OAKS VALLEY WTP



3,500 AF Reservoir – Alternative 3A

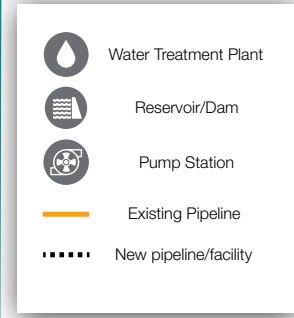
3A would require a small new reservoir in North County to ensure operational flexibility for non-scheduled RCS outages. This reservoir would create a short-term water source while aqueduct operators switch to MWD supplies. The other alternatives would rely on San Vicente Reservoir for all backup supplies.

Pump Station and Pipeline – Alternatives 5A & 5C

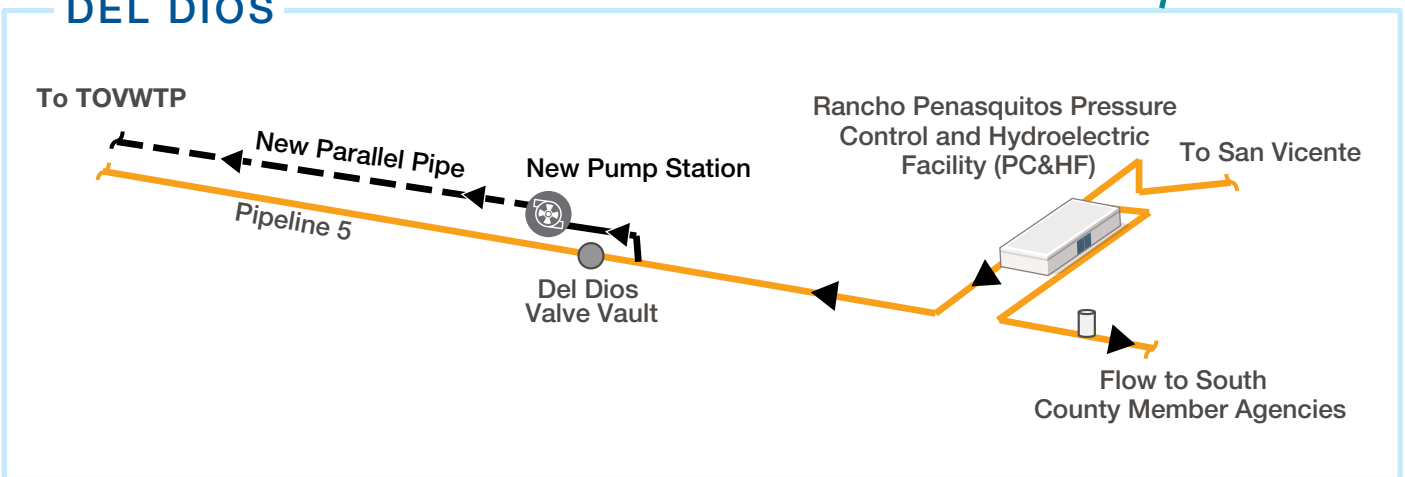
5A and 5C would deliver water to San Vicente Reservoir (EL. 766 ft.), leveraging the value of existing investments. Water stored in San Vicente Reservoir (SVR) would flow by gravity to member agencies to the south, but would require pumping to reach higher elevations. The existing San Vicente Pump Station can pump to EL. 920 feet, pushing water north approximately to the Del Dios Valve Vault. Sending QSA supplies all the way to the new 40-million-gallon storage tank (EL. 1,140 ft.) near TOVWTP would require a new pump station in the Del Dios area near Lake Hodges, along with a pipeline that would stretch for about 12 miles, mainly in or next to the existing Water Authority rights of way for the Second Aqueduct. When QSA flows are not stored in San Vicente Reservoir, the hydraulic grade from the RCS would be sufficient to convey flows to the new pump station near the Del Dios Valve Vault.

40-Million-Gallon Storage Tank – All Alternatives

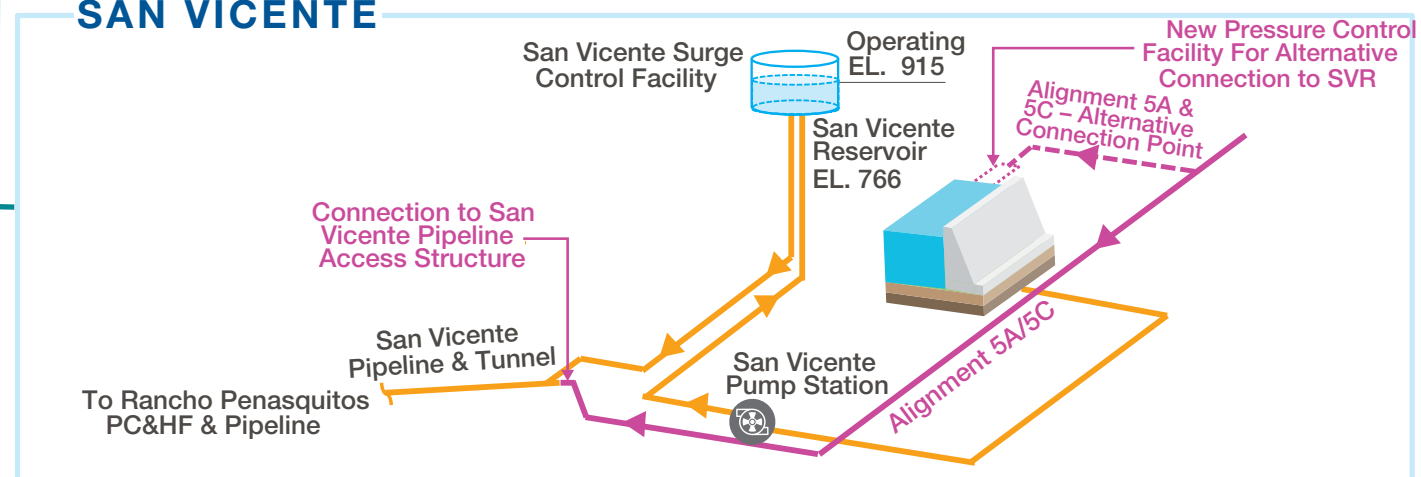
New RCS facilities would allow the Water Authority to maintain consistency of existing untreated water supply operations, to provide continued, consistent service to member agencies, and to provide operational flexibility. For all alternatives, the hydraulic grade line would be set with a new 40-million-gallon storage tank at EL. 1,140 feet or higher near the TOVWTP.



DEL DIOS



SAN VICENTE



Reducing Salinity of QSA Water with a Treatment Facility

A new water treatment facility would be necessary for all three RCS alternatives to reduce the salinity of untreated Colorado River water and align with the current salinity goals for MWD deliveries. Salt concentrations, also referred to as total dissolved solids, or TDS, in Colorado River water typically range from 600 to 880 mg/l, which is higher than water from the State Water Project. Currently, MWD delivers a blend of those two sources, bringing the average salt concentration to approximately 500 mg/l. Since QSA water is sourced solely from the Colorado River, treatment is needed to meet the same goal.

Treatment Plant Location

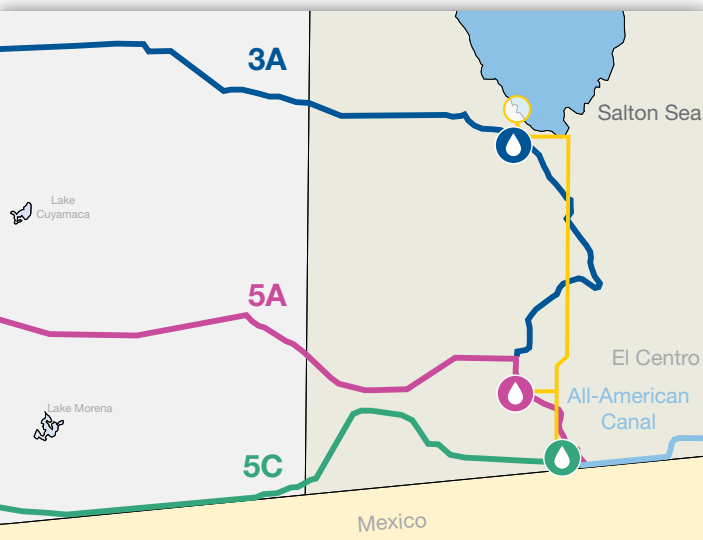
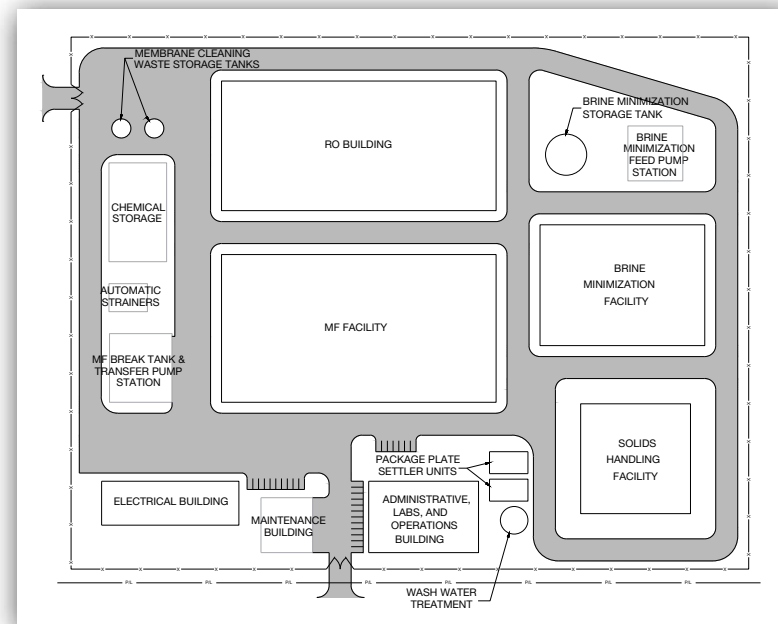
RCS water can be treated either near the source in Imperial County or in San Diego County. Two key items influence the location of the treatment plant, including the amount of water being transported and the management of treatment byproducts (most notably brine). Brine represents a total volume loss of approximately 5-10%, so treating in Imperial Valley would reduce the size, capital, and Operation and Maintenance (O&M) costs of much of the RCS facilities. It was determined that the most cost effective approach is to treat the QSA water in Imperial Valley.

Salinity of Water Sources

	MWD	Colorado River	Treated QSA
TDS	500 mg/l	600 - 880 mg/l	500 mg/l

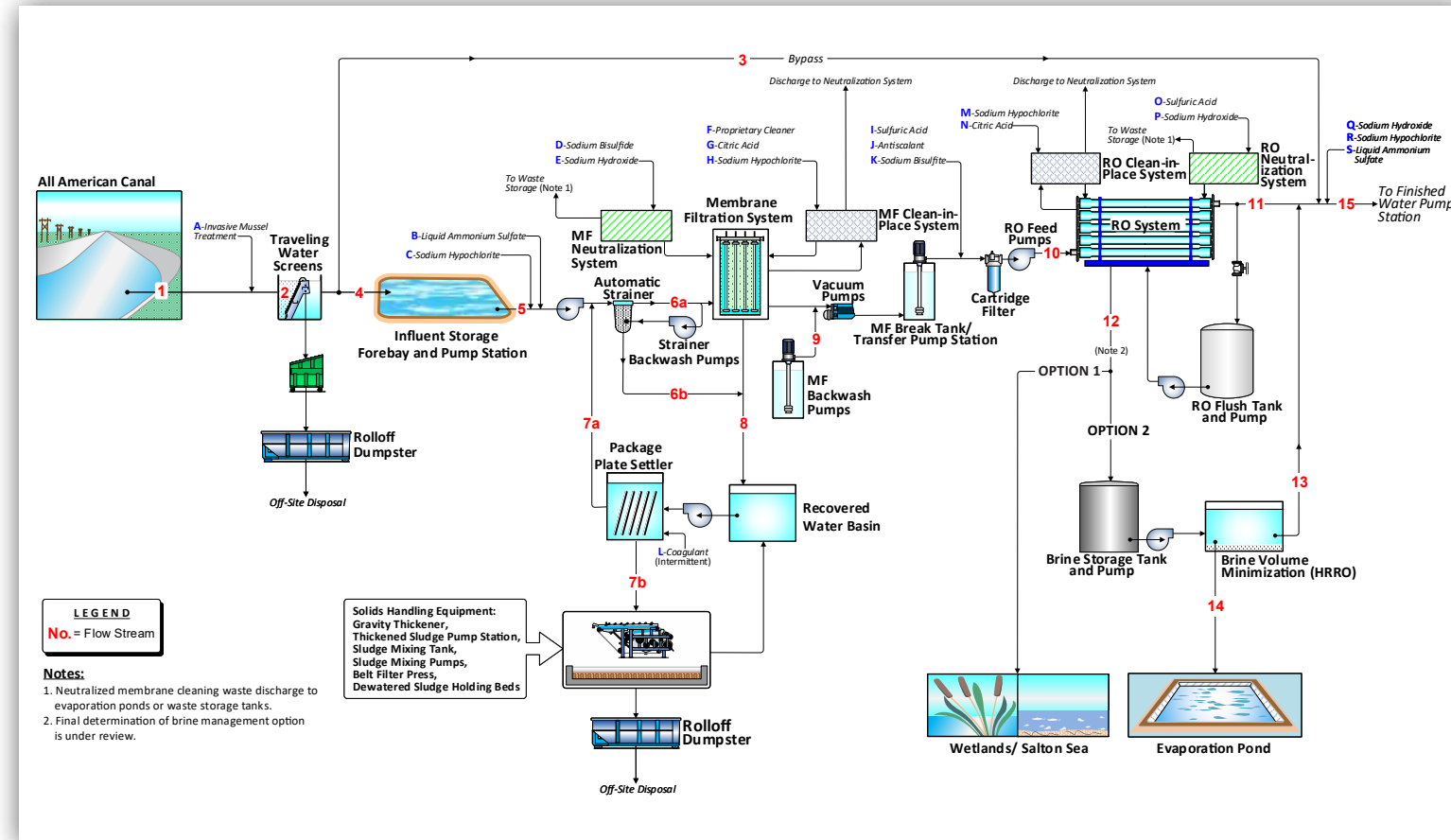
Plant Layout

A preliminary treatment plant layout was developed to help forecast costs. Each RCS alternative requires a slightly different plant layout to accommodate differing site conditions.



The Treatment Process

Membrane treatment is likely the preferred process for QSA water salt removal due to its efficiency and cost-effectiveness. This diagram represents the unit processes and other elements of the plant used to prepare layouts and costs.



Brine Management

Removing salt from QSA water requires a plan for managing the highly saline byproduct called brine. The nearby Salton Sea is an attractive location because salinity of QSA brine (approx. 5,000 mg/l) would be much lower than the sea's salinity of approximately 60,000 mg/l, creating potentially significant environmental benefits. Brine could be deposited directly to the Salton Sea or released into constructed wetlands nearby. Both approaches are viable due to the likelihood of regulatory approvals and partnership opportunities. Direct delivery was used to develop cost estimates, though wetland restoration would be further studied, if Phase B moves forward.

Treatment Facility Implementation

The Water Authority has experience with a variety of contract delivery methods that could help develop a financing solution for the RCS treatment plant. For instance, the agency developed a public-private partnership with Poseidon Water to build and operate the Claude "Bud" Lewis Carlsbad Desalination Plant, which began commercial operations in 2015. The previous decade, the Water Authority developed its TOVWTP using a design-build-operate contract. Alternative design-build and conventional design-bid-build strategies also should be considered. Phase A assumed a design-bid-build development path because additional partnerships won't be better defined until Phase B, if authorized.

Meeting RCS Energy Demands

New electric transmission lines and substations would be necessary to deliver power to RCS facilities, including the treatment plant, pumping stations and tunnel portals. The RCS would cross areas served by two electric utilities – IID and San Diego Gas & Electric (SDG&E). Both utilities have existing infrastructure – ranging from high-voltage 12 kV lines to extra-high-voltage 500 kV lines – that could be tapped by the RCS. Choosing the right energy procurement strategy is critical to ensuring a cost-effective RCS.

Utility Coordination

The Water Authority and IID identified existing and proposed electrical transmission and step-down substation facilities for supplying power to RCS facilities in IID’s territory. Preliminary power supply alternatives in SDG&E’s service area have been identified for estimating costs. If the RCS progresses, additional coordination with electric utilities would be required.

Power Purchase Options

Power purchases would be a major component of RCS costs over many decades, requiring special care when it comes to developing an affordable energy procurement strategy. For this study, the annual operating cost estimates for energy were based on published data. However, due to the size of the RCS energy demand, the Water Authority likely could lower energy costs with the following strategies:

- Local Energy Providers – Long-term power purchase agreements could be negotiated with IID and SDG&E.
- Request for Offer – Issuing a Request for Offer would allow for a public-private partnership in which energy providers compete with investor-owned utilities (IOUs) and public energy providers for long-term energy contracts. This could drive down energy costs compared to published rates. Because RCS energy contracts could last for decades, private energy providers may be motivated to tailor new power-generating facilities to RCS needs. This is particularly likely given California’s goal of procuring 100% renewable energy by 2045, which coincides with the operational start of the RCS.



Key Energy-Demand Facilities

Facility Description	Power Requirement	Major Components
Salinity Treatment Facility	55 MW	Microfiltration (MF), reverse osmosis (RO), screening, intermediate pumps, HVAC, lighting, chemical systems, washwater treatment, brine volume minimization
Pump Station (each)	36 MW	Pumping units, HVAC, lighting, misc. loads
Tunnel Portals	2 MW	Power to Tunnel Boring Machine (TBMs) and associated systems, HVAC, lighting, dewatering



Navigating Risks in an Uncertain World

Every strategy for providing water to San Diego County comes with inherent risks – uncertainties that could have positive or negative effects. Even the status quo, of course, poses risks. Economic, political, geologic, hydrologic, and other uncertainties are part of every water-related equation, and they are most pronounced with long-term projections. But generational thinking is what water agencies must do, especially in semiarid regions like San Diego County with few natural water resources. The real issue is how to best address risks through planning, diversification, partnerships and other strategies – which is why risk management is a key element of every project.

RCS Risk Analysis

The RCS would involve elements of risk – and those risks are greater for some options than they are for others. Phase A includes a Risk Register that accounts for high-level risks divided into seven categories.

For each studied alternative, these risks were assessed qualitatively and scored. High scores represent risks that are very likely and come with significant cost and schedule implications. Lower scores correspond to lower likelihood and fewer impacts.

As part of Phase A, one of three high-level strategies was assigned to each known risk: mitigate, avoid, or accept. Phase A also includes more details about what each type of strategy could include.

While each potential RCS route has a unique set of risks, the largest risks for each project are unknown, underscoring the importance of updating risk analyses at key points along the way.

Risk Categories

RCS risks were divided into seven categories:

- Design
- Permitting and environmental
- Right-of-way
- Construction
- Operations
- Agency coordination
- Public affairs

No Fatal Flaws

The risk assessment included a fatal flaw analysis that considered two main risks that could derail the project. The first was not meeting project objectives, such as being cost-competitive or enhancing supply resiliency. The second category of fatal flaws includes environmental impacts that can't be mitigated. Fatal flaws were not detected for Alternatives 3A and 5A. Alternative 5C did not have any technical fatal flaws, but it was not cost-competitive with Alternatives 3A and 5A, and it was only marginally competitive to the status quo.

Next Steps in Risk Analysis

If this study moves to Phase B, the Risk Register would be enhanced with a quantitative analysis of potential cost and schedule impacts that would also be used to update the economic analysis. (See page 16-17.)

Refining Costs to Provide More Project Clarity

Previous studies offered a foundation to develop updated costs for very complex RCS systems that would comprise numerous facilities, such as pipelines, canals, tunnels, pump stations, treatment facilities, tanks and reservoirs.

B&V prepared a new cost estimate for 3A and updated costs for the other two alternatives, providing the basis for economic analysis by staff. While 5A and 5C have been evaluated several times over the years, 3A had not been studied since 1996. As a result, in Phase A, Alternative 3A was evaluated in sufficient detail to match 5A and 5C.

In addition, areas that were not previously detailed or evaluated were developed to provide enough engineering clarity to perform a Class 4 cost estimate of the entire project. Class 4 cost estimates are appropriate for feasibility-level analysis and relevant Class 4 cost contingencies are included. Costs associated with identified risks would be further evaluated and refined in Phase B, if authorized.

RCS costs were developed based on conceptual engineering and refined with feedback from an independent review. The costs were then used to compare alternatives and inform the economic analysis. (See page 16-17.)

Topline Cost Comparison of RCS Alternatives

2020	Alternative 3A	Alternative 5A	Alternative 5C
Capital	\$4.95 Billion	\$4.96 Billion	\$4.86 Billion
Annual Operation, Maintenance & Replacement Costs	\$143 Million	\$149 Million	\$258 Million



New RCS Facilities

Several RCS facility needs were identified and studied in Phase A, resulting in a more robust cost projection. Major upgrades from past studies include providing costs associated with: addressing All-American Canal and Westside Main Canal capacity constraints; integrating the RCS into the Water Authority's aqueduct system; and better-defining RCS treatment facilities.

Independent Review of Project Costs

Based on direction from the Water Authority's Board of Directors, an independent review of project costs was conducted by Hunter Pacific Group, which was selected through a competitive process. That review resulted in project cost refinements.

Building the RCS is Cost-Competitive with Other Options

Economic comparisons are at the heart of Phase A; identifying non-competitive options is critical, as is comparing the RCS against other alternatives for meeting future water needs to support the San Diego region. To complete this complex task, B&V performed the technical and financial assessment that informed staff's economic analysis.

Water Supply Options

Several water supply options were evaluated through 2112, the end of the canal lining agreement in the QSA:

1. Building and operating RCS Alternative 3A
2. Building and operating RCS Alternative 5A
3. Developing additional local supplies when the initial IID transfer portion of the QSA ends in 2047
4. Relying on MWD for 200,000 AF/y of supplies when the initial IID transfer portion of the QSA ends in 2047
5. Relying on MWD for 200,000 AF/y of supplies when the IID transfer portion of the QSA ends 2077 (if the transfer is extended)
6. Extending the IID transfer portion of the QSA and entering into a new agreement with MWD to continue transporting transfer water through 2112

Comparison of Results

The analysis showed that 3A and 5A are cost-competitive with all other options without partnership funding (referred to as the "baseline" condition). Because the cost to develop the RCS is significant, the project would likely benefit from a variety of potential partnerships with private companies, utility providers, federal, state, and local agencies, and others.

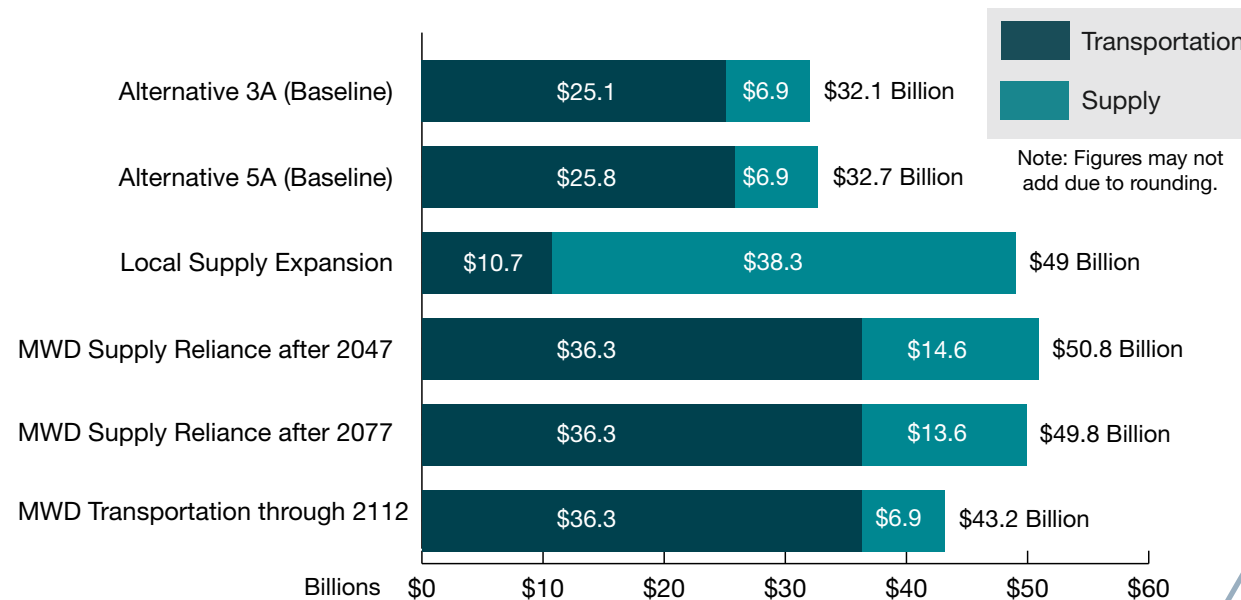
Forecasting MWD's Rates

Future prices of MWD's untreated water and transportation service were projected based on 20 years of historical data. Over the past two decades, MWD's transportation costs have increased an average of 4.5% annually. MWD's Tier 1, full-service untreated water rate has historically risen an average of 5.1% annually, and that escalation factor was used to forecast MWD rates. MWD's full-service rate was also evaluated at 0.5% higher and lower as part of the sensitivity analysis to assess a variety of potential outcomes within a reasonable range. Phase B, if authorized, would include an additional economic analysis incorporating any revised or new information.

Other Key Assumptions

- No projected costs from the Bay-Delta Water Fix or MWD's recycled water program were included in MWD's Tier 1 Full-Service rate; any costs for these projects would require additional rate increases.
- The assumed cost of new local supplies was \$3,000/AF and is based on a melded rate of half ocean water desalination and half recycled water. A detailed evaluation was not performed but could be added to Phase B.
- No grant or partner funding was included in Phase A; those funding sources would be explored in Phase B.
- The Water Authority would own and operate RCS facilities.

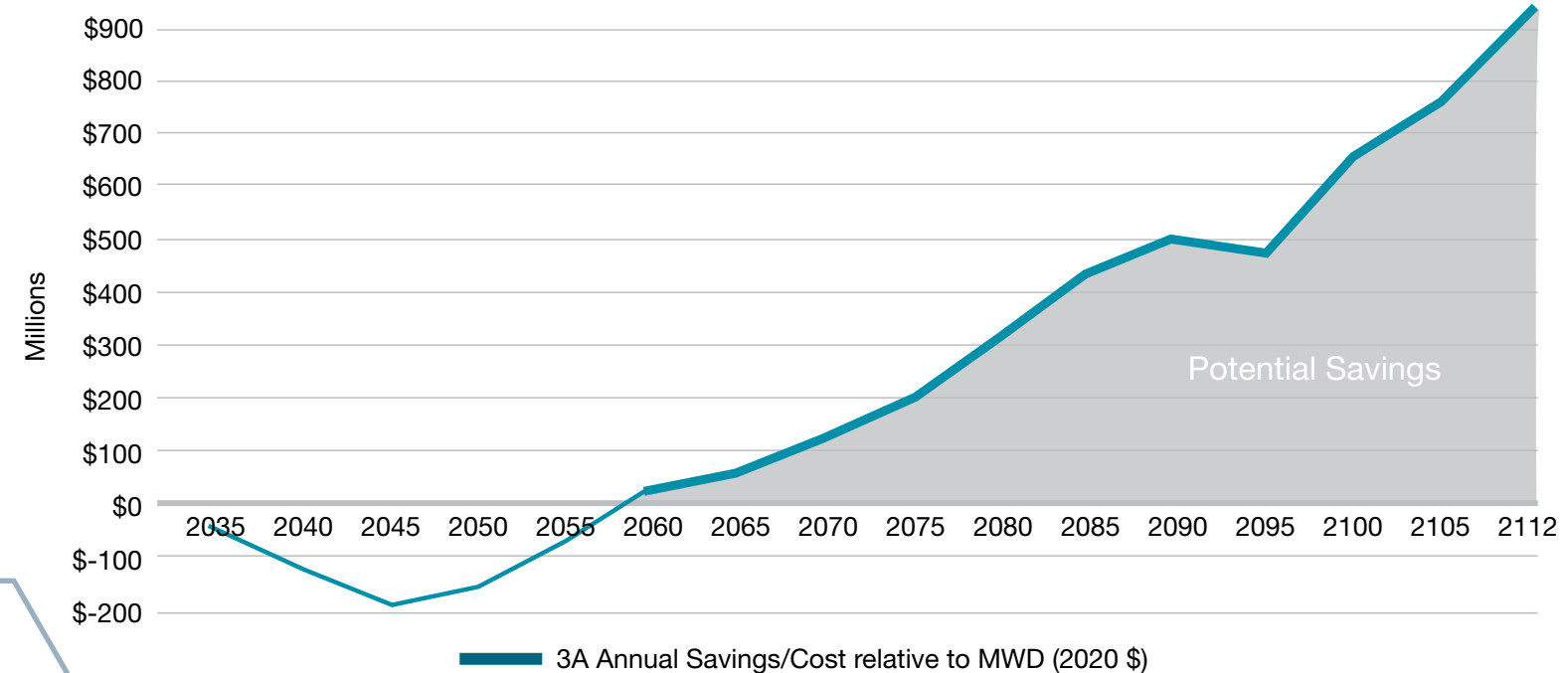
RCS on Low End of Cost Forecasts*



*Net Present Value of 277,700 AF (2045-2112); assumes incremental costs through 2045 and includes the cost of water transportation and supplies starting in 2045.

RCS Produces Significant Savings Over Time

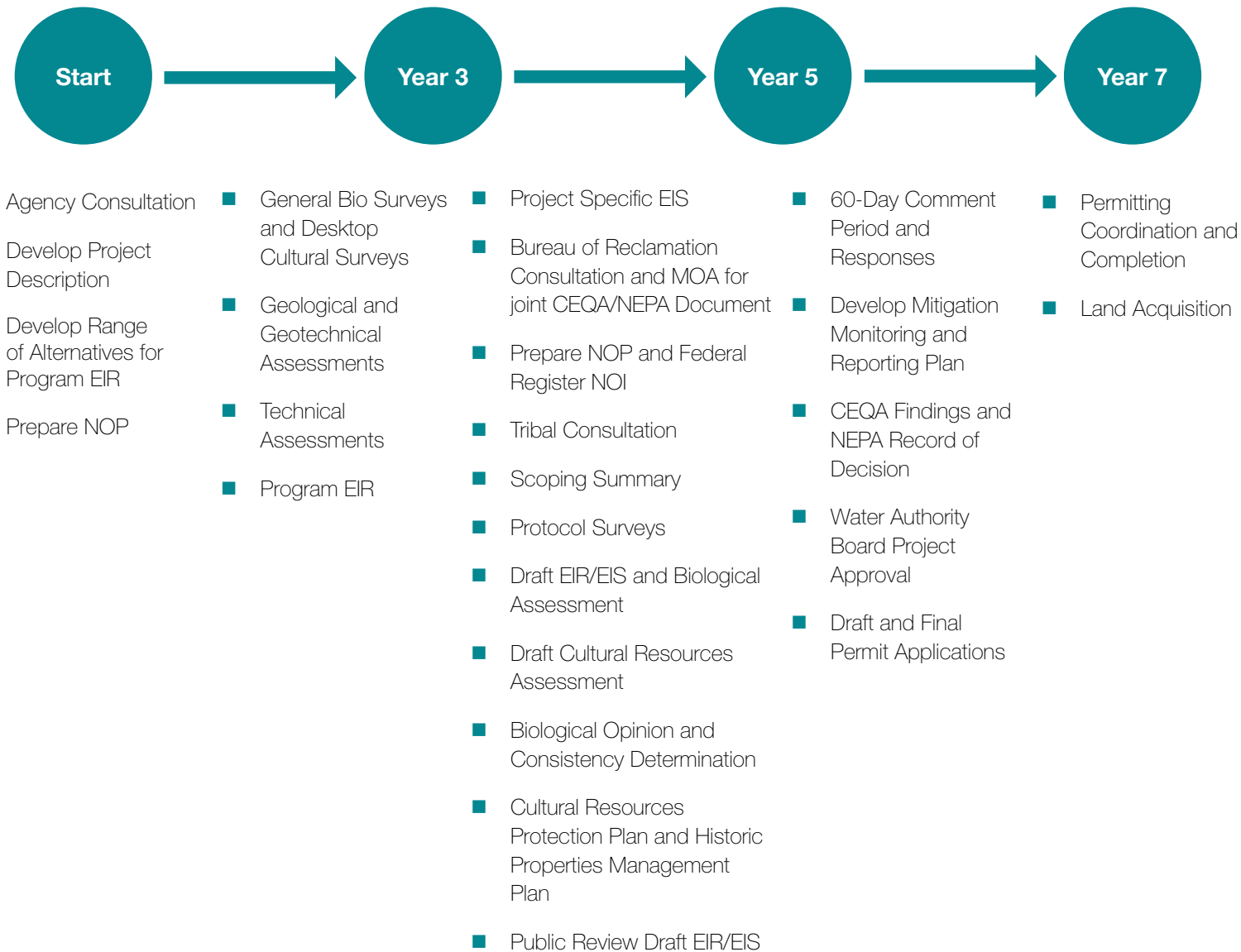
Shortly after project completion, the RCS starts to yield long-term benefits



Like any major infrastructure project, the RCS would require numerous permits and environmental approvals. Each alternative would have both shared and unique permitting requirements. For instance, each route requires land for access roads, canals, tunnels and tunnel portals, powerline corridors and other facilities.

The RCS would cross a variety of federal, state, county, city and private lands. It's also near habitat preserves, state and local parks, a national landmark, a military reservation and tribal reservations. The permitting process for major infrastructure projects is complex and takes many years to complete. The chart below summarizes major regulatory approvals that would be necessary for the RCS.

Overview of the Regulatory Approval Process



The three RCS alternatives offer many shared and unique partnership opportunities, and those opportunities were evaluated in Phase A based on an initial review of agencies, governments, and other organizations that align with the Water Authority's interests in water supply resiliency and environmental sustainability. Priority consideration was given to partners that may benefit from the RCS in a variety of ways, including the use of shared facilities and shared project funding.

Partnership Categories

Shared Storage – All alternatives could benefit from a partnership with IID for an operational water storage facility in Imperial Valley. Shared storage could also include groundwater replenishment, which could yield environmental and community economic benefits.

Environmental Benefits – With a desalination treatment facility near the Salton Sea, brine generated by the RCS could help lower salt concentrations in the sea and provide a water source for habitat restoration.

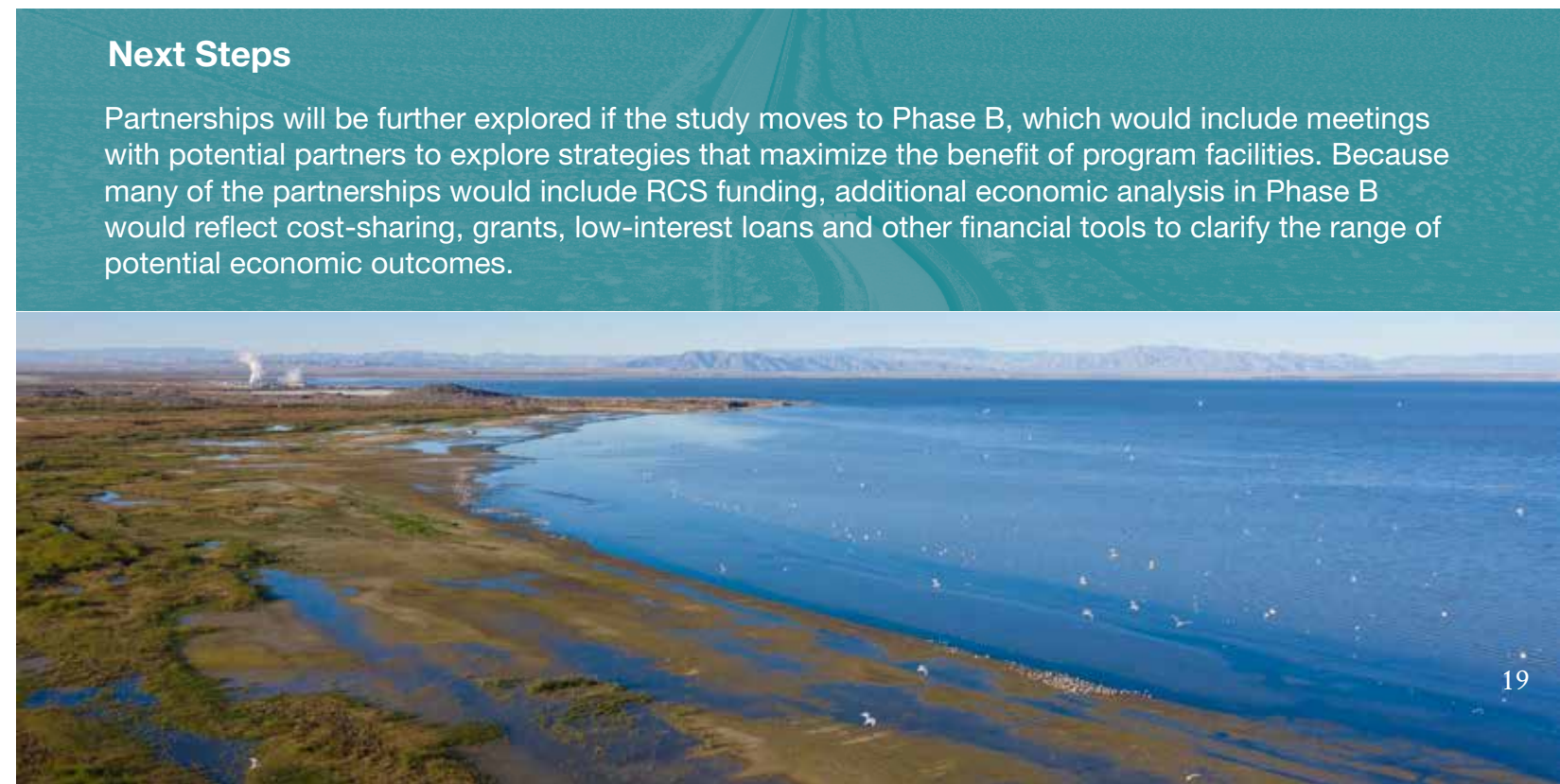
Public-Private Partnership (PPP) – Because of the large scale of the RCS, private entities may be interested in developing facilities, such as a treatment plant or renewable energy facilities, increasing the potential for partnerships that reduce risk for Water Authority ratepayers.

Resiliency Partnerships – The RCS would add resiliency to the water supply in San Diego County, making it an attractive program for the state and federal governments – and possibly even a bi-national partnership. Water supply resiliency is critical during natural disasters, such as earthquakes and wildfires, that can render some infrastructure inoperable while highlighting the value of alternative facilities.

Member Agency Partnerships – For each potential RCS route, Water Authority member agencies could benefit from additional flexibility in untreated water deliveries to existing reservoirs nearby.

Next Steps

Partnerships will be further explored if the study moves to Phase B, which would include meetings with potential partners to explore strategies that maximize the benefit of program facilities. Because many of the partnerships would include RCS funding, additional economic analysis in Phase B would reflect cost-sharing, grants, low-interest loans and other financial tools to clarify the range of potential economic outcomes.



RCS Could Leverage Several Funding Opportunities

Major infrastructure development projects like the RCS require thoughtful, strategic funding strategies that can involve a variety of options. By incorporating a sensitivity analysis into the funding development, the Water Authority can assess what strategies provide the most value for ratepayers. Phase B, if authorized, would include additional analysis of funding options.

Public-Private Partnerships

The Water Authority would benefit from PPPs by moving upfront costs of a facility – or perhaps several facilities – to the private sector. Development risks (and potentially operating risks) may be accepted by companies in return for profits, a model successfully used at the Claude “Bud” Lewis Carlsbad Desalination Plant. In addition, construction and financing costs could be kept off the Water Authority’s balance sheet. Up-front cost transfers would result in higher overall program costs and a higher Net Present Value (NPV), but the trade-off would be greater protection for the Water Authority and ratepayers from some risks and development costs.

Low-Interest Loans

Public infrastructure projects often qualify for low-interest loans from state and federal agencies. State Revolving Fund (SRF) loans are the most common government program, offering subsidized interest rates that are currently about 1.5%. Preliminary project design and permitting must be in place before SRF loan closing. SRF loans can be combined with other funding and financing sources. They require some construction materials be made in the U.S.

WIFIA Loans

The federal Water Infrastructure Finance and Innovation Act (WIFIA) provides 30-year loans with an optional 5-year deferral period and flexible repayment schedule. WIFIA loans include a subsidized interest rate, currently about 1.3%, and cover up to 49% of total project costs. Preliminary designs and permitting must be in place before closing. WIFIA debt can be subordinated to other debt, and it can be combined with SRF loans and other funding sources. WIFIA requires some construction materials be made in the U.S.

Tax-Exempt and Taxable Bond Sales

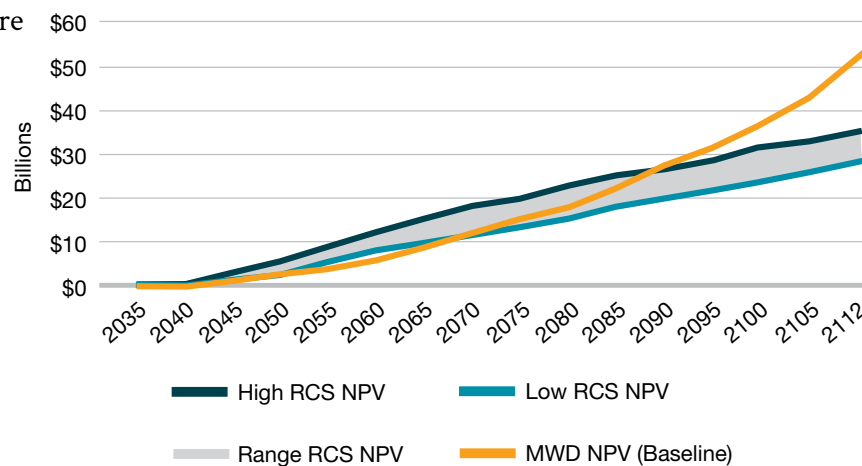
Tax-exempt and low-interest bonds (with rates at approximately 1.5-2.5%) require Board approval and, in some cases, a public vote. These bonds are backed by the credit and taxing power of the Water Authority, rather than project revenue.

Taxable bonds are generally more expensive than tax-exempt bonds because investors are not able to deduct interest earnings from taxable income; however, they come with greater flexibility in what type of projects they can fund.

Grants

State and federal governments offer many grant programs for critical water infrastructure, however, grants are often small and include restrictions. Most grant programs require preliminary designs to be complete and permitting in place before closing.

Long-Term MWD Costs Exceed RCS Costs



The Phase A economic analysis includes several assumptions, including no grants, standard financing, and construction and operation of the facilities by the Water Authority. This graphic shows a high-level sensitivity analysis of Alternative 3A (baseline condition); higher and lower costs for 3A construction and capital; and the MWD baseline scenario. While this presents conservative bookends for the net present value of 3A, savings opportunities would be assessed in future studies.

Initial Screening Analysis Produces Competitive Alternatives

An important component of Phase A was conducting an initial screening analysis by comparing each of the three RCS alternatives to other supply and conveyance options and against each other to see if one or more alternatives could be removed from consideration. If the study moves to Phase B, viable alternatives would be further evaluated to confirm competitiveness with other options and identify the preferred alternative.

Project Objectives

To assess overall viability, each alternative was rated on project objectives:

- 1. Cost-Competitiveness** – Does the alternative offer a cost-competitive solution that makes good use of ratepayer funds compared to the status quo?
- 2. Consistency with other Water Authority Investments** – Does the alternative provide resilient and reliable improvements that are consistent with the Water Authority’s other investments?
- 3. Multiple Benefits** – Does the alternative provide multiple benefits by meeting multiple needs and aligning with state objectives, such as California’s Water Resilience Portfolio?

Evaluation Process

For alternatives that met the project objectives, further evaluation was performed using information collected during the study. A scoring system was developed to objectively compare alternatives using screening criteria and weighting factors that emphasize the most important screening items.

Scoring details were established for each criterion and then applied to the alternatives in a model developed for the study. Scores from the model were used to rank alternatives and run sensitivity analyses.

Screening Criteria

- Project Cost
- Environmental Constraints – Land Impacts
- Environmental Constraints – Greenhouse Gas Emissions
- Regulations & Institutional Coordination
- Land Use
- Community Impacts & Public Affairs
- Operations – Mechanical Equipment
- Operations – Canals
- Partnership Opportunities

Screening Results

The screening process included an assessment of whether alternatives met project objectives and the development of weighted scores for each alternative.

Alternatives	3A	5A	5C
Objectives (Pass - Yes/No)	Yes	Yes	No
Weighted Score	422	380	148

Conclusion

Alternatives 3A and 5A meet project objectives, while 5C does not due to its high long-term O&M costs, largely from pumping and energy use. Even though 5C did not meet the project objectives, its scores were run through the screening analysis to provide a complete assessment.

Next Steps Needed to Maintain RCS Viability

Phase A of the RCS study was successful in providing answers to several key questions about the viability of an independent water supply and conveyance system from the All-American Canal to San Diego County. For a decision of this magnitude with potentially significant long-term economic benefits to the region, continued step-by-step phase implementation is prudent until a clear long-term water supply option emerges.

Cost Competitiveness

3A and 5A are cost-competitive to other water supply and delivery options, including: the status quo, replacing IID transfer supplies with other MWD water supplies, and replacing IID transfer supplies with local water resource development.

Future Water Demands

Based on San Diego County water demands from the 2015 Urban Water Management Plan (2018 Reset), all of the existing QSA supplies will be needed in 2045, the projected on-line date of the RCS. In addition, Phase A indicates that there will always be a need for some MWD water unless alternative supplies are developed above and beyond current supplies and proposed additional local supply development.

Multi-Benefit Opportunities

All RCS alternatives analyzed in Phase A would provide multiple benefits, including improved water supply resiliency, consistent with state goals.

Offramps

Each phase of the RCS study and program development is designed with offramps for the Board to discontinue if this option no longer makes sense – all the way up to the start of construction in about 10 years.

Flexibility in Decision-Making

The development process provides numerous offramps until construction begins, not only at the end of each phase but at any point along the way.

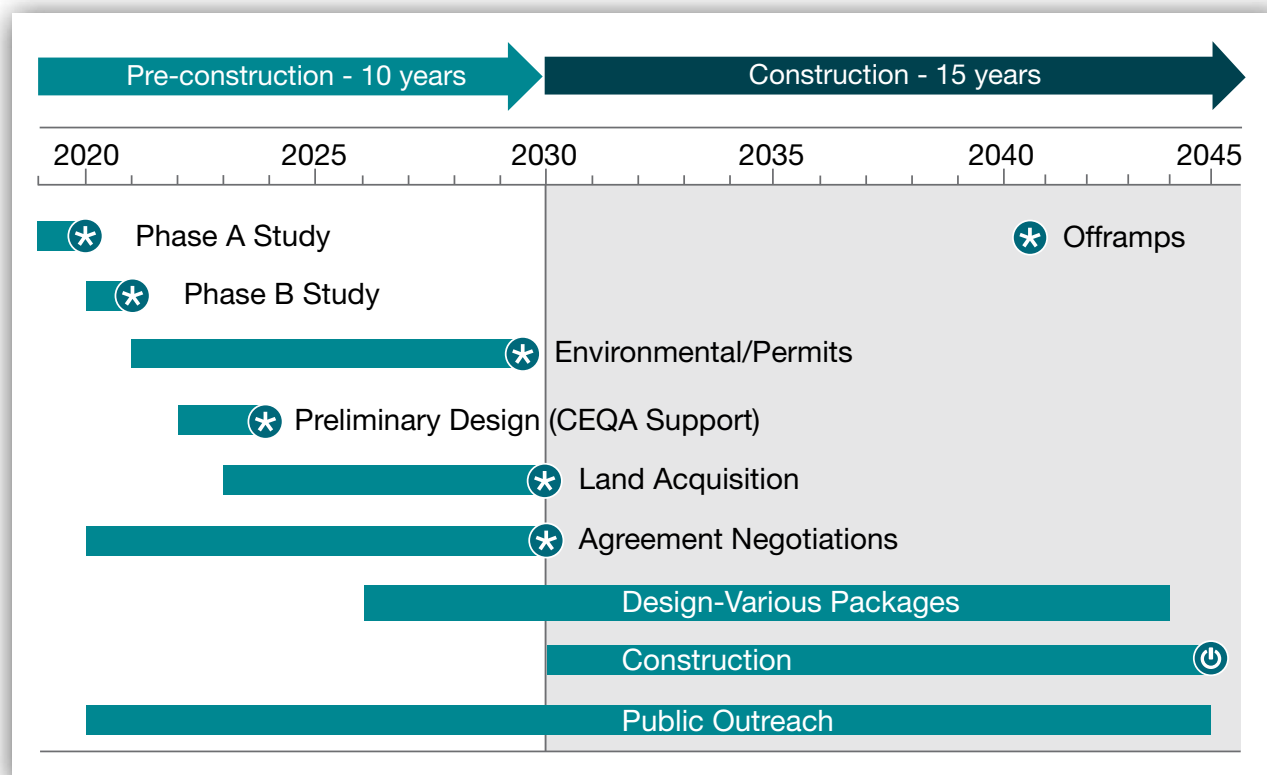
Phase B

Charting a path for the future of the San Diego region's water supply requires flexibility, agility and strategy. Phase A showed that the RCS is one of the options that remains a viable solution. However, the long lead time for developing major infrastructure projects means the Water Authority Board would need to authorize Phase B to retain the RCS option. Otherwise, the window of opportunity for the project will close due to the need to make other decisions about water supply sources and transportation options. Phase B would take another year to complete and include another offramp for the Board to consider next steps based on Phase B results. It would also include public outreach to stakeholders and potential partners to help inform the study. Staff would continue to engage with the Board and member agency managers during Phase B, as was done in Phase A.

Potential Phase B Components

Phase B would determine a preferred alternative and provide a conceptual analysis for starting the CEQA/NEPA process. Phase B would help to inform Water Authority Board decisions on potential next steps and future phases. Phase B would also include:

- Quantitative Risk Assessment – Furthering the Risk Register by assessing the probability of each risk, along with the impacts of each risk, and the resulting cost of mitigation plans. That information would facilitate updates of RCS costs and the economic analysis.
- Updated Water Supply Demands – The 2020 Urban Water Management Plan would be used to update future water demands and compare projections with QSA supplies.
- Further Refinement of Facility Layouts – Improving the detail of facility layouts would improve cost estimates and lower the risk of cost escalation.
- Refined Cost Estimates – New and refined information would further clarify project costs.
- Partnership Discussions – Compatible multi-use projects identified in Phase A would be explored with the potential partners.
- Funding Opportunities – Quantification of funding opportunities and resulting impacts on cost and economics would be explored.
- Economic Sensitivity Analysis – Additional sensitivity analysis would be developed to frame a range of potential economic outcomes for RCS alternatives, MWD alternatives, and local supply development options.
- Legal Analysis – Assessing revisions to existing agreements, such as the QSA and any new agreements required as a result of the RCS option.

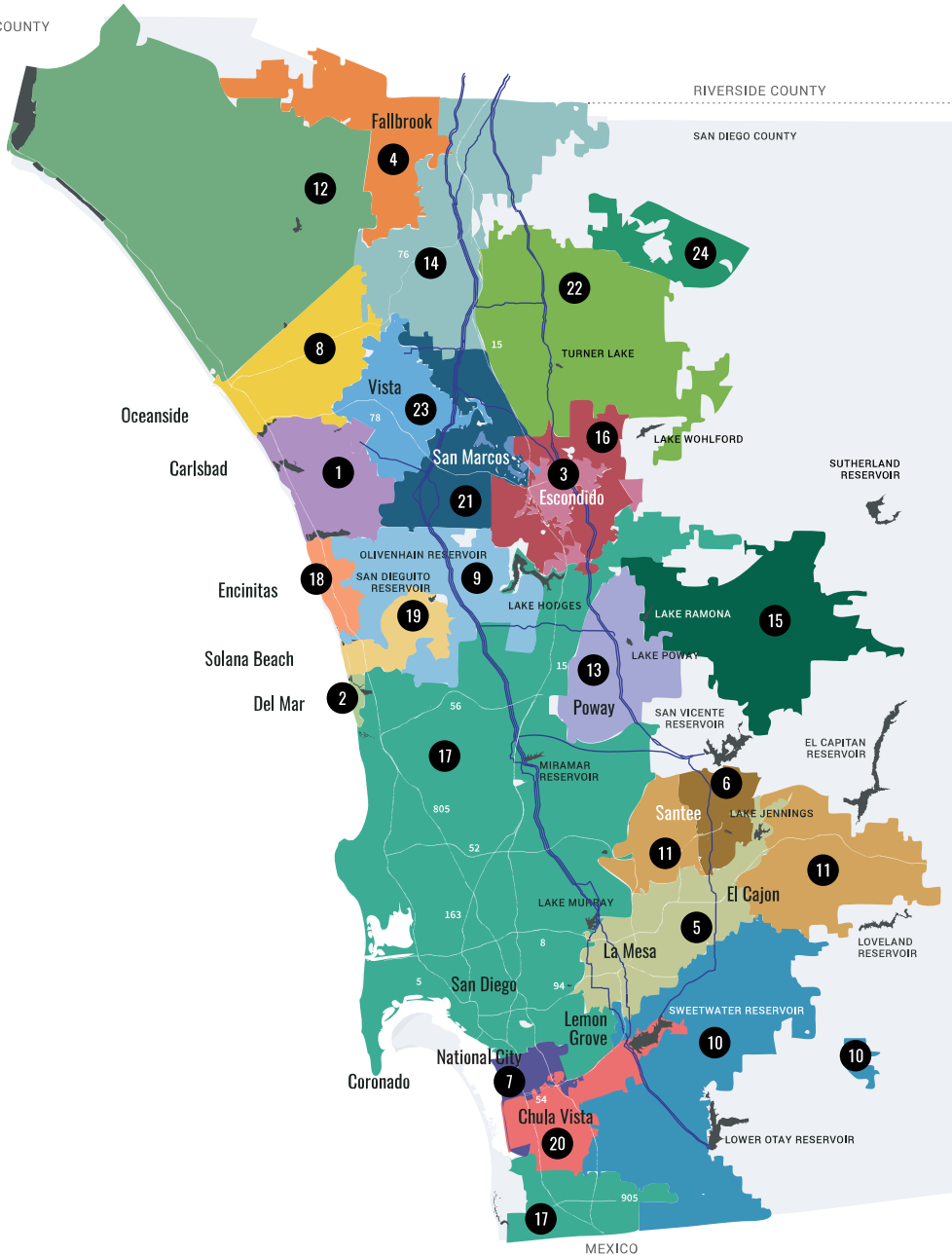


Member Agency Map

ORANGE COUNTY

RIVERSIDE COUNTY

SAN DIEGO COUNTY



- 1 Carlsbad MWD
- 2 City of Del Mar
- 3 City of Escondido
- 4 Fallbrook Public Utility District
- 5 Helix Water District
- 6 Lakeside Water District
- 7 City of National City*
- 8 City of Oceanside
- 9 Olivenhain MWD
- 10 Otay Water District
- 11 Padre Dam MWD
- 12 Camp Pendleton Marine Corps Base
- 13 City of Poway
- 14 Rainbow MWD
- 15 Ramona MWD
- 16 Rincon del Diablo MWD
- 17 City of San Diego
- 18 San Dieguito Water District
- 19 Santa Fe Irrigation District
- 20 South Bay Irrigation District*
- 21 Vallecitos Water District
- 22 Valley Center MWD
- 23 Vista Irrigation District
- 24 Yuima MWD

* The Sweetwater Authority is a service organization for the City of National City and the South Bay Irrigation District.

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