San Diego County Water Authority Regional Conveyance System Environmental Impact Analysis

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ENE 502

Project Description

Project Purpose

The San Diego County Water Authority (SDCWA) provides water supplies to a population of 3.3 million and sustains a $245 billion economy through its retail member agencies. In order to maintain this growing population and continue to sustain the economy, the SDCWA must secure a long-term, cost-effective water supply. Currently, approximately ⅔ of the SDCWA supply comes from the Colorado River via aqueducts, around 20% comes from local supplies, and the rest comes from Northern California.

With the vast majority of the County's water supply coming from the Colorado River, this supply must be secured in a cost-effective manner for the future. The San Diego Regional Water Conveyance System (RCS) is a proposed project that would allow direct connection of water from the Colorado River to the San Diego County Water Authority via a system of canals, pipelines, and tunnels beginning from a connection to the All-American Canal. This project proposal stems from the 2003 Colorado River Quantification Settlement Agreement (QSA) in which San Diego County receives water indirectly from the Colorado River via the Metropolitan Water District of Southern California (MWD). The 2003 Colorado River QSA apportioned 4.4 million acre-feet of water to the State of California. This agreement arose, in part, due to California's consistent overconsumption of water supplies beyond that of its 4.4 million acre-feet allotted portion, and, as a part of the QSA, California has agreed to reduce its reliance on imported water by conserving and transferring up to 280,000 acre-feet of water annually from Imperial Valley to San Diego County. This conserve-and-transfer agreement thus became the largest agricultural to urban water transfer within the United States. This water is still connected to the Colorado River, but the supplies come from the conservation agreement with the Imperial Irrigation District, thereby saving resources within the state.

Currently, these supplies are transported to the Water Authority by the MWD via the San Diego Aqueducts. This process is very expensive to the Water Authority because of the transportation and treatment fees charged by the MWD, and these fees are set to continue increasing in the coming decades. It has been estimated that the San Diego County region will continue to need the 2003 QSA water supplies until at least 2112, while the transportation and treatment contract with the MWD is set to expire in 2047, with an extension possible until 2077. Therefore, the Water Authority is seeking a long-term, economically feasible alternative to access these reliable supplies for the County. The studies conducted in partnership with the Water Authority to date have identified two financially feasible routes (routes 3A and 5A) to serve as a direct connection to the All-American Canal in the Imperial Irrigation District via a combination of canals and pipelines. Both routes are able to be integrated into the existing Water Authority infrastructure without many significant changes to current operations. In addition, by incorporating multi-use projects with partnership agencies, the cost of the water supply could be reduced still and enhance the value of this project while providing regional benefits to surrounding areas.

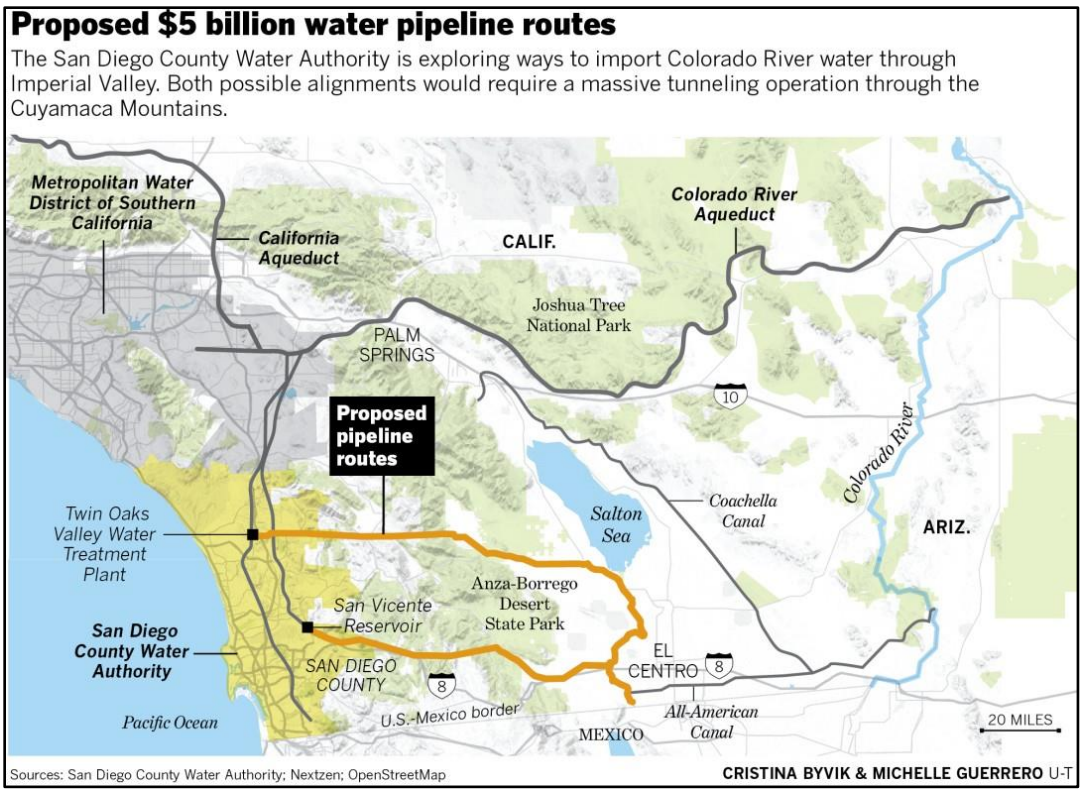

Figure 1.1: Existing Southern California Aqueduct System with Proposed RCS

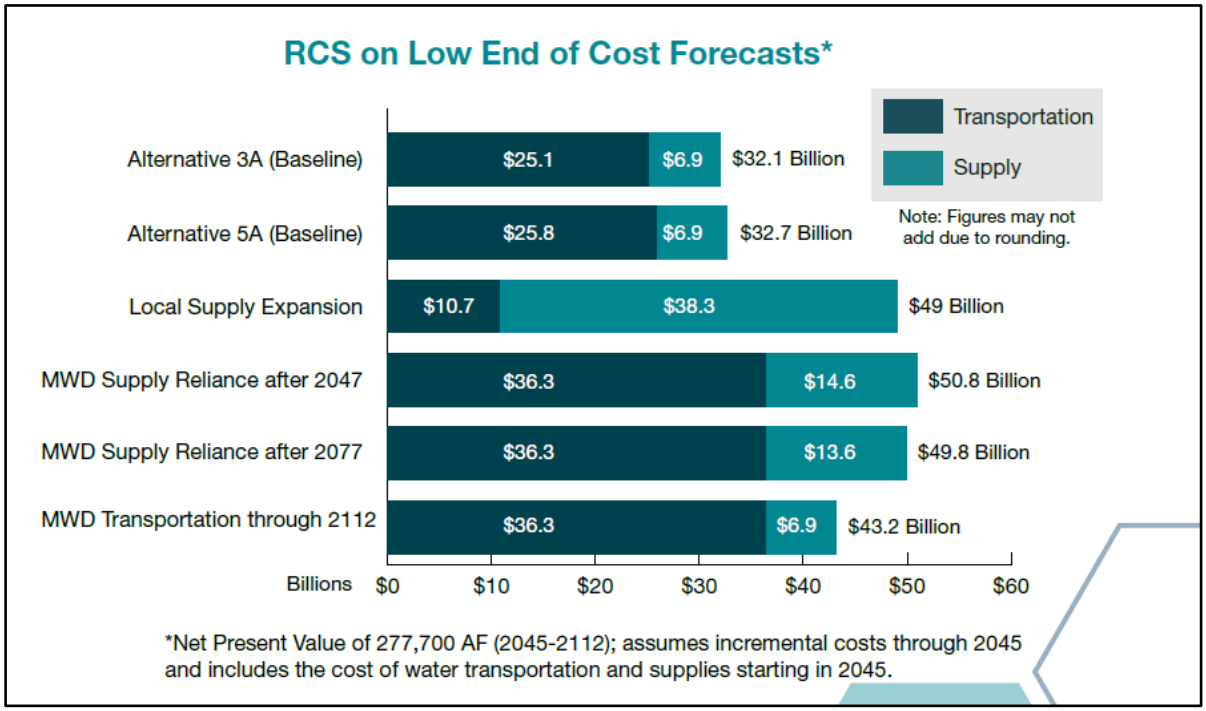

Figure 1.2: Water Supply Alternatives Cost

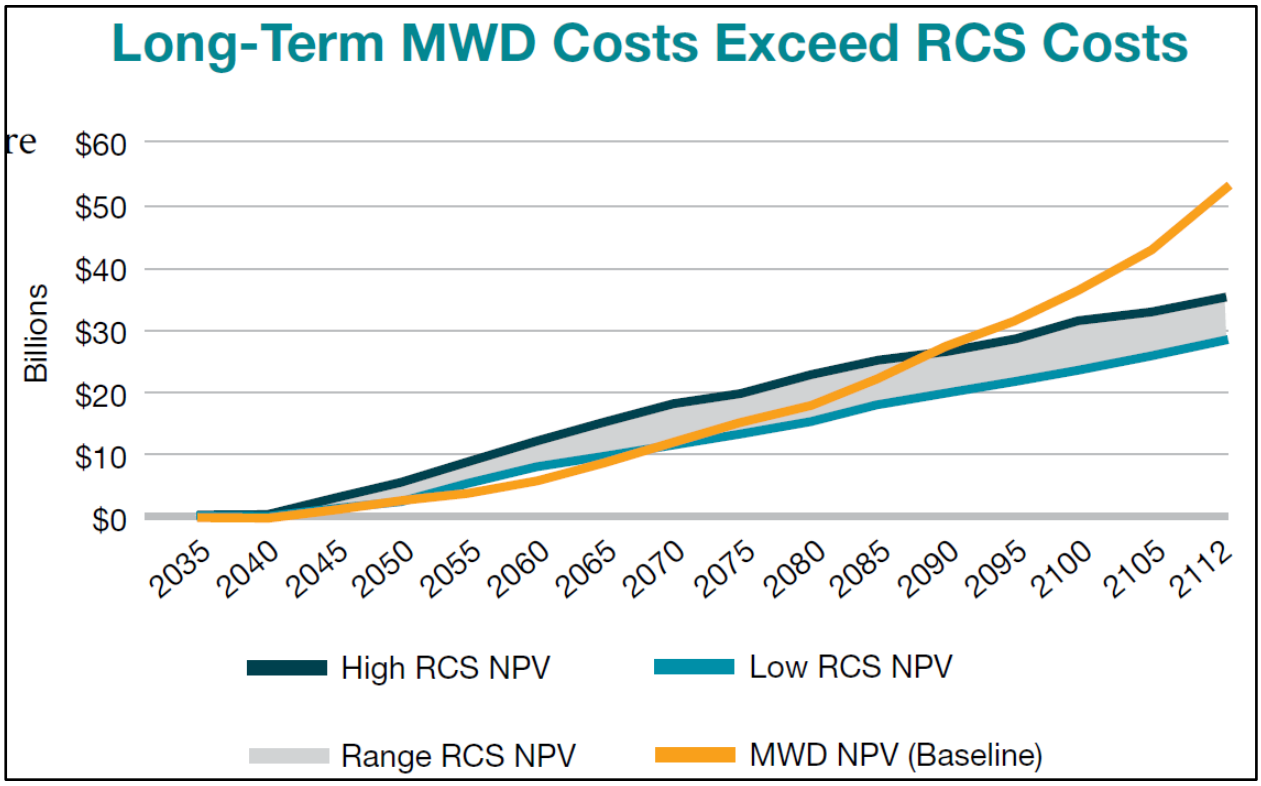

Figure 1.3: Water Supply Cost MWD vs RCS Over Time

Project Location

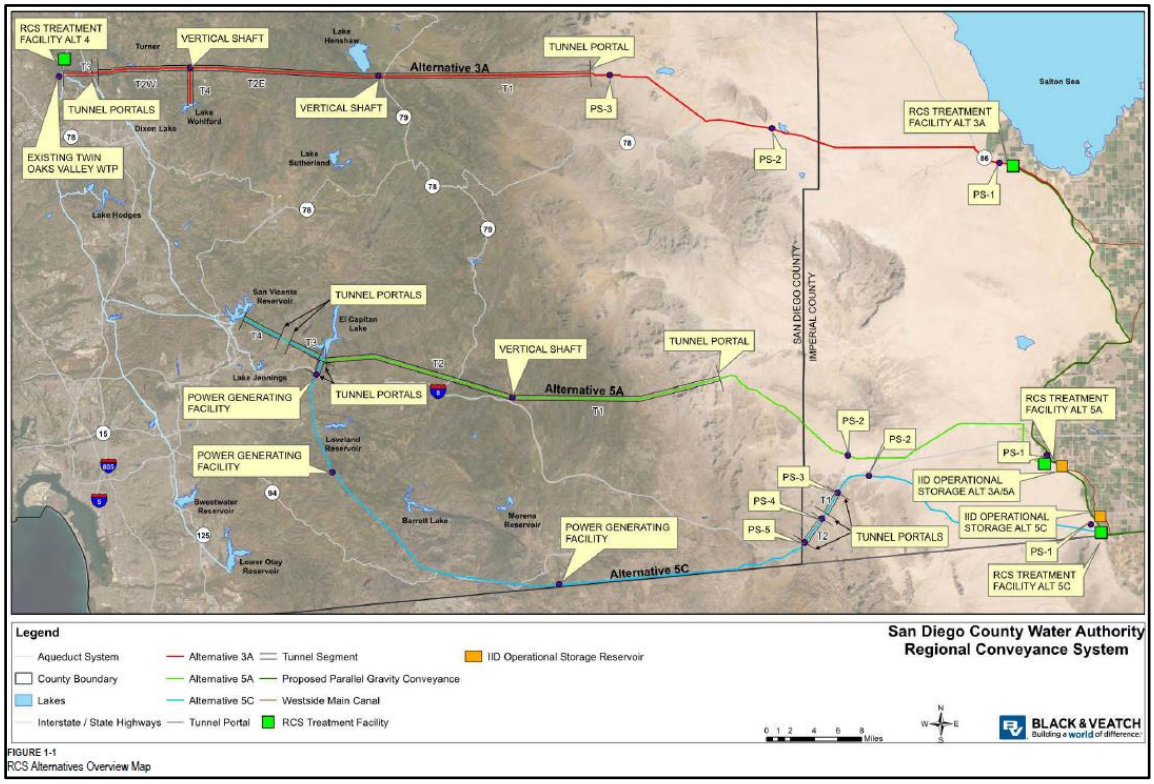

Figure 2.1: Satellite Map of Project Location (San Diego County and Imperial County) with Routes Overlayed

Alternative 3A consists of 46.7 miles of gravity flow canals, 38.8 miles of pressure pipelines, and 46.5 miles of pressure tunnels with 3 pumping stations, an entirely new treatment plant, and 2.4 miles of brine management pipeline (not included in alignment length). This results in an overall alignment length of 132 miles. In addition, this route would require a 40 MG covered tank storage in San Diego County (likely adjacent to Twin Oaks Valley WTP) along with an entirely new 3,500-4,500 acre-feet reservoir for storage and operational flexibility (located north of Lake Wolford, approximately 10 miles before reaching Twin Oaks Valley WTP). This route terminates at the existing Twin Oaks Valley Water Treatment Plant.

Alternative 3A would pass through Bureau of Land Management land, 6 miles of trench pipeline and 4 miles of tunnel would pass through Anza-Borrego Desert State Park, 2 miles of tunnel would pass through Cleveland National Forest and the route would pass under State Routes 76, 78, 79, and interstate 15. The route also passes through or adjacent to the San Pasqual Reservation, which is of critical importance, as coordination with the Tribe is crucial. A related incident where an MWD tunnel impacted the groundwater of a nearby reservation in San Bernardino county shows the importance of tribal consultation and the unintended consequences in which this type of project can result.

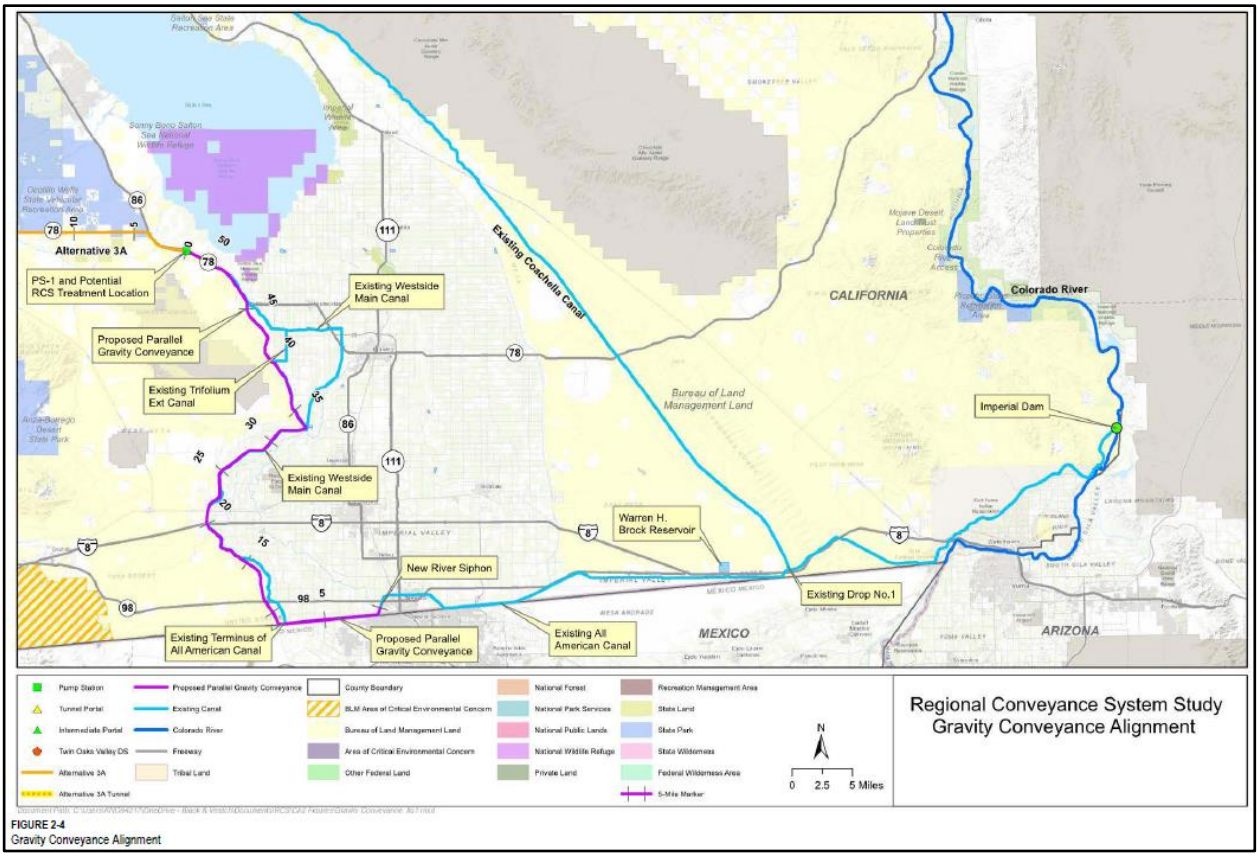

Figure 2.2: Map of Eastern Imperial County; 3A Connection of RCS to All American Canal

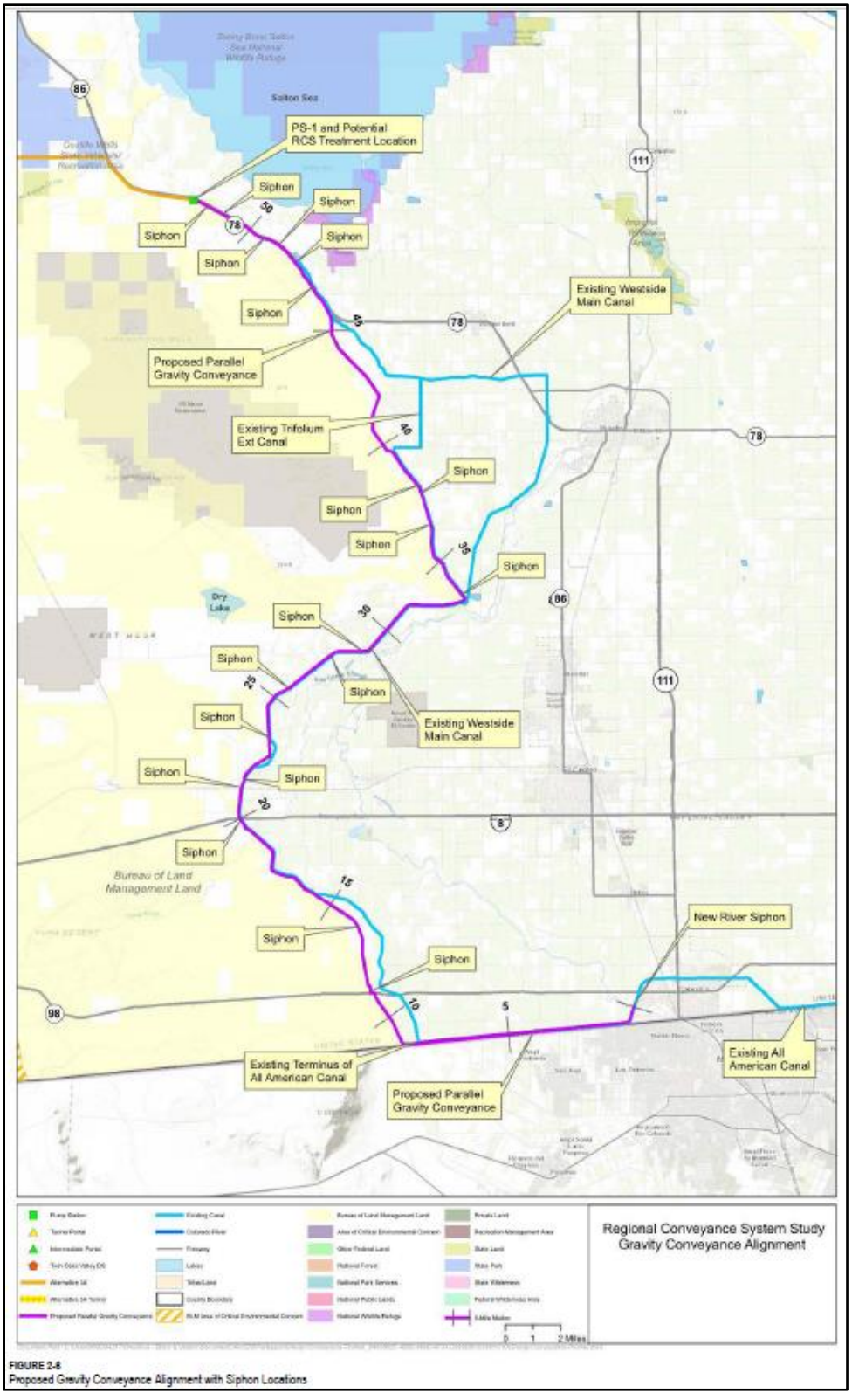

Figure 2.3: Detailed Map of Parallel Gravity Conveyance (3A) System along Westside Canal

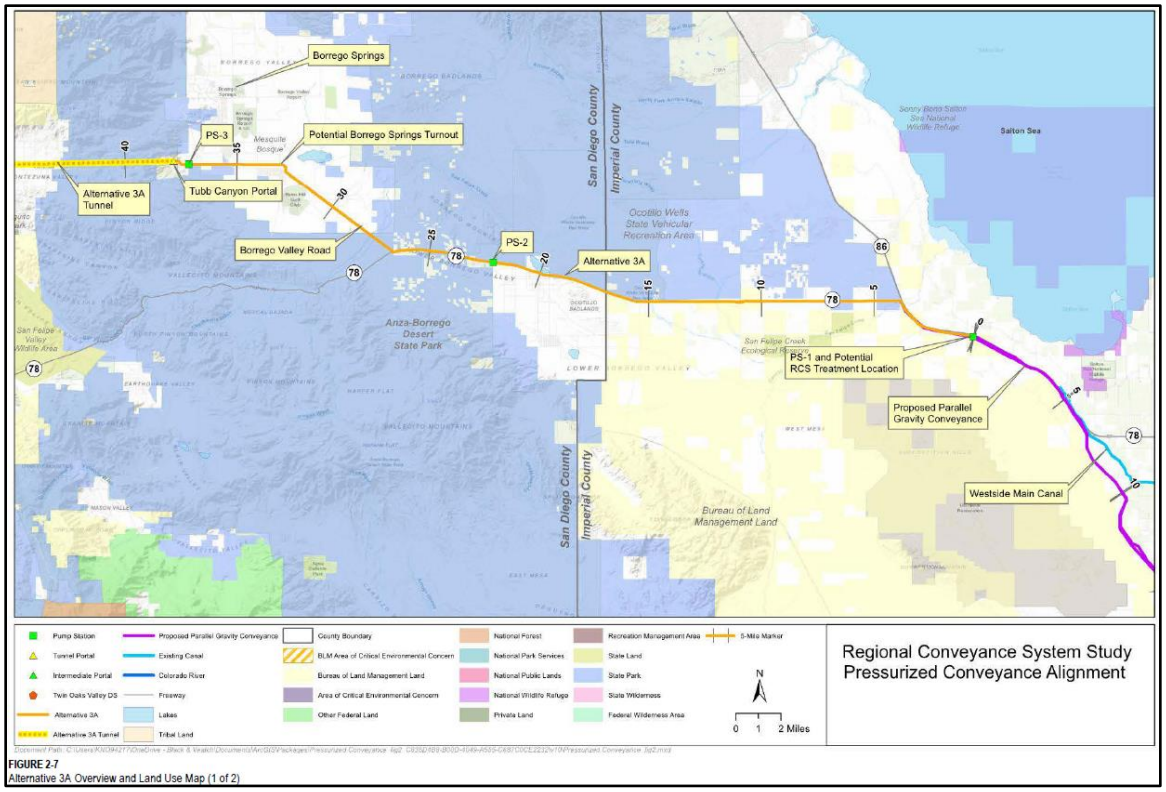

Figure 2.4: Detailed Map of Eastern Half of Route 3A

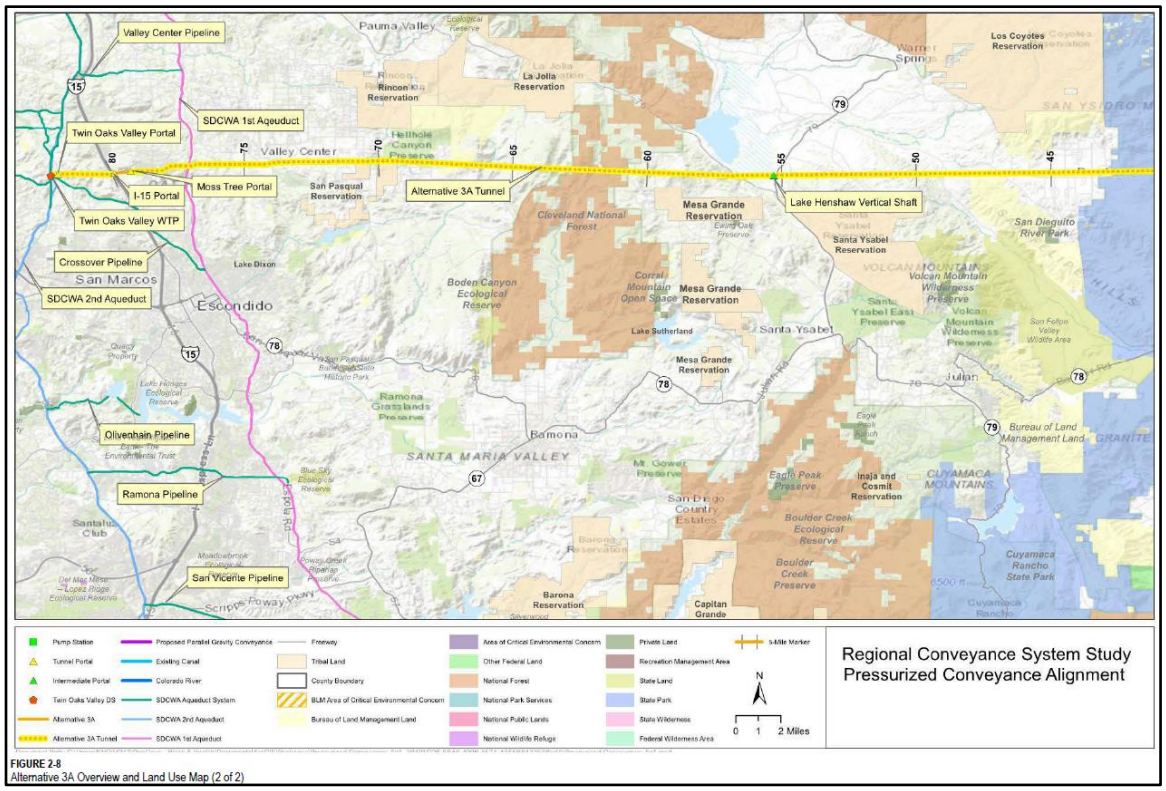

Figure 2.5: Detailed Map of Western Half of Route

Alternative 5A consists of 8.8 miles of gravity flow canals, 34.8 miles of pressure pipelines, 41.4 miles of pressure tunnels, and 12.5 miles of aqueduct pipeline with 2 pumping stations, and aqueduct pump, an entirely new treatment plant, and 27.5 miles of brine management. This results in an overall alignment length of 85 miles. In addition, the same 40 MG covered tank storage in San Diego County would be required. This route terminates at the San Vicente Reservoir

Alternative 5A would cross through the southern portion of Anza-Borrego Desert State Park as the pipeline passes into San Diego County from Imperial County. The route would transition from pipeline into tunnel in the middle of the state park, and this tunnel would continue until it reaches its terminus at the San Vicente Reservoir where it would connect to the existing Water Authority infrastructure. On this route, shortly after exiting Anza-Borrego Desert State Park, the tunnel would cross directly underneath or adjacent to the Ewiiaapaayp Reservation before crossing into the Laguna mountains and into the Descanso & Palomar southern portion of the Cleveland National Forest. The tunnel continues through the Cleveland National Forest towards El Capitan Reservoir, passing through a narrow (<1 mile) gap between the Capitan Grande and Viejas reservations. The tunnel then exits the National Forest and passes underneath/ adjacent to suburban areas east of San Diego and terminates at the San Vicente Reservoir at the Oakoasis County Preserve <1 mile from the Barona Reservation.

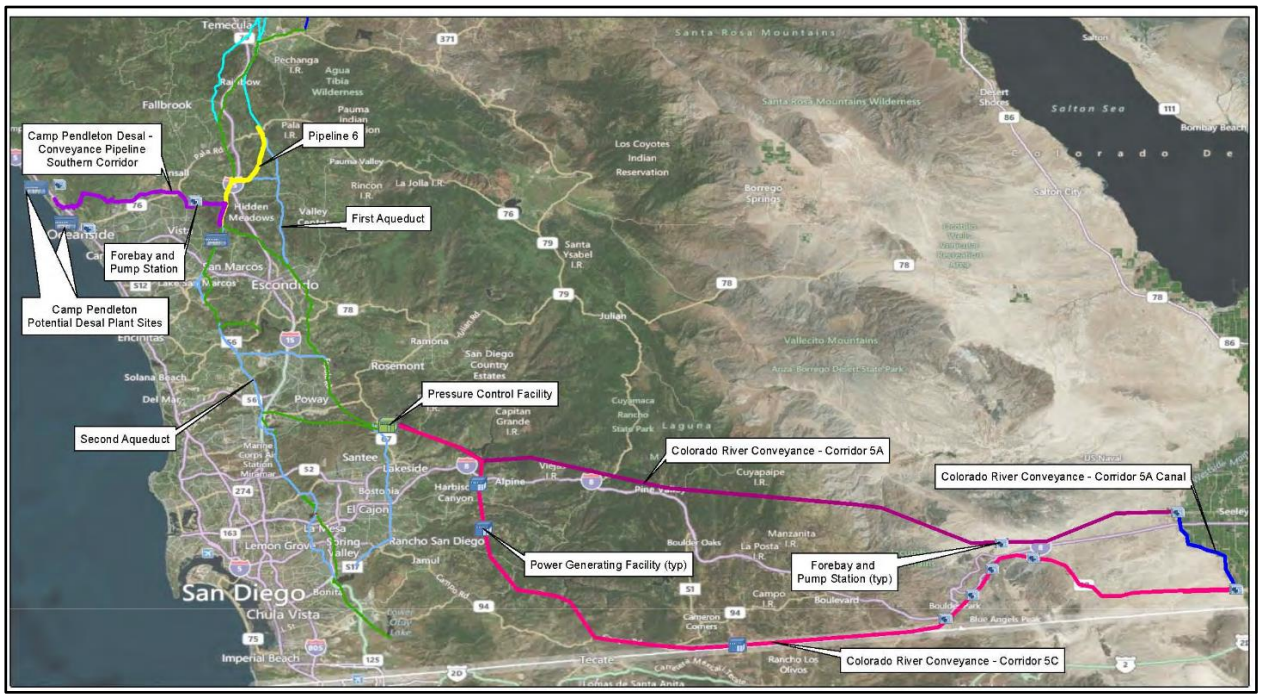

Figure 2.6: Satellite Map with Route 5A Imposed (Maroon)

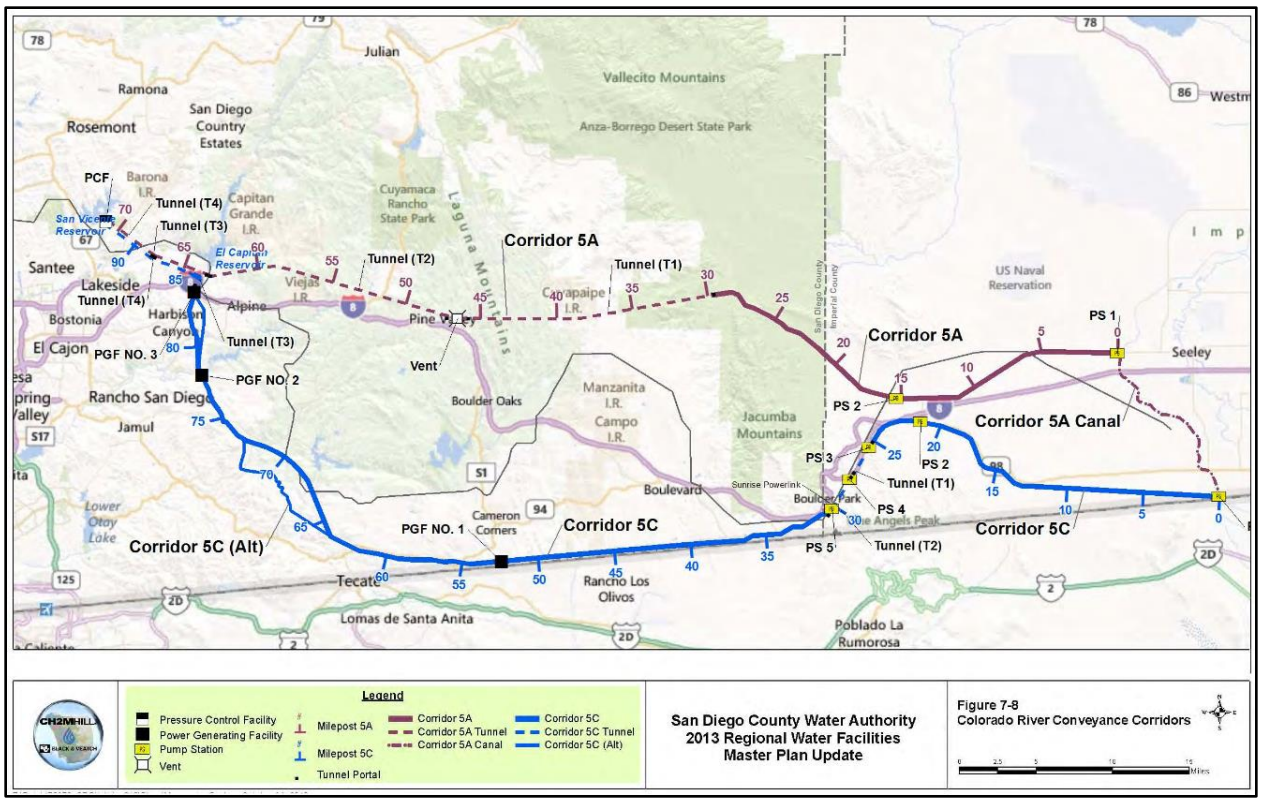

Figure 2.7: Regional Map of Route 5A (Violet)

It was determined that the salinity treatment plant would be best located in Imperial Valley (See Figures 2.8 &2.9) because of the lowered transportation costs due to a 5-10% water loss through brine management. This brine will be discharged into the Salton Sea, which, given the lower salinity of the brine (approximately 5,000 mg/L), could provide environmentally beneficial impacts to the Salton Sea (with a salinity of ~ 60,000 mg/L).

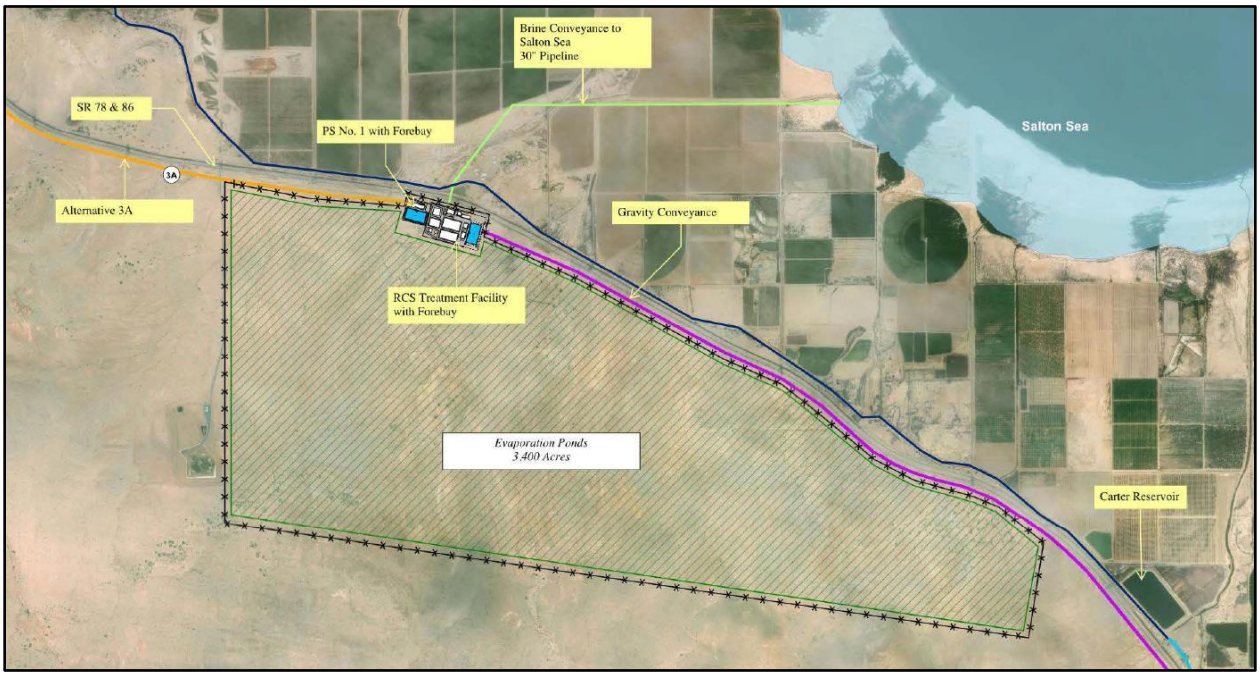

Figure 2.8: Route 3A Treatment Facility Location and Brine Conveyance

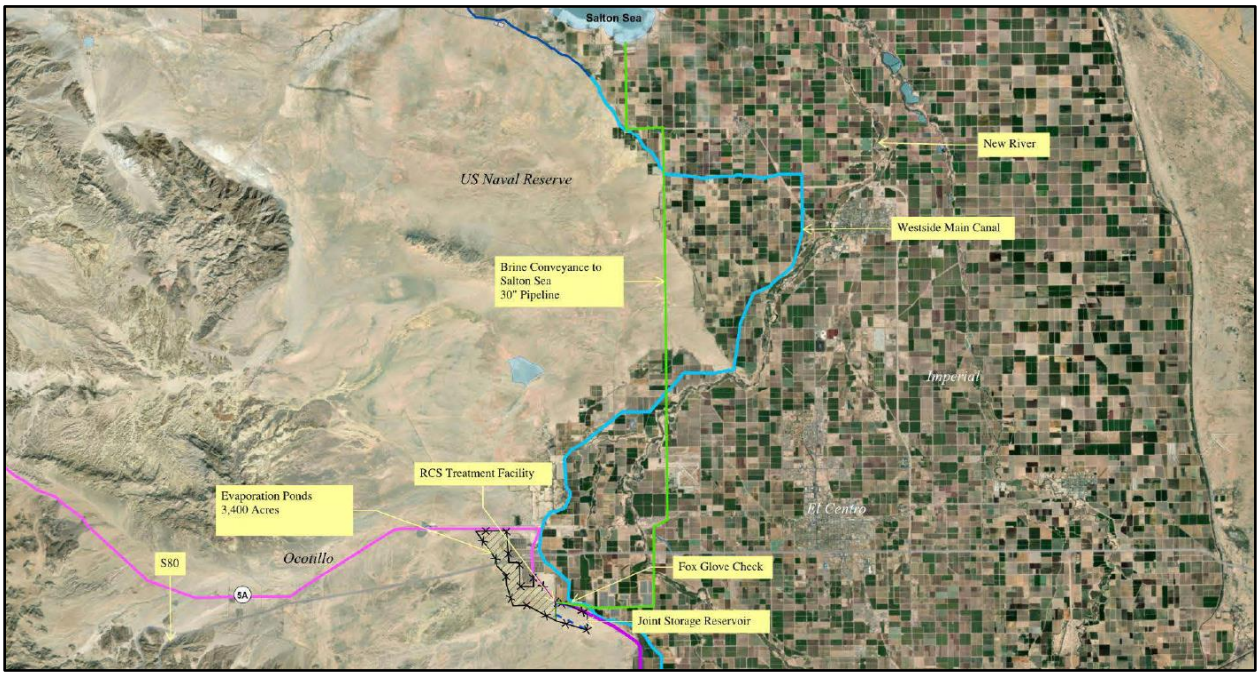

Figure 2.9: Route 5A Treatment Facility Location and Brine Conveyance

Construction aspects:

The assumed online date for this project is in the year 2045. Construction is slated to begin by 2030, occurring over the next 15 years with a cost of $5 billion. Since each route has its own specific series of conveyance plans, the exact construction details vary between the routes. Generally, a long series of canals, pipelines, tunnels, pumps, storage, and treatment facilities will be constructed, regardless of route. Specific sets of equipment are needed for the primary construction projects including open trench construction for canals and pipelines, tunnel construction, and building pump stations, as well as storage and treatment facilities. A detailed outline of the equipment needed for these construction projects can be found in Section 3 of this report under Air Quality Impacts, along with a breakdown of the construction timelines.

Construction is expected to occur in many areas of cultural, economic, and environmental importance including federal and state-managed land, indigenous reservations, national forests, and state parks. Included in the list of places with potential impact, is also the Salton Sea. Although not directly in the path of either of the conveyance routes, around 20,000 acre-feet of brine disposal is expected to be discharged into the Salton Sea which is already an environment of critical concern. As each of the routes cross west, they run into more rugged terrain that will move the conveyance underground and require construction to tunnel into many hills and mountains. Overall, both the Northern Alignment (3A) and Southern Alignment (5A) routes would pass through significant regions of Anza-Borrego Desert State Park, California's largest, as well as Cleveland National Forest, which has already been devastated by two of the largest wildfires in California history. Each route also passes through and around many indigenous reservations including adjacent to San Pasqual Reservation (3A), through the Ewiiaapaayp and Viejas Reservation (5A), as well as nearby (and thereby potentially affecting groundwater supply of) many others, especially the Barona and Capitan Grande Reservations that border the San Vicente and El Capitan Reservoirs, respectively.

According to the Phase A Final Report, most of the land-uses the RCS will cross through, including Area of Critical Environmental Concern, State Parks, National Forests, Tribal Lands, Endangered Species Critical Habitat, and Military bases, have sections in which certain construction methods will have a high relative impact. Some of these land-uses may require construction technique alternatives that mitigate the impact to a moderate level, but in others, like Tribal Lands, construction will have a high relative impact regardless of construction technique. In some areas of tunneling, explosives might be deemed necessary for construction, and large equipment such as Tunnel Boring Machines will need to be transported into protected lands, inevitably causing some negative impact on the land. Additionally, most of the tunnel reaches will be constructed below local water tables, creating many complications for construction, in order to minimize impact on local water resources, requiring techniques such as precast concrete to seal off groundwater. The report itself recognizes that most of the permits and approval required to cross through all these land areas will face significant scrutiny and will likely be difficult to obtain.

On top of the large-scale passage of the conveyance system through significant land-use areas, there are also many additional considerations that need to be made. The

routes will need specialized construction techniques to cross existing roadways and railroads, and most importantly, streams. Under the Clean Water Act, construction projects are prohibited from destroying any stream systems, with the exception allowed through mitigation by paying to repair other systems. Therefore, specialized construction techniques will also be required at any stream crossings to prevent impacts on waterways. Furthermore, the project's inherent size in Southern California means that the RCS spans across four different areas of fault zone risks in which earthquakes could impact the water supply.

Although estimates of the labor power required for this project have not been made in the studies so far, assumptions can be made based on other projects. The Colorado River Aqueduct, for example, was constructed over the course of 8 years between 1933 - 1941, employing approximately 30,000 people, up to 10,000 at a time. Considering that the Colorado River Aqueduct is 2-3x longer than this conveyance system would be, and that the Colorado River Aqueduct was built in the mid 1900's with less advanced technology, the workforce for an equivalent project would be considerably smaller today. The Colorado River Aqueduct, however, was built only in 8 years whereas the RCS is expected to take 15 years for completion, the vast majority of which taken for tunnel construction. The employment estimate of this project, based on these assumptions, would be roughly 10,000-15,000 people.

Operations

The conveyance system will redirect San Diego County's QSA apportionment directly to the Water Authority instead of through the MWD of Southern California, saving the Water Authority expensive transportation and treatment costs. This conveyance system is expected to direct 280,000 acre-feet of water per year, with treatment losses accounting for 20,000 acre-feet after the proposed treatment plant in Imperial County. All alternatives will begin with new connections to the Imperial Irrigation District's existing canal system. According to current studies, the IID has determined that the All-American Canal has sufficient existing capacity to operate the RCS flows. However, between the New River Siphon and the western end of the All-American Canal, either a new parallel gravity flow system is required (which is accounted for in the route outlines), or operations during off-peak hours with new additional storage will be required, but this is less likely.

It is assumed that the gravity flow canals, which primarily reside in Imperial County, would be owned and operated by the San Diego County Water Authority, or they would be jointly owned and operated by the Water Authority and the Imperial Irrigation District, but it has yet to be determined. Most of the rest of the newly constructed facilities and transportation infrastructure (including pipelines, pump stations, and storage) are expected to be owned, operated, and maintained by the SD Water Authority.

Energy demands would be substantial but could be provided with existing infrastructure by the two electric utilities serving the regions this project crosses through (IID and San Diego Gas & Electric (SDG&E)). The salinity treatment plant in Imperial Valley would require 55 MW of power for operations, while each of the pumping stations (3 along route 3A, 2 in route 5A) would require 36 MW of power, resulting in a total energy demand of 72-108 MW. Additionally, each tunnel portal would require 2MW of power. With 5 tunnel portals along each, this would total to 10 MW. Therefore, the energy demand of key facilities would total to 137 MW along route 3A and 173 MW along route 5A.

The salinity treatment plant would discharge and transport approximately 20,000 acre-feet of brine (5,000 mg/L salinity) to the Salton Sea each year. This plant would require microfiltration and reverse osmosis treatment along with standard screening and solids handling. This plant will also need standard chemicals for salinity treatment to treat 280,000 acre-feet of water annually (250 MGD on average).

Sources:

1. Black & Veatch, Regional Conveyance System Study - Phase A: Executive Summary. August 2020. Available: https://www.sdcwa.org/sites/default/files/RCS-Executive%20Summary%20Final%20August%202020.pdf
2. Black & Veatch, Regional Conveyance System Study – Phase A: Final Report. August 2020. Available: https://www.sdcwa.org/sites/default/files/RCS-Study-Phase-A-Final-Report%20August-2020.pdf
3. Colorado River Quantification Settlement Agreement. October 2003. Available. https://www.sdcwa.org/wp-content/uploads/2020/11/QSA_final.pdf
4. Smith, Joshua Emerson. "A $5-billion water project could drill through Anza-Borrego park. Is it a pipe dream?". Los Angeles Times. 04/05/21. Available:

https://www.latimes.com/california/story/2021-02-05/water-pipeline-anza-borrego-desert-state-park

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Visual Impact Analysis

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. The visual impacts are assessed according to existing visual conditions, and how these conditions are currently perceived.

Environmental Setting

Map overview of the project. Representation 1.

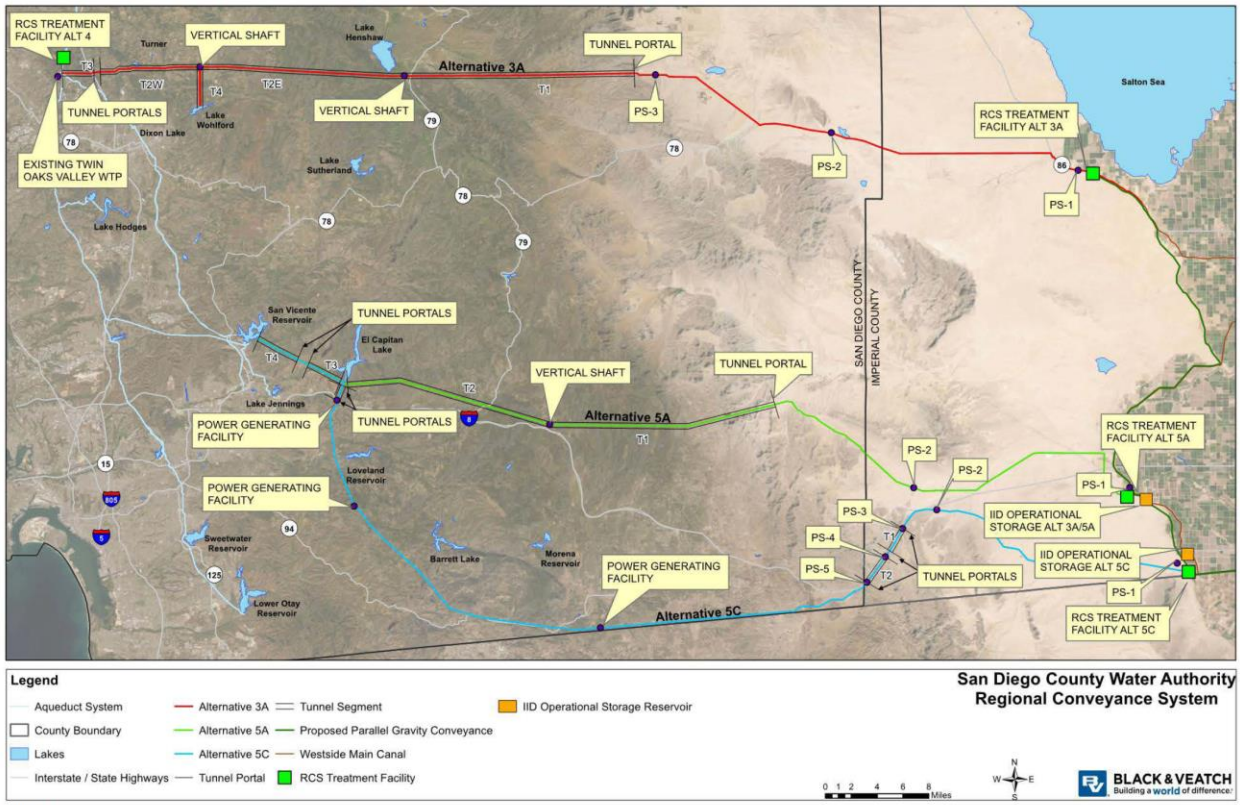
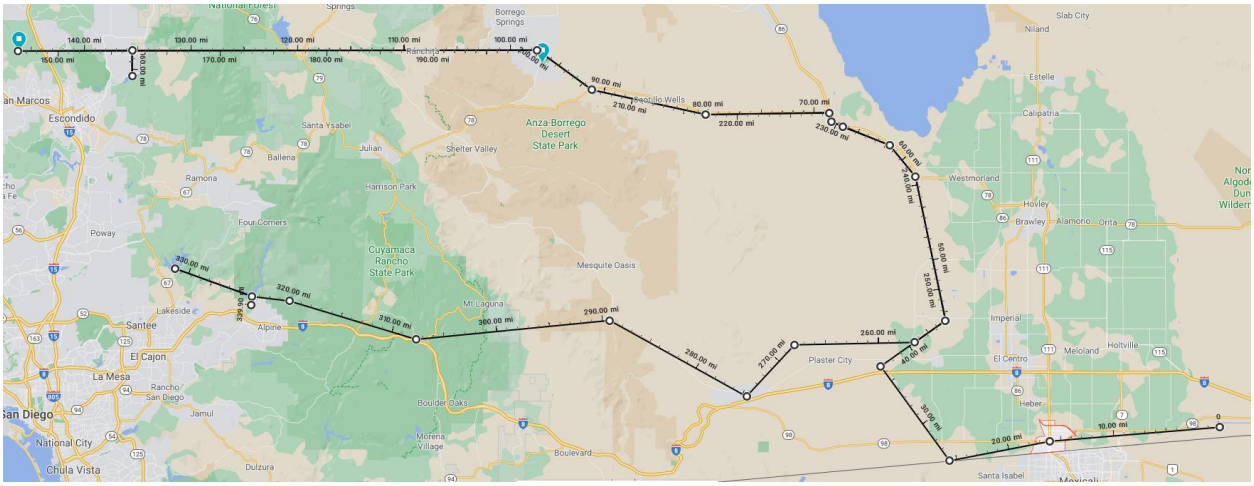


FIGURE 2-1
RCS Alternatives Overview Map

Map 1.

Map overview of the project. Representation 2. Rough sketch on Google Maps.



Map 2.

The RCS is characterized by flowing mostly through agricultural fields and undeveloped lands such as deserts, mountains, sand dunes, and several bodies of water, the most significant being the Salton Sea and Anza Borrego State Park. For this latter, several man-made structures, landforms, and varied vegetation are part of the visual field.

Alternative 3A runs parallel to existing canals in the Imperial Valley, and where State Route 78/86 junction intersects, the channel turns west into Borrego Valley and enters 46-miles of tunnel, exiting at west of Interstate 15 thus terminating at the Oaks Valley Water Treatment Plant (TOVWTP). Along its route, it will encounter the Salton Sea, Lake Henshaw, and a new 3,500 AF reservoir would also be implemented. What is more, 3 pump stations would be utilized along its course.

Alternative 5A also begins at the ending of the All American Canal (AAC) and runs parallel to agricultural land along Interstate 8. Following County Routes S80 and S2, it enters 41 miles of tunnel that exit near the San Vicente Reservoir (SVR). It will require 2 pumping stations, and it will flow near El Capitan Lake.

The first segment of the project, which would be independent from whether this is Alternative 3A or 5A, runs along the border of Anza Borrego Desert State Park and agricultural fields from Imperial County.

At the bifurcation where Alternative 5A turns west, the area is characterized mostly by desert and mountainous terrain. It is not until it reaches the north section of Interstate 8 that the construction could be

perceivable. Further down the canal, the project reaches El Capitan Lake and SVR, at which points potential visual impact could be appreciated. Along its length, however, no large residential areas where visible impact could be appreciated is observed.

For Alternative 3A, the canal would cover the border between the desert and agricultural land until it reaches Highway 78, running west of this road. Even though it would be close to Salton Sea, it would be visually imperceptible since the canal would be found at a distance of about a mile and a half in a non-recreational region of this body of water. Approximately at Ocotillo Wells State Vehicular Recreation Area, the canal turns west-wards and roughly follows a straight path through desert and mountains along Route 78. Then it slightly shifts north and after roughly ten miles (at Rams Hill Country Club) it once again follows a horizontal path towards San Diego until it reaches TOVWTP. Some points of interest to assess visual impact would include residential areas along the canal, such as Valley Center, Hidden Meadows, and North Ridge.

One of the items that will be left out from the analysis is the *Proposed Parallel Gravity Conveyance System,* since its location/trajectory is comparable to the *Existing Westside Main Canal,* and thus pertinent EIR for that project can be found within the *Imperial Irrigation District EIR.* Thus, for alternative 3A, the aesthetic assessment is going to begin at Pump Station 1, where the Regional Conveyance System (RCS) Treatment Facility for this option will be located. For Alternative 5.A., the analysis will commence at Pump Station 1, where the Regional Conveyance System (RCS) Treatment Facility for this option will be located. For more detail, please refer to the map above.

Alternative 3.A - Photos

Imperial County (Salton Sea) - Proposed Treatment Facility + Pump Station 1

California 92227

33.106225, -115.818598

Photo 1.

Photo 2.

San Diego County - Potential Pump Station 2

California

33.150069, -116.158849

Photo 3.

4966-5048 Borrego Springs Rd (Rams Hill Golf Club)

Borrego Springs, CA 92004

33.199856, -116.311662

Photo 4.

Photo 5.

CA-76 (Lake Henshaw) - Potential Vertical Shaft

Santa Ysabel, CA 92070

33.213999, -116.739553

Photo 6.

Photo 7.

19242-19399 Santee Ln (Hellhole Canyon Preserve)

Valley Center, CA 92082

33.216262, -116.932020

Photo 8.

25878-25590 Lake Wohlford Rd - Potential Portal

Valley Center, CA 92082

33.177606, -116.988779

Photo 9.

San Diego County (I-15) - Potential Portals

California

33.214066, -117.137653

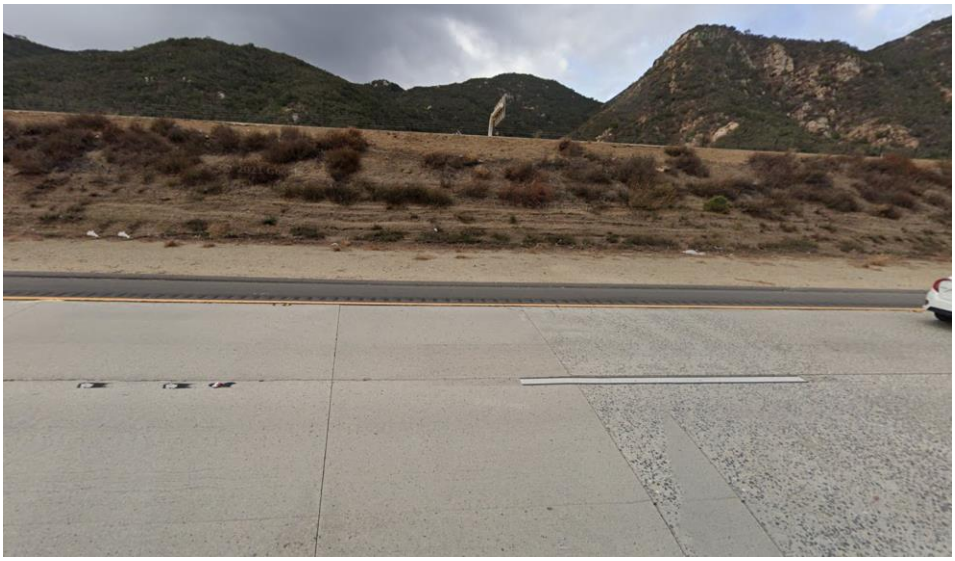


Photo 10.

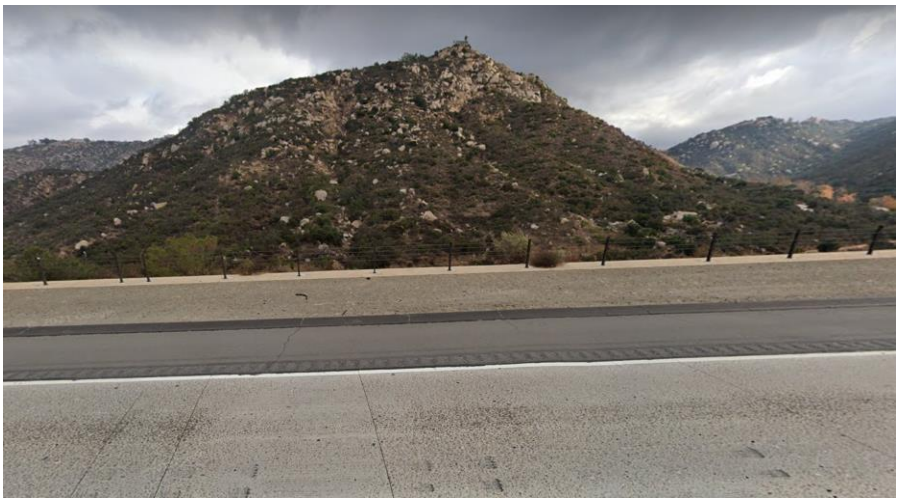


Photo 11.

Table _ .1.
Alternative 3.A. Visual Characteristics.

Visual Unit	Photo Number	Landscape Feature	Primary Viewer Group	Distance from observation
Salton Sea	1	Roadway view towards the desert. Barren land with a mountainous backdrop and power lines. Constant throughout the segment.	Roadway motorists.	On-site.
	2	Agricultural land view with crops. The Salton Sea is not visible from this perspective as it is covered by the farmland. This situation repeats throughout the segment but for a stretch between the US Border Patrol Service and W Bannister Rd.		
San Diego County - Route 78	3	Rare view of CA-78. Desert and mountains with some arable land. The pump station would be located by the road.	Roadway motorists.	On-site.
Rams Hill Golf Club lodging	4	Roadway view towards the desert. Barren land with a mountainous backdrop. Constant throughout the segment.	Roadway motorists. Golf players.	500 - 1000 ft.
	5	Golf Club viewshed. Lodging is barely visible. Mountain range in the background.		
Lake Henshaw	6	View towards the lake. Trees and bushes and a meadow before the lake. It might be potentially visible, but it is imperceptible in the picture.	Roadway motorists. Visitors and tourists.	3000 - 5000 ft

	7	Uphill view. Bushes, trees, and powerlines.		
Hellhole Canyon Preserve	8	Single-lane roadway and mountains/hills. Power lines along the road. Low-growing bushes.	Visitors and tourists.	On site
Lake Wohlford	9	Roadway with dense vegetation. To the right of the picture, the viewer can appreciate the lake. To the left, the elevation of the hill. The pipeline will have a Lake Wohlford Portal in the neighboring region.	Rodway motorists. Visitors and tourists.	On site
I-15	10 11	Viewshed towards TOWTP. Hillside. Multilane Interstate-15. Downhill of I-15, Alternative 3.A. will conduct the construction of two portals: The Moss Tree Tunnel Portal and the I-15 Tunnel Portal.	Roadway Motorists.	2 mi. 1000 ft. - 3000 ft.

Alternative 5.A - Photos

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

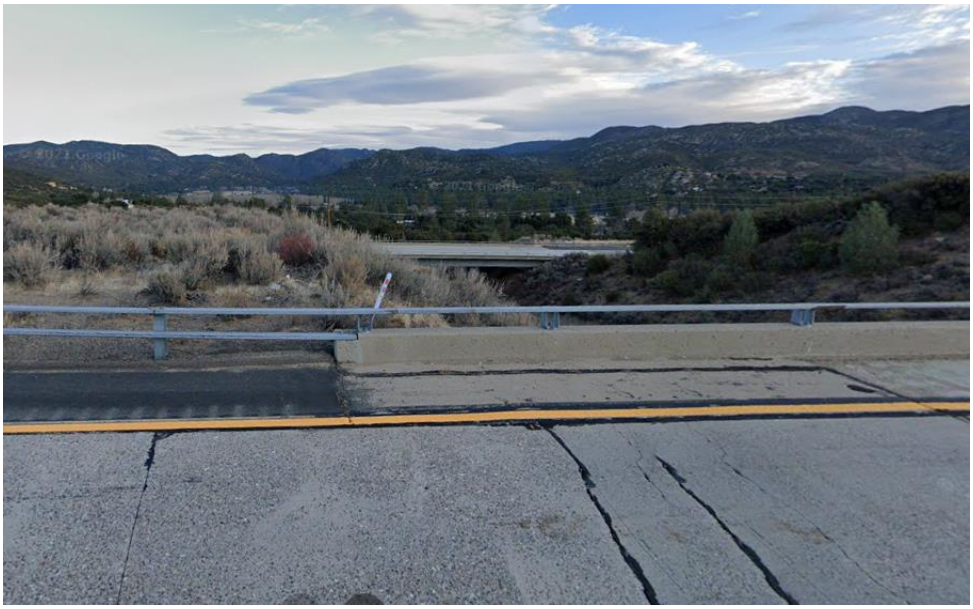


Photo 13.

Photo 14.

El Capitan Reservoir - Tunnel Portals

Photo 15.

I- 8 - San Diego County - Potential Power Generating Facility.

California
32.851473, -116.809908

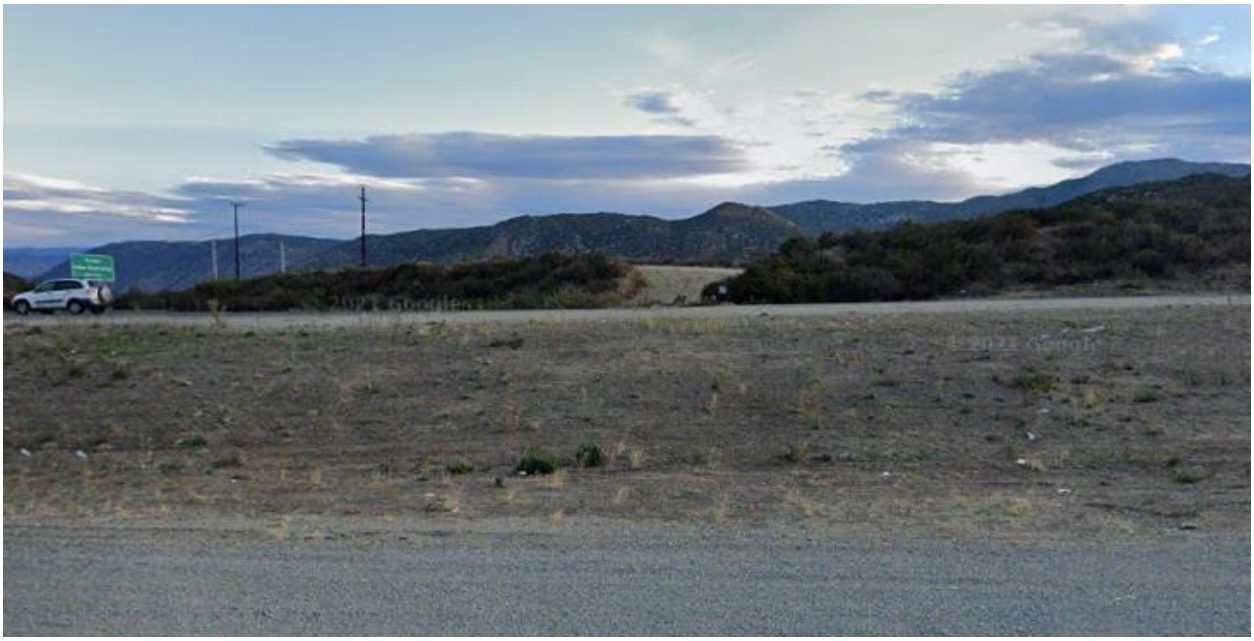


Photo 16.

San Vicente Reservoir - Tunnel Exit

California

32.915555, -116.915861

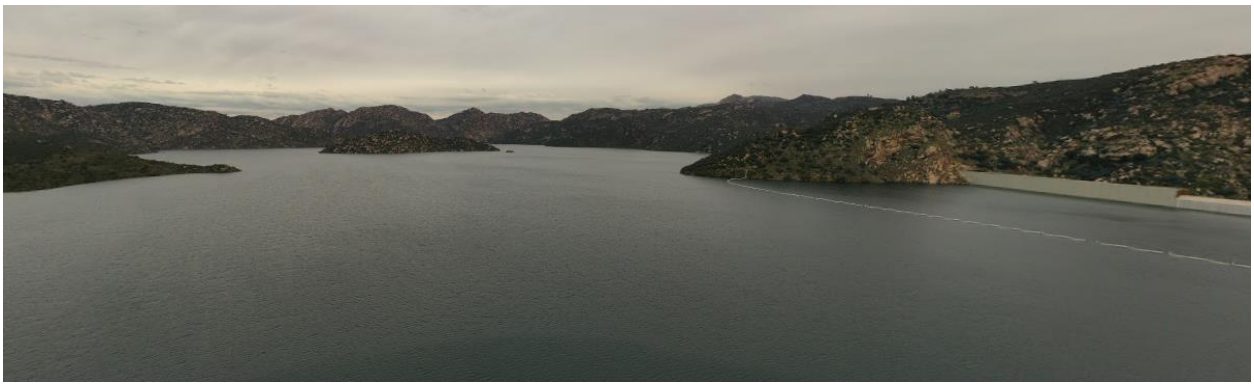


Photo 17.

Photo 18.

Table __.2
Alternative 5.A. Visual Characteristics.

Visual Unit	Photo Number	Landscape Feature	Primary Viewer Group	Distance from observation
Agricultural Land	12	Agricultural land with the Westside Main Canal. Accurate pictures are unavailable. Deserted and not hospitable to any extent, but for the rural farm workers. The closest highway (I-8) is more than 2 miles away.	Farm Workers.	2 mi.
I-8 and Pine Valley Rd.	13	Viewshed includes an overlook of the mountains and the town of Pine Valley. The vertical shaft is located on sight, so it shouldn't be visible for the residents, but it could be perceivable too.	Roadway motorists. Pine Valley residents. Hikers.	On site.
	14	Scenery towards the mountains. The vertical shaft would be located close to hiking and recreational areas.		On site.
El Capitan Reservoir	15	View of the reservoir. Recreational areas on the western bank of the reservoir. Mountain backdrop and elevation on either bank. This reservoir would receive the connection between tunnels T2 and T3, as well as to the Power Generation Facility	Visitors	On site
I-8 Glen Oaks	16	Mountain viewshed with I-8. Partially habited segment between Blossom Valley (NW), Glean Okas (S), and Alpine	Roadway motorists. Residents.	On site and 2,000 - 4,000 ft semi-circle radius in the directions of

		Heights (SE). There would be a power generating facility in this area.		Blossom Valley and Glen Oaks.
San Vicente Reservoir	17 and 18	Reservoir with recreational areas for boats and visitors. Ample water spaces and mountains, with low-growing vegetation. Not heavily populated.	Visitors. Boats.	On site.

Several regions throughout the project have not been included in these tables since the points of interest where there could be potential visual impact are detailed above. For most of the conveyance system, the canal/pipelines are located in remote areas where visual impact may be neglected, such as agricultural land with no impact, state park area which is out of reach from the general public, and deserts/mountains with no population.

Furthermore, for the latter portions of either alternatives, the pipeline/canal enters residential areas and impact assessment regarding these viewsheds is comparable and thus some were not listed. Others, such as those included in the table, function as a reference to this general aesthetic impact possibility and are regarded as sites where the viewshed could be potentially affected.

Finally, note that some structures were omitted, such as the Lake Wohlford Vertical Shaft, or Pump Station 3 for Alternative 3.A., as these would not result in any potential impact.

Construction impacts

Introduction

Visual construction impacts will include:

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

These impacts - since temporal - will not affect the long-term of the project, and remote regions where no effect is perceptible to sensible populations will be neglected, thus only the categories listed in the table above will be considered and described below.

Description

First and foremost, construction will require the movement of equipment over the 15-year period of projected construction. The movement of equipment will be accompanied by the transportation of material, which will require trucks to carry not only the required instruments and components for the project, but also haul debris from excavation, tunneling, and grading. This debris might be employed for the stabilization of the Salton Sea Shoreline, as described later. This will substantially lead to an increase in construction-related traffic in working zones, including the possible need to re-allocate flows of traffic in highly transited areas.

In addition, views from aesthetically disruptive incomplete buildings and structures that take several months to years to complete will persist for the time it takes them to become completed. This issue can be tackled by fencing where possible (Mitigation Measure AMM - 1). Such buildings will include the Power Generating Facility for Alternative 5.A. and the Water Treatment Plants, for both Alternative 3.A. and Alternative 5.A. To limit vandalism, continuous monitoring and anti-graffiti measures will be utilized, which will also reduce the attractiveness of these sites as epicenters for deploying inappropriate and/or unauthorized material (Mitigation Measure AMM - 2).

Construction will also require heavy duty equipment, such as cranes, bulldozers, excavators, loaders, graders, and trenchers. This machinery does not align with the commonplace viewshed of the diverse

construction regions, and will be particularly notorious in recreational areas, such as Lake Henshaw, Lake Wohlford, and both El Capitan Reservoir and San Vicente Reservoir. This can be solved by keeping the equipment out of sight when not in use, and restricting the utilization based on a specific schedule (Mitigation Measure AMM - 3).

Some locations might undergo night construction, which would benefit the rapid development of the process. This can lead to nighttime visual impact if nighttime construction occurs in heavily populated regions, and it can also impact the visual field of roadway motorists if high-beam lightning is used. Therefore, the most probable outcome is the limitation of nighttime construction to specific locations and schedules, whenever possible (Mitigation Measure AMM - 4).

Finally, it is important to acknowledge that there will be construction occurring along important highways, including but not limited to I-8, 78, 79, and I-15. However, as it can be observed from Map 1., most of the construction will occur deep underground in the form of tunnels - which is the case for both Alternative 3.A., and Alternative 5.A. However, segments that are open flow channels are also substantial and long lasting, and will require the use of heavy duty equipment as described in previous paragraphs.

Operation impacts

Introduction

In order to qualitatively quantify the visual impacts in the long term, and determine the magnitude, the significance of these impacts will be evaluated according to the following parameters, on a scale from one to five (1-5), where 5 represents a significant impact, while 1 represents no impact:

- Past and present viewshed;
- Perturbation of surrounding area;
- Public opinion[1];
- Impact on light-sensitive features;
- Vegetation removal

The location of each of the listed elements of either Alternatives will then add a wight to the cumulative scoring (α), where this multiplier is based on the attractiveness of each of this sights, in terms of:

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

Where α can range anywhere from 1 - 10, with 1 being the least significant value and 10 the most (i.e. a score of 1 for population means the population is small). These, in contrast to the first categorizations, are absolute values, meaning that they are not skewed towards the specific location (i.e. a score of 10 for population corresponds to a city such as Los Angeles). The tables with relative α values and explanation on the weighing system are attached in the Appendix. Note that the maximum score is 1 (i.e. $\alpha = [(P+A+V)/30]$).

Finally, the scoring will be normalized by the maximum, worst possible outcome, so that the impacts can be assessed on a scale from 0 to 1. As an arbitrary measuring system, any score above 0.5 could be considered a significant impact (i.e. a score that is worse than 50% of the worst possible impact). Thus, the final score can be summarized according to the following formula:

[1]Given the impossibility to survey a large population, this will be an average value provided by the members of the team.

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

Formula for determining visual impact score.

Results

The results are the following:

Table __.3
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

Table __.4
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

Color Code	
0	1

Analysis and Conclusions

From the tables above, it can be observed that 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). This is due to several factors that collectively result in a significant impact. For instance, the facility would be located in a highly transited area which also has a high population density in the surrounding neighborhood. Public opinion is rather neutral regarding the power plant, and this is because this zone is already developed. However, the main relevant impacts are the perturbation of the surrounding area (with the inclusion of power lines, fencing, etc), and the modification in the viewshed of the region.

Other 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. Yet, the weighting factor significantly decreases the impact, and this is mainly because these structures are located in remote areas. A similar outcome occurs for the water treatment plants for either alternatives. As a visual reference, Photo 19 is an example of a pumping station. Likewise, Photo 20 and Photo 21 are models of the treatment plants for Alternative 3.A and Alternative 5.A., respectively.

Last but not least, as expected, the vertical shafts and the portals will not produce major impacts since they do not affect the viewshed, and are usually out of sight. However, they score rather high in the public opinion category, and this is because these structures are usually found in recreational areas and visitors might not want to have their activities affected or the region modified altogether, even though effect on the landscape and the surrounding areas is minimal.

Also note that the Salton Sea is left out of the analysis. This is because there are no actual structures or visual impacts regarding the Salton Sea. However, it should be acknowledged that the debris/rock material from the excavation of tunnels can be used to the advantage of the projected newly exposed playa (75,000 acres due to variation in agricultural drainage inflow) and minimize PM10 and windblown dust exposure and accumulation. This will both be a visual impact and an environmental benefit for the surrounding communities. Nevertheless, since it is out of scope, this analysis is not included.

Finally, due to the location of these buildings/structures, along with the negligible impact on light sensitive components and limited height, it has been concluded that no shadow analysis is required.

Likewise, light and glare will neither be a concern since the buildings will not produce a new source of light and glare that will substantially impact the viewshed or result in significant light spill within the region. This is because the materials of choice, along with the characteristic of these buildings, will not result in increased emission of light or glare.

Eagle Mountain Pumping Plant.

California

Photo 19.

Alternative 3.A. Water Treatment Plant - Visual model.

California

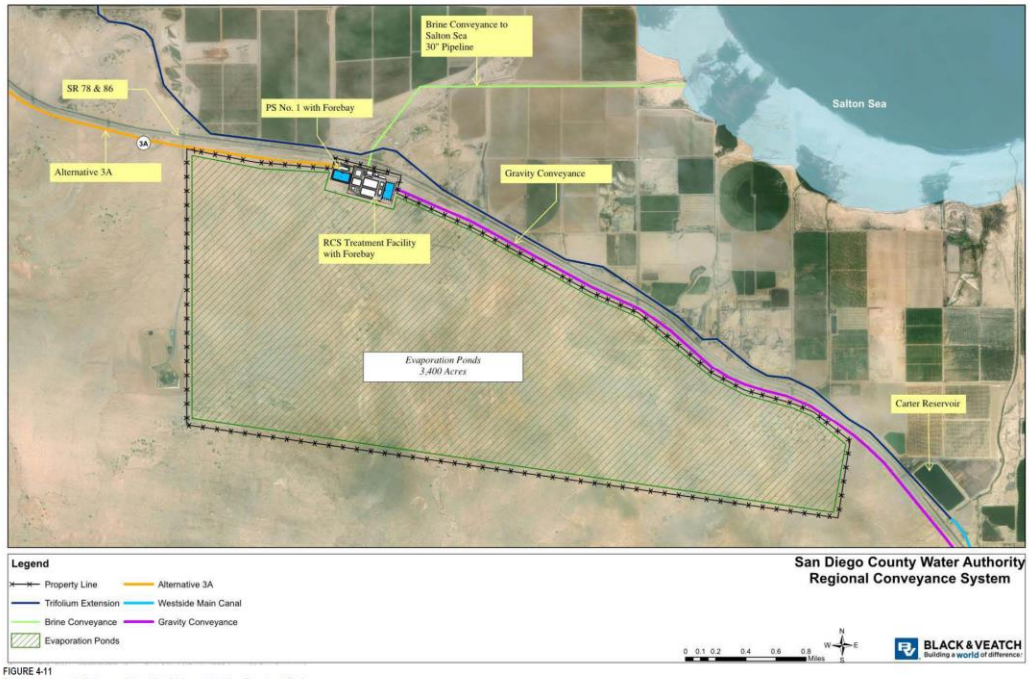


FIGURE 4-11
Brine Management Options – Alternative 3A Imperial Valley Treatment Option

Photo 20.

Alternative 5.A. Water Treatment Plant - Visual model.

California

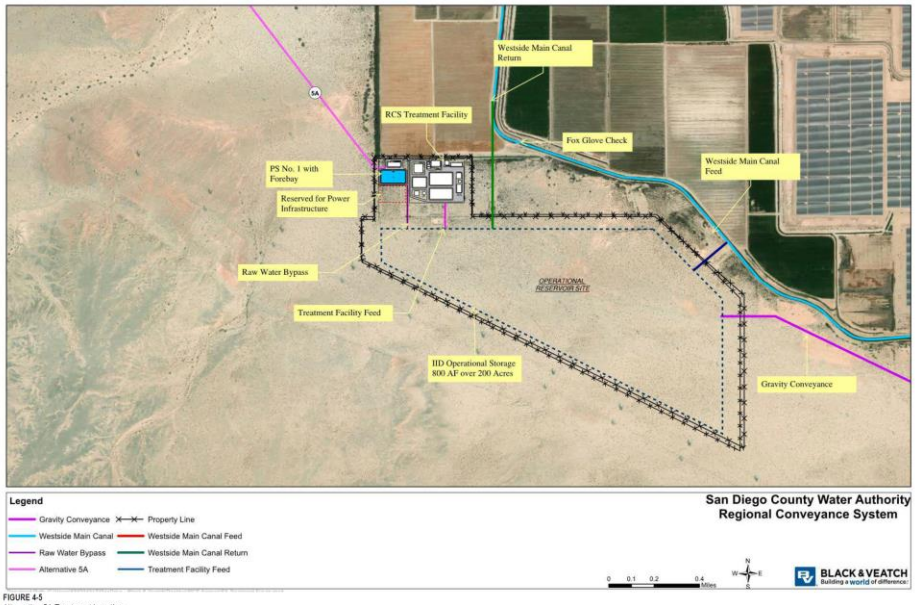


FIGURE 4-5
Alternative 5A Treatment Location

Photo 21.

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. These will be in urban areas where the effect is most noticeable. It might be needed for the Water Treatment Plants for either alternatives as well.

Mitigation Measure AMM - 2: Fencing, monitoring, and maybe surveillance might be used in order to prevent the illegal vandalization of the premises. Fencing, gating, and signaling will be deployed to enforce the law while minimizing the impact on the viewshed.

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. Moreover, it is yet to be determined whether nighttime work will be allowed in order to accelerate the process and decrease the exposure to visitors.

Mitigation Measure AMM - 4: Nighttime construction will be carefully supervised and deployed according to regional and local requirements, such as noise laws. In addition, it will be carefully monitored not to disturb neighborhoods and drivers with strong lights characteristic of night construction zones.

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.

Appendix

Weighting Factors (α)

1. Population:

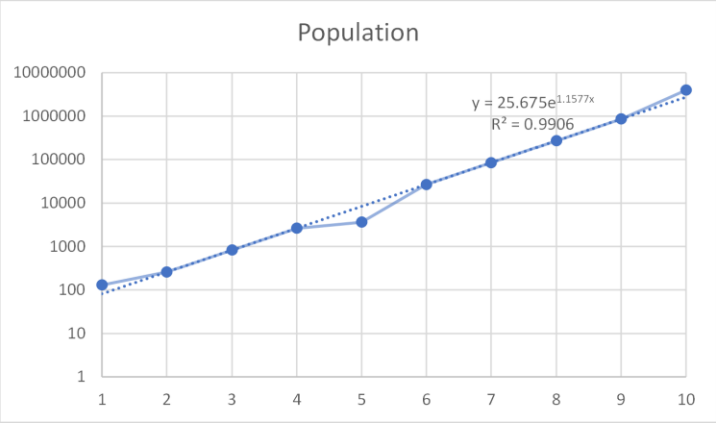
Table __.5

Population Weighting Factors.

Population		
Score	Value	Example
1	130	Vernon
2	260	.
3	828	.
4	2634	.
5	3633	Meadow Vista
6	26680	.
7	84913	.
8	270244	.
9	860078	.
10	3,966,936	Los Angeles

Chart __.1

Population interpolation chart.



One important factor to consider is the number of people that permanently have visual exposure to new project developments. In order to account for this factor, a linear extrapolation model with log-transform was utilized, with minimum (Vernon), maximum (Los Angeles), and median (Meadows Vista) values[2] used as initial data points. There are roughly 1,500 cities in California[3]. Notice that the midpoint is not centered, meaning that the scoring is skewed towards higher values, as these would result in greater impacts.

2. Traffic:

Table __.6

Traffic Weighting Factors.

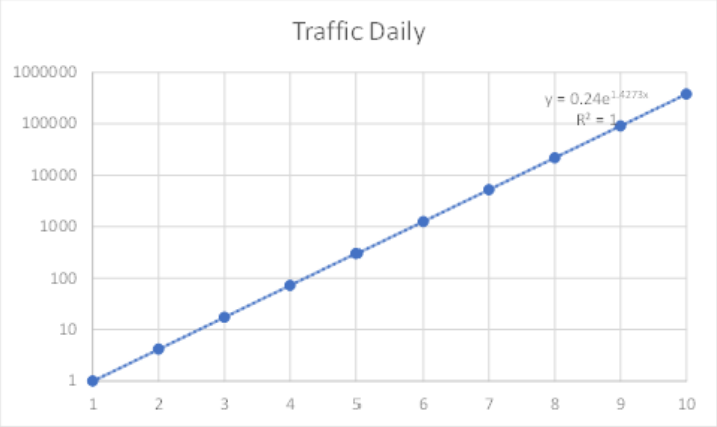
Chart __.3

Traffic interpolation chart.

[2] The population values were obtained from data provided by the United States Census Bureau.

[3] Information on city size was obtained from California Demographics by Cubit.

Traffic Daily		
Score	Value	Example
1	1	Nowhere
2	4	
3	17	
4	72	
5	302	
6	1257	
7	5240	
8	21835	
9	90997	
10	379,000	I-405 OC



Traffic will determine the number of cars that will drive by the project sites and thus expose roadway motorists to the developed structures. The weighting factors were obtained from extrapolating between the max value, which occurs at Orange County segment of I-405[4], and the minimum value, which was assumed to be one single vehicle. Data for traffic in different segments was obtained from the Traffic Volume Census conducted by the California Government.

3. Attendance:

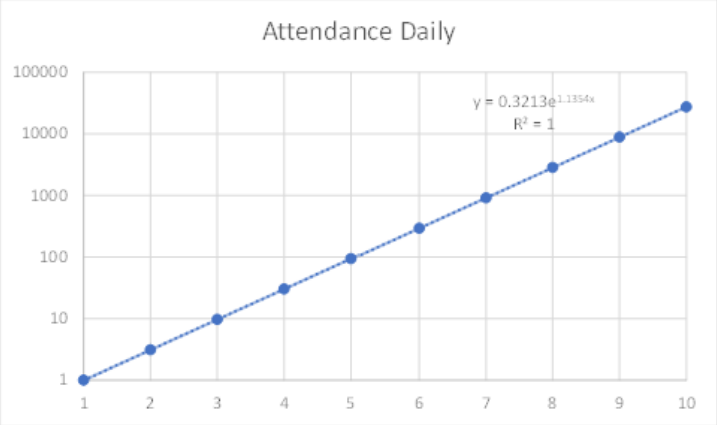
Table __.7

Attendance Weighting Factors.

Attendance Daily		
Score	Value	Example
1	1	Nowhere
2	3	
3	10	
4	30	
5	94	
6	292	
7	909	
8	2829	
9	8806	
10	27,397	Golden Gate

Chart __.3

Attendance interpolation chart.



Attendance measures the number of visitors that arrive and stay in a particular point of interest for a longer time than that of traffic (i.e. visiting points of interest such as state parks, recreational areas, hikes, etc.) This category goes along with Traffic, since receptors are in both cases temporary. Similar to traffic, the data is obtained from interpolating between the least popular (Nowhere) and most popular (Golden

[4] From to The Orange County Register.

Gate)[5] locations. Nevertheless, it is important to note that it is sometimes difficult to quantify the exact number of visitors, and therefore some of these values are approximations. This was the case for four out of the five sights, which are: Rams Hill Golf Club, Lake Wohlford, El Capitan Reservoir, and San Vicente Reservoir.

4. Visibility:

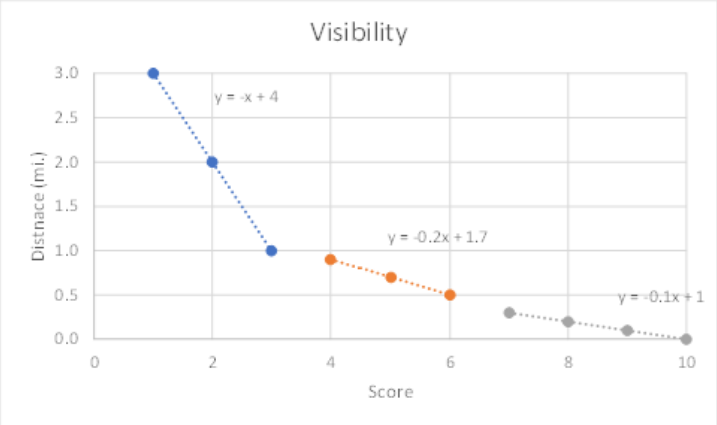
Table __.8

Visibility Weighting Factors.

Visibility		
Score	Value (mi.)	Example
1	3.0	out of sight
2	2.0	
3	1.0	
4	0.9	
5	0.7	
6	0.5	
7	0.3	
8	0.2	
9	0.1	
10	0.0	on sight

Chart __.4

Visual data point. Representation of the distribution of data points to account for sensibility.



Visibility measure the possible viewshed as seen from ground-level on a maximum range of 3.0 miles[6]. Notice how for the first three miles the weighting score is not as sensitive as the values for the last mile.

[5] From Bay City Guide.

[6] Maximum visual distance for the naked human eye.

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Biological Impact Assessment

Introduction

The focus of this section is to characterize the biological resources present in the proposed site, identify any sensitive biological resources, including vegetation and wildlife resources, describe potential impacts to the resources from the proposed project, and discuss mitigation strategies to avoid or reduce the significance of potential impacts. The proposed project routes run through national forests, state parks, and other important habitat areas, which leaves large potential for impact to the resources at the state. Because the conveyance system would run several hundred miles across Southern California, this analysis identified and focused on three geographic subregions of significant importance. These subregions are the Salton Sea, Anza Borrego State Park (ABSP), and Cuyamaca Rancho State Park (CRSP).

Regulatory Framework

Several federal, state, and local environmental regulations and policies have been implemented with the intent to safeguard sensitive biological resources. The regulations that are relevant to the CEQA review process are described below.

a. Federal Regulations and Standards

The proposed project would be subject to the following federal regulations and policies concerning biological resources.

- National Environmental Policy Act (1970). NEPA, requires that federal agencies assess environmental effects of proposed actions before making decisions on permit applications, adopting federal land management actions, and constructing highway and other publicly owned facilities.
- Federal Endangered Species Act (1973). FESA was implemented in 1973 and provides regulatory framework to protect and recover jeopardized plant and animal species and their associated habits. There are three major elements FESA: (1) provisions for listing species as threatened or endangered; designation of the habitats that species depend upon for survival and recovery, and revival of species to healthy populations that no longer require federal protection for survival.
- Clean Water Act (). CWA is the main federal law governing discharges of pollutants into the United States' water resources and water quality standards. "Water of the United States" has a broad definition, encompassing lakes, rivers, streams, mudflats, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds.
- Migratory Bird Treaty Ac (1918). The Migratory Bird Treaty Act prohibits the killing, capturing, selling, trading, transport, and import of protected migratory birds

and their eggs and nests, unless specifically authorized by the Department of Interior U.S. Fish and Wildlife Service. Protected migratory birds

- Fish and Wildlife Coordination Act (1958). The Fish and Wildlife Coordination Act was enacted to protect fish and wildlife by preventing the loss of, or damage to, wildlife resources.

b. State Regulations and Standards

The proposed project would be subject to the following state regulations and policies concerning biological resources.

- California Environmental Quality Act (1970). CEQA was signed into law shorted after NEPA as a statewide policy of environmental protection. The purposes of CEQA are to identify and reduce potential environmental damage from proposed projects as well as create an informed and transparent public decision-making process.
- California Endangered Species Act (1977). The goal of CESA is to conserve and protect plants and animal species hat are at risk of extinction. Plant and animal species are designated as threatened or endangered through a formal listing process carried out by the California Fish and Game Commission.
- State Fully Protected Species and Species of Special Concern. Fully protected species and species of special concern or those that are identified by the California Department of Fish and game as animals that are rare and face possible extinction. Under the California Fish and Game Code, these species "may not be taken or possessed at any time". Many of these animals are also listed under CESA and/or FESA.
- California Department of Fish and Game "Special Animals". The term "Special Animals" refers to any animal species that the California Natural Diversity Database tracks, regardless of legal or protection status. Animals on this list may not be protected under CESA or FESA but have been listed as at risk species by other state or federal agencies.
- California Native Plant Society. The CNPS curates an Inventory of Rare and Endangered Plants of California, and includes information about the distribution, ecology, rarity, and legal status of rare plants in California.
- Porter-Cologne Water Quality Control Act (1969). The Porter-Cologne Act is also known as the California Water Code and governs water quality regulation in California. This act applies to any surface water, groundwater, or wetlands and regulates point and nonpoint pollution sources.
- Sensitive Vegetation Communities. Sensitive vegetation communities are natural communities that are either unique, have relatively limited distribution in the region, or have high wildlife values, as defined by federal, state, and local conservation plans, policies, or regulations. When impacts to these communities are identified by local or regional plans, policies, regulations, or by federal or state agencies, they must be considered and evaluated under CEQA.

Data Collection

To determine the potential environmental impacts of the proposed project, the biological resources of the site were identified and characterized, including vegetation, wetland habitats, wildlife, and special status plant and animal species that occur or have the potential to occur in the site. Special status refers to any species that are:

- Listed as threatened or endangered under the Federal Endangered Species Act (FESA)
- Listed as threatened or endangered under the California Endangered Species Act (CESA)
- Identified as a species of concern or fully protected species by the California Department of Fish and Game (CDFG)
- Assigned a ranking of 1 or 2 by the California Native Plant society (CNPS)

Several sources were used to gather information concerning the biological resources of the three geographic subregions. These include the San Diego Natural History Museum Atlas databases, U.S. Fish and Wildlife Service, the California Department of Fish and Wildlife, California Department of Parks and Recreation, Bureau of Land Management, Data Basin, and literature searches. Multiple regional resource planning documents and existing biological resource assessments were referenced including Salton Sea Ecosystem Monitoring and Assessment Plan, Physical and Biological Resources Inventory Cuyamaca Rancho State Park, Salton Sea Habitat Modeling Technical Report, Quantifying Bird Habitat at the Salton Sea, Cuyamaca Rancho State Park Final General Plan and Environmental Impact Report, Anza-Borrego Desert State Park Bibliography, Biological Resources Assessment for the Casa Del Zorro Project, and Sunrise Powerlink Project Biological Resources Assessment.

Environmental Setting

The RCS alternatives each begin at the same point at the All-American Canal in southern Imperial County and flow through Southern California, terminating at two different locations in San Diego County. In alternative 3A, the conveyance system would cut through the surrounding habitat of the Salton Sea and a water treatment facility would be located near the southwest shore. Both alternatives would include disposing of the brine byproduct from a treatment facility in the lake. Alternative 3A also cuts through ABDSP, and the proposed route for alternative 5A would run through CRSP. Each of the three subregions feature unique biological resources and consist of diverse vegetations and habitats that support a number of special status plants animals. Figure 1 highlights the three areas and depicts the general habitat of the study region. As shown in the figure, the vegetation in the study region is dominated by shrub, desert shrub, and agricultural land, with a scattering of conifer forest and woodland and developed land.

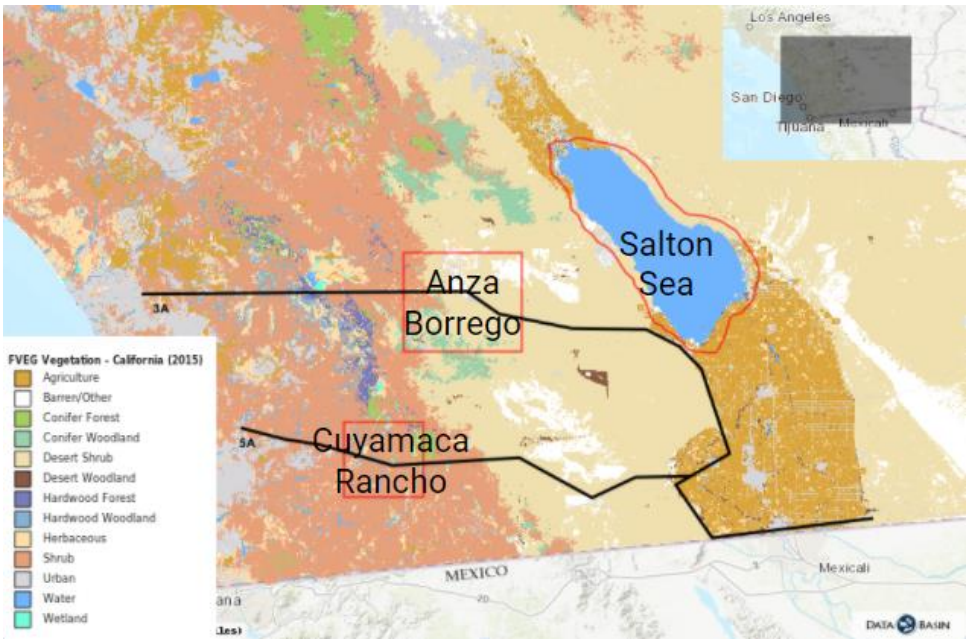

Figure 1. Vegetation map of the proposed project site

Background

The Salton Sea is California's largest lake and is located in a closed desert basin in the Riverside and Imperial counties in southern California. The lake lies at the bottom of the Salton Trough, the largest below sea level depression in the Western Hemisphere, which has historically been home to a series of natural lakes, a desert, and currently, a human-created and artificially maintained saline desert lake. Today's Salton Sea was formed from 1905-1907 as a result of a levee break and water being illegally diverted from the Colorado River for agricultural purposes [1]. The lake continues to be fed by agricultural runoff and has no natural outlet, meaning it fluctuates in size as inflows vary. The terminal nature of the lake and decreased flow into the lake have resulted in salinity that is 50 percent greater than that of the ocean. Together, increasingly salinity, temperature extremes eutrophication, anoxia, and algal productivity are negatively impacting the Sea's fish and wildlife resources. Without major and swift intervention, these water quality issues could result in a collapse of the entire Salton Sea ecosystem [2].

Despite the relatively young age of the Salton Sea, it has become a critical resource for many animal species, most notably resident and migratory birds. Over the last century 90% of California's wetlands have disappeared, which has led the Salton Sea ecosystem to become one of the most important wetlands for birds in North America [3]. Since its inception in the early 1900's, the changes in salinity have led to changes in the overall ecosystem. Water quality concerns continue to alter the ecosystem and threaten to reduce habitats for species in the region as well as migratory birds that depend on the lake.

Wildlife and Wildlife Habitat

The Salton Sea is host to a number of species with high priority conservation status as well as habitats that support these animals.

Four general terrestrial wildlife habitats occur in the Salton Sea and surrounding areas [4]:

- Drain habitat
- Tamarisk scrub habitat
- Desert habitat
- Agricultural field habitat

Drain habitat

The drain habitat refers the to the areas associated with the existing drainage and conveyance systems, the managed marshes, and unmanaged vegetation adjacent to the Salton Sea. The drainage system is composed of unlined, dirt channels operated and maintained by the IID with water flows that are determine by both irrigation practices and storms. Within the drains, vegetation consists mostly of invasive species such as saltgrass, salt bush, Bermuda grass, common reed, and salt cedar. There are also patches of cattail, bulrushes, rush, and sedges found in drain channels but typically in smaller, localized areas. Along the edges of the Salton Sea, natural vegetation can also be found, including 6,485 acres of wetlands and 64 acres of mudflats. In the adjacent wetlands, tamarisk, iodine bushes, cattails, and bulrushes are the primary vegetation. The managed marsh area consists of any areas that are actively managed for marsh habitat values and functions, and mostly occur on state and federal refuges near the Salton Sea.

The wildlife associated with drain habitat includes a number of birds that feed off the snails, midge larvae, fish, seeds and vegetation material from wetland plants. Common wading birds consist of the green-backed heron, great blue heron, and great egret. Riparian and wetland birds include red-winged blackbird, common yellowthroat, Yuma clapper rail, and black phoebe. The mourning dove, greater roadrunner, and killdeer, and channel embankments provide burrow sites for burrowing owl, kingfisher, and southern rough-winged swallows are commonly found in the embankments and levees. Lastly, the drains provide habitat for waterfowl species such as American coots, and mallards. Mammals in the drain habitat include muskrats, raccoons, bats, squirrels, and gophers, and bullfrog, spiny softshell turtle, and red-spotted toad are commonly found reptile and amphibian species.

Tamarisk scrub habitat

The tamarisk scrub habitat consists of non-native plant species that frequently take over the native riparian species in the desert southwest. Tamarisk is poor quality habitat for native wildlife species in the region, but some have adapted to using it in instances where native vegetation was displaced. The main vegetation includes salt cedar, big saltbrush, saltgrass, common reed, and giant reed; these usually occur as dense monocultures with little structural

diversity in the tamarisk habitats. Several bird species depend on the habitat, including yellow warbler, southwestern willow flycatcher, mourning dove, black-crowned night heron, cinnamon teal, and phainopepla, but there is less diversity and abundance than in native riparian vegetation. Mammals include deer mouse, cotton rat, muskrat, raccoon, common gray fox, ringtail cat, and coyote. The reptile and amphibian species found here are spiny softshell turtle, bullfrog, leopard frog, and woodhouse's toad.

Desert habitat

A small area of native desert habitat occurs in the project area and supports solely consists of creosote bush scrub. Creosote bush scrub is the dominant shrub in the southwestern deserts of North America and is known for widely spaced shrubs, about 1.6 to 9.8 feet tall, with mostly bare ground in between. It typically occurs on well-drained secondary soils of slopes, fans, and valleys and includes the species of creosote bush, burro weed, brittle brush, ocotillo, and mesquite thickets. Succulents are also common and ephemeral annual herbs bloom in late winter. Wildlife found in desert habitat include birds, mammals, and reptiles that are adapted to arid desert conditions. Resident birds include white-crowned sparrow, greater roadrunner, great-horned owl, and loggerhead shrike. Other birds that use the habitat include phainopepla, mockingbird, and ash-throated flycatcher. Mammals can be found in low densities such as the kangaroo rat, little pocket mouse, desert kangaroo rat, ground squirrels, striped skunk, desert cottontail, coyote, common gray fox, white-throated woodrat, and black-tailed hare. Common reptiles include zebra-tailed lizard, sidewinder, coachwhip, desert iguana, side-blotched lizard, and California whiptail.

Agriculture

Irrigated agricultural land is the dominant land cover type in the Imperial Valley and makes up a portion of the project area, including where the water treatment facility would be located. Some of the most common crops include alfalfa, sudan grass, Bermuda grass, wheat, sugar beets, lettuce, carrots, melons broccoli, and onion, but many other crops are grown. A number of species use the agricultural fields adjacent to the agricultural fields including geese, ibis, gulls, blackbirds, long-billed curlews, and mountain plovers. Birds such as red-tailed hawk, northern harrier, and wintering ferruginous hawks forage on the agriculture fields. When fields are flooded foraging wading birds and waterfowl often use the fields and geese will forage on crops when no standing water is left. Gulls, wintering mountain plovers, brown-headed cowbirds, and horned larks also forage the fields. The western harvest mouse and southern pocket gopher are two of the most common mammals found in the agriculture habitat.

Fish and Aquatic Habitat

The Salton Sea is primary fed by agricultural inflows, which have high level of phosphorous, nitrogen and salinity. Agricultural inflows coupled with a lack of outlet create high salinity conditions of 44 g/L of total dissolved solids (TDS). In comparison, the average TDS in lakes

and streams is between 50 to 250 mg/L. The lake also experiences high eutrophication due to phosphorous and nitrogen inputs, creating a strong environment for phytoplankton and phytobenthic algae. Water quality issue limit the diversity of fish; a few species that can tolerate high temperatures and salinity as well as low dissolved oxygen concentrations thrive in the Salton Sea.

The Salton Sea is considered eutrophic, with high density of primary-producers phytoplankton and phytobenthos. For this reason, vegetation in the lake is dominated by single-celled algae. The dominate algae groups are diatoms, dinoflagellates, and green algae. There are also five phyla of invertebrates present in the sea, with the most common species being ciliate protozoans, foraminifera, rotifers, copepods, barnacle, pilework, amphipod, and the water boatman. Most of the invertebrate and phytoplankton species are invasive and have a wide range of distribution globally [1]. There is a low diversity of macroscopic species in the sea, but they are in very high numbers.

The California Department of Fish and Game made three major attempts to populate the Salton Sea with fish. The first two in the early 1930's failed, but the final attempt which occurred in the 1950's was extremely successful. Of the 30 species that were introduced, three became abundant. These were the Bairdiella, sargo, and orangemouth Covina. Within a few years, the Salton Sea become the most popular and productive sport fishery in the state. Tilapia also became an abundant species after being introduced into the lower Colorado River in 1964 and eventually reaching the Salton Sea [1]. For several decades, a thriving fish population existed until water quality issues led to massive fish die offs. In 2000, it was estimated that the Salton Sea was home to 100 million fish, but by 2019 it was reported that 97% of the fish were gone [5]. The fish still found in the sea today include tilapia, the dominant species, desert pupfish, sailfin mollies, and western mosquitofish [2].

Avian Resources

The Salton Sea has become one of the most important wetlands for birds in North America for a number of reasons. First, over 90% of California's wetlands have disappeared in the last century making the lake one of the last remaining bodies of water in the region. Second, Salton Sea is located on Pacific Flyaway, a major flyway for migratory birds that extends from Alaska to Patagonia. Fish eating birds are highly susceptible to any fluctuations in their prey, so declining fish populations from massive die offs has also led to a decline in bird populations have decreased as well [6]. Without intervention, it is very likely that the ecosystem will collapse and many of the higher-level organisms of the Salton Sea, including fish and fish-eating birds, will disappear [2].

Most of the bird activity occurs in three locations; the north shore, south shore, and near Salt Creek mouth on easter shore. Very large populations of wintering waterfowl use the Salton Sea and adjacent agricultural areas. Eared Grebes are the most common, but northern shovelers,

northern pintail, green-winged teal, American widgeon, ruddy ducks, Snow Geese, and Ross's geese can also be found. There are large numbers of fall and spring migrant shorebirds population, and large wintering population. These include dowitcher, western sandpiper, American avocet, black-necked stilt, willet, marbled godwit, black-bellied plover. White pelicans use Salton Sea as migratory stopover and wintering area in large numbers. Record numbers have been measured in past. The Sea also supports transient species during post-breeding periods and spring and fall migrations. Most visited spring stopover area in the intermountain and desert regions of the west and second most important after Great Salt Lake in the fall [7].

Special Status Species

Forty-four special status animal species, and six special status plant species occur or have the potential to occur at the Salton Sea and surrounding habits. These species are listed in tables 1 and 2. The distribution of the desert pupfish and the southwestern willow flycatcher, two prominent special status species that occur at the Salton Sea are shown in figures 2 and 3.

Table 1. Special status animal species at the Salton Sea

Common Name	Scientific Name	Element Type	Federal Status	State Status	CDFW Status
American badger	Taxidea taxus	Animals - Mammals	None	None	SSC
American peregrine falcon	Falco peregrinus anatum	Animals - Birds	Delisted	Delisted	FP
American white pelican	Pelecanus erythrorhyncho	Animals - Birds	None	None	SSC
black skimmer	Rynchops niger	Animals - Birds	None	None	SSC
black storm-petrel	Hydrobates melania	Animals - Birds	None	None	SSC
black tern	Chlidonias niger	Animals - Birds	None	None	SSC
burrowing owl	Athene cunicularia	Animals - Birds	None	None	SSC
California black rail	Laterallus jamaicensis cotu	Animals - Birds	None	Threatened	FP
California brown pelican	Pelecanus occidentalis cali	Animals - Birds	Delisted	Delisted	FP
California glossy snake	Arizona elegans occidental	Animals - Reptiles	None	None	SSC
California leaf-nosed bat	Macrotus californicus	Animals - Mammals	None	None	SSC
Colorado Desert fringe-toed lizard	Uma notata	Animals - Reptiles	None	None	SSC
Colorado Valley woodrat	Neotoma albigula venusta	Animals - Mammals	None	None	
Crissal thrasher	Toxostoma crissale	Animals - Birds	None	None	SSC
desert bighorn sheep	Ovis canadensis nelsoni	Animals - Mammals	None	None	FP
desert pupfish	Cyprinodon macularius	Animals - Fish	Endangered	Endangered	
desert tortoise	Gopherus agassizii	Animals - Reptiles	Threatened	Threatened	
flat-tailed horned lizard	Phrynosoma mcallii	Animals - Reptiles	None	None	SSC
Gila woodpecker	Melanerpes uropygialis	Animals - Birds	None	Endangered	
gull-billed tern	Gelochelidon nilotica	Animals - Birds	None	None	SSC
large-billed savannah sparrow	Passerculus sandwichensis	Animals - Birds	None	None	SSC
Le Conte's thrasher	Toxostoma lecontei	Animals - Birds	None	None	SSC
least Bell's vireo	Vireo bellii pusillus	Animals - Birds	Endangered	Endangered	
least bittern	Ixobrychus exilis	Animals - Birds	None	None	SSC
little willow flycatcher	Empidonax traillii brewste	Animals - Birds	None	Endangered	
loggerhead shrike	Lanius ludovicianus	Animals - Birds	None	None	SSC
lowland leopard frog	Lithobates yavapaiensis	Animals - Amphibians	None	None	SSC
mountain plover	Charadrius montanus	Animals - Birds	None	None	SSC
northern harrier	Circus hudsonius	Animals - Birds	None	None	SSC
olive-sided flycatcher	Contopus cooperi	Animals - Birds	None	None	SSC
pallid bat	Antrozous pallidus	Animals - Mammals	None	None	SSC
Palm Springs pocket mouse	Perognathus longimembris	Animals - Mammals	None	None	SSC
razorback sucker	Xyrauchen texanus	Animals - Fish	Endangered	Endangered	FP
redhead	Aythya americana	Animals - Birds	None	None	SSC
southwestern willow flycatcher	Empidonax traillii extimus	Animals - Birds	Endangered	Endangered	
spotted bat	Euderma maculatum	Animals - Mammals	None	None	SSC
western mastiff bat	Eumops perotis californicu	Animals - Mammals	None	None	SSC
western snowy plover	Charadrius nivosus nivosu	Animals - Birds	Threatened	None	SSC
western yellow bat	Lasiurus xanthinus	Animals - Mammals	None	None	SSC
wood stork	Mycteria americana	Animals - Birds	None	None	SSC
yellow warbler	Setophaga petechia	Animals - Birds	None	None	SSC
yellow-breasted chat	Icteria virens	Animals - Birds	None	None	SSC
yellow-headed blackbird	Xanthocephalus xanthocep	Animals - Birds	None	None	SSC
Yuma Ridgway's rail	Rallus obsoletus yumanen	Animals - Birds	Endangered	Threatened	FP

Table 2. Special status plant species at the Salton Sea

California saw-grass	Cladium californicum	Plants - Vascular	None	None	2B.2
chaparral sand-verbena	Abronia villosa var. aurita	Plants - Vascular	None	None	1B.1
gravel milk-vetch	Astragalus sabulonum	Plants - Vascular	None	None	2B.2
Harwood's milk-vetch	Astragalus insularis var. ha	Plants - Vascular	None	None	2B.2
Orocopia sage	Salvia greatae	Plants - Vascular	None	None	1B.3
triple-ribbed milk-vetch	Astragalus tricarinatus	Plants - Vascular	Endangered	None	1B.2

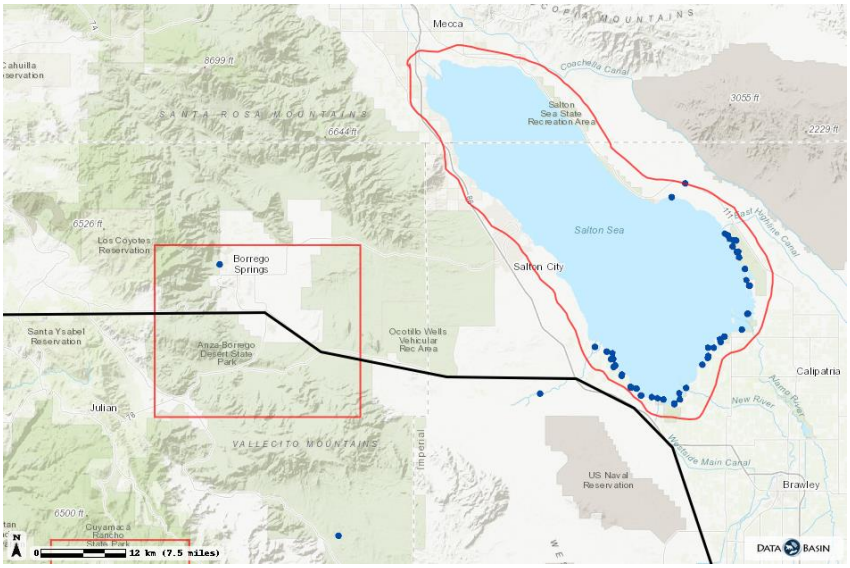

Figure 2. Species distribution of the desert pupfish

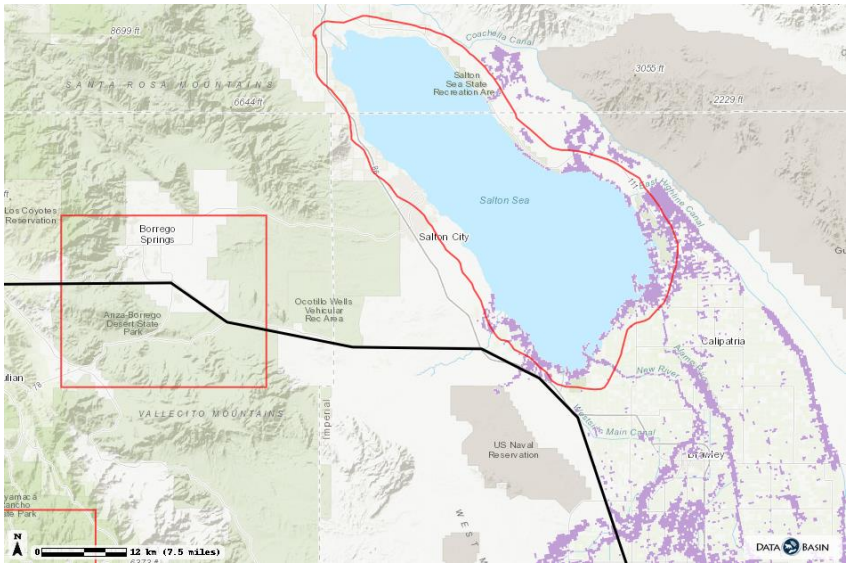

Figure 3. Species distribution of the southwestern willow flycatcher

a) Anza Borrego Desert State Park

Background

Anza Borrego Desert State Park was designated in 1974 as a National Natural Landmark and a member of the International biosphere Reserve Program by the United States in 1985 due to its significance as a conservation area (California State Parks, 2005 page 16). It is the largest state park in California and second largest U.S. state park, with an area over 600,000 acres. The park is located in eastern San Diego County and spans 935 square miles of the Colorado Desert. The park's topography consists of dry lake beds, badlands, and mountains, with over two-thirds of the area designated as wildernesses. Mountain ranges frame the park, with Bucksnorts and Santa Rosas on the north, the Jacumba Mountains on the south, and Vallecito and Pinyon Mountains and the west. The east side of the park consists of the Carrizo Badlands that fade away into the Salton Trough. Because of the park's elevation range from below sea level to 8,000 feet, it is one of the most diverse desert landscapes in the world and contains several varying ecological zones. Washes, alluvial fans, badlands, wildflowers, palm groves, numerous trees and cacti, and vast open areas make up ABDSP. The park is also known for having rich archeological heritage, with indications that people lived in the region as early as 6000 years ago.

Vegetation and Wildlife

Approximately two-thirds of ABDSP are designated as State wilderness, divided into the Santa Rosa Mountains State wilderness and Anza-Borrego Desert State Wilderness. Some of the broader habitats found within the park include washes, arroyos and adjacent terraces, wetland and riparian areas, open desert scrub, montane, and transition zone habitats [8]. Several sensitive and rare habitats exist within ABDSP, including desert riparian, mesquite bosque, alkali marshes, monte vernal pool and meadow, desert ephemeral playas, small springs and seeps, sand dunes, and wildflower areas. Common plant communities and vegetation types in these habitats include low desert wash to pinion-juniper woodland to oak woodland, and include creosote bush, Mojave yucca, desert microphyll woodlands, large woody perennials, and palm oases. The animal species that occur in these habitats include roadrunner, golden eagle, kit fox, mule deer, Peninsular bighorn sheep, desert iguana, common chuckwalla, and several rattlesnake species [9].

The proposed project would cut through the northern portion of ABDSP, with much of it passing through Borrego Springs, a small town completely surrounded by the park. Borrego Springs is characterized by urban and developed land and creosote bush scrub. The plant species found in this habitat include white bursage, cheesebush, shadescale, desert holly, allscale, brittle bush, California joint fir, Nevada joint fir, and Anderson's boxthorn [10]. The creosote bush scrub alliance is not considered a sensitive biological resource under CEQA as it is both secure

globally and within the state of California [11]. Urban and developed land is defined as land with previous construction activity or alteration so that it no longer supports natural vegetation. This can include land that has permanent or semi-permanent structures, pavement or hardscape, and landscaped areas that require irrigation [12]. Developed lands are not vegetation communities and are not considered sensitive biological resources under CEQA [11].

Special Species Status

Forty-nine special status animal species, and thirty special status plant species occur or have the potential to occur in Anza-Borrego Desert State Park. These species are listed in tables 3 and 4. The distribution of the barefoot gecko and the burrowing owl, two prominent special status species that occur at ABDSP are shown in figures 4 and 5.

Table 3. Special status animal species at ABDSP

Common Name	Scientific Name	Element Type	Federal Status	State Status	CDFW Status
American badger	Taxidea taxus	Animals - Mammals	None	None	SSC
arroyo toad	Anaxyrus californicus	Animals - Amphibians	Endangered	None	SSC
barefoot gecko	Coleonyx switaki	Animals - Reptiles	None	Threatened	
Borrego parnopes cuckoo wasp	Parnopes borregoensis	Animals - Insects	None	None	
burrowing owl	Athene cunicularia	Animals - Birds	None	None	SSC
California glossy snake	Arizona elegans occidental	Animals - Reptiles	None	None	SSC
California leaf-nosed bat	Macrotus californicus	Animals - Mammals	None	None	SSC
California red-legged frog	Rana draytonii	Animals - Amphibians	Threatened	None	SSC
Carlson's dune beetle	Anomala carlsoni	Animals - Insects	None	None	
coast horned lizard	Phrynosoma blainvillii	Animals - Reptiles	None	None	SSC
coast patch-nosed snake	Salvadora hexalepis virgult	Animals - Reptiles	None	None	SSC
coastal cactus wren	Campylorhynchus brunnei	Animals - Birds	None	None	SSC
coastal whiptail	Aspidoscelis tigris stejnege	Animals - Reptiles	None	None	SSC
Colorado Desert fringe-toed lizard	Uma notata	Animals - Reptiles	None	None	SSC
Colorado Valley woodrat	Neotoma albigula venusta	Animals - Mammals	None	None	
Costa's hummingbird	Calypte costae	Animals - Birds	None	None	
Crissal thrasher	Toxostoma crissale	Animals - Birds	None	None	SSC
Crotch bumble bee	Bombus crotchii	Animals - Insects	None	Candidate Endangered	
desert pupfish	Cyprinodon macularius	Animals - Fish	Endangered	Endangered	
desert tortoise	Gopherus agassizii	Animals - Reptiles	Threatened	Threatened	
Earthquake Merriam's kangaroo rat	Dipodomys merriami collir	Animals - Mammals	None	None	
flat-tailed horned lizard	Phrynosoma mcallii	Animals - Reptiles	None	None	SSC
least Bell's vireo	Vireo bellii pusillus	Animals - Birds	Endangered	Endangered	
loggerhead shrike	Lanius ludovicianus	Animals - Birds	None	None	SSC
long-eared myotis	Myotis evotis	Animals - Mammals	None	None	
long-eared owl	Asio otus	Animals - Birds	None	None	SSC
Mohave tui chub	Siphateles bicolor mohave	Animals - Fish	Endangered	Endangered	
Mojave fringe-toed lizard	Uma scoparia	Animals - Reptiles	None	None	SSC
pallid bat	Antrozous pallidus	Animals - Mammals	None	None	SSC
pallid San Diego pocket mouse	Chaetodipus fallax pallidus	Animals - Mammals	None	None	SSC
Palm Springs pocket mouse	Perognathus longimembris	Animals - Mammals	None	None	SSC
Peninsular bighorn sheep DPS	Ovis canadensis nelsoni pc	Animals - Mammals	Endangered	Threatened	FP
pocketed free-tailed bat	Nyctinomops femorosaccu	Animals - Mammals	None	None	SSC
quino checkerspot butterfly	Euphydryas editha quino	Animals - Insects	Endangered	None	
red-diamond rattlesnake	Crotalus ruber	Animals - Reptiles	None	None	SSC
San Diego banded gecko	Coleonyx variegatus abbot	Animals - Reptiles	None	None	SSC
San Diego black-tailed jackrabbit	Lepus californicus bennett	Animals - Mammals	None	None	SSC
San Diego desert woodrat	Neotoma lepida intermedi	Animals - Mammals	None	None	SSC
Southern California legless lizard	Anniella stebbinsi	Animals - Reptiles	None	None	SSC
summer tanager	Piranga rubra	Animals - Birds	None	None	SSC
Townsend's big-eared bat	Corynorhinus townsendii	Animals - Mammals	None	None	SSC
two-striped gartersnake	Thamnophis hammondii	Animals - Reptiles	None	None	SSC
Vaux's swift	Chaetura vauxi	Animals - Birds	None	None	SSC
western mastiff bat	Eumops perotis californicu	Animals - Mammals	None	None	SSC
western yellow bat	Lasiurus xanthinus	Animals - Mammals	None	None	SSC
willow flycatcher	Empidonax traillii	Animals - Birds	None	Endangered	
yellow warbler	Setophaga petechia	Animals - Birds	None	None	SSC
yellow-breasted chat	Icteria virens	Animals - Birds	None	None	SSC
yellow-headed blackbird	Xanthocephalus xanthocep	Animals - Birds	None	None	SSC

Table 4. Special status plant species at ABDSP

Common Name	Scientific Name	Element Type	Federal Status	State Status	CA Rare Plant Rank
Arizona carlowrightia	Carlowrightia arizonica	Plants - Vascular	None	None	2B.2
Arizona spurge	Euphorbia arizonica	Plants - Vascular	None	None	2B.3
Blair Valley pepper-grass	Lepidium flavum var. felipe	Plants - Vascular	None	None	1B.2
Borrego bedstraw	Galium angustifolium ssp.	Plants - Vascular	None	Rare	1B.3
brown turbans	Malperia tenuis	Plants - Vascular	None	None	2B.3
California ayenia	Ayenia compacta	Plants - Vascular	None	None	2B.3
chaparral sand-verbena	Abronia villosa var. aurita	Plants - Vascular	None	None	1B.1
Cove's cassia	Senna covesii	Plants - Vascular	None	None	2B.2
desert spike-moss	Selaginella eremophila	Plants - Vascular	None	None	2B.2
Gander's cryptantha	Cryptantha ganderi	Plants - Vascular	None	None	1B.1
gravel milk-vetch	Astragalus sabulonum	Plants - Vascular	None	None	2B.2
hairy stickleaf	Mentzelia hirsutissima	Plants - Vascular	None	None	2B.3
Harwood's milk-vetch	Astragalus insularis var. ha	Plants - Vascular	None	None	2B.2
Hellhole scaleseed	Spermolepis infernensis	Plants - Vascular	None	None	1B.2
Jacumba milk-vetch	Astragalus douglasii var. p	Plants - Vascular	None	None	1B.2
little-leaf elephant tree	Bursera microphylla	Plants - Vascular	None	None	2B.3
narrow-leaf sandpaper-plant	Petalonyx linearis	Plants - Vascular	None	None	2B.3
Nevin's barberry	Berberis nevinii	Plants - Vascular	Endangered	Endangered	1B.1
Orcutt's woody-aster	Xylorhiza orcuttii	Plants - Vascular	None	None	1B.2
Palmer's jackass clover	Wislizenia refracta ssp. pal	Plants - Vascular	None	None	2B.2
Peirson's milk-vetch	Astragalus magdalenae va	Plants - Vascular	Threatened	Endangered	1B.2
Peirson's pincushion	Chaenactis carphoclinia va	Plants - Vascular	None	None	1B.3
pink fairy-duster	Calliandra eriophylla	Plants - Vascular	None	None	2B.3
pygmy lotus	Acmispon haydonii	Plants - Vascular	None	None	1B.3
smooth tarplant	Centromadia pungens ssp.	Plants - Vascular	None	None	1B.1
southern jewelflower	Streptanthus campestris	Plants - Vascular	None	None	1B.3
spear-leaf matelea	Matelea parvifolia	Plants - Vascular	None	None	2B.3
Twisselmann's nemacladus	Nemacladus twisselmannii	Plants - Vascular	None	Rare	1B.2
Warner Springs lessingia	Lessingia glandulifera var.	Plants - Vascular	None	None	1B.1
western bristly scaleseed	Spermolepis lateriflora	Plants - Vascular	None	None	2A

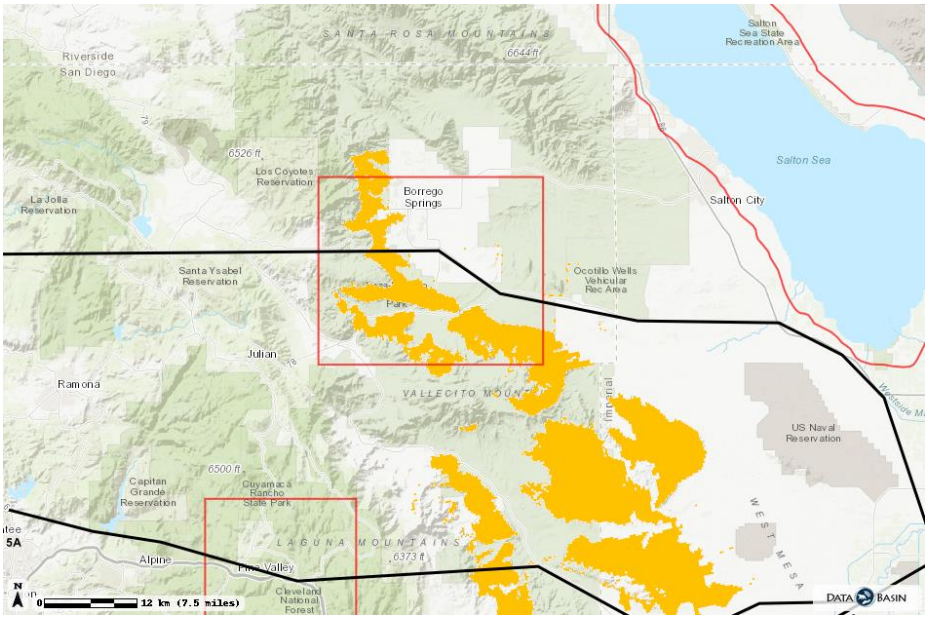

Figure 4. Species distribution of the barefoot gecko

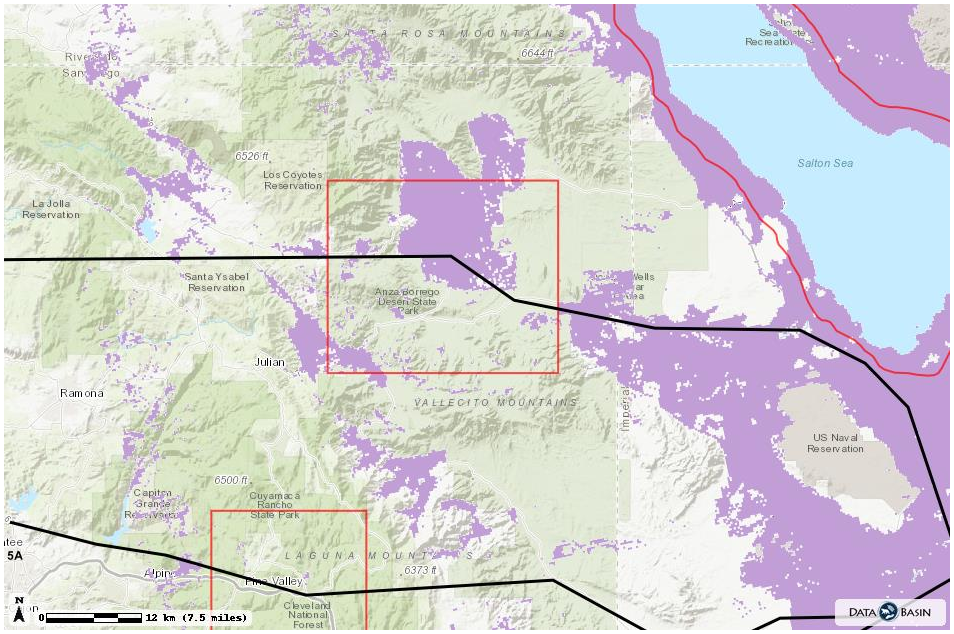

Figure 5. Species distribution of the burrowing owl

b) Cuyamaca Rancho State Park

Background

Cuyamaca Rancho State Park is located in unincorporated San Diego County in the Cuyamaca and Lagunas Mountains and spans 26,000 acres. Because of the relatively high elevation compared to surroundings, the park's ecosystems are markedly different than the rest of the desert region. CRSP features forested mountains of pine, fir, and oak, grassy meadows and streams, and chaparral-covered hills. The region has a Mediterranean climate with large valleys surrounded by mountain peaks, including Cuyamaca Peak the second-highest point in San Diego County. and diverse biological resources. Much of the vegetation is new growth due to a 2003 wildfire that burned over 98% of the state park [13]. Cuyamaca Rancho State Park is also full of historical features dating back 7000 years with the presence of Native Americans to the discovery of gold in the 19th century that brought a rush of settlers [14].

Vegetation and Wildlife

Because the park is located in a transition zone from coastal to desert ecotone, a diverse range of vegetation exists within CRSP. The broader vegetation communities that exist within the park include meadow and grassland, chaparral, oak woodland, conifer forest, riparian woodland, and developed land [13]. Each of these communities are composed of several wildlife habitats, with a

total of 40 recorded vegetation alliances. The communities, habitats, and alliances in CRSP are listed in table 5. The proposed project will cut through primarily chaparral communities and oak woodland communities, with the primary habitats being mixed chaparral and coastal oak woodland.

Table 5. Plant communities, habitats, and alliances found in CRSP

Community	Wildlife Habitat	Alliance
Meadow and Grassland	Annual Grassland	Annual Brome Grasslands
		California Black Oak Forest/Annual Grass-Herb
		Cheatgrass Grassland
		Fiddleneck Fields
		Upland Mustards
		Western Ragweed Meadows
		Wild Oats Grasslands
	Perennial Grassland	Bracken Fern Patch
		Creeping Rye Grass Turfs
		Deer Grass Beds
	Wet Meadows	Baltic and Mexican Rush Marshes
		Sedge Meadows
		Soft Rush Marshes
Chaparral	Chamise Chaparral	Chamise Chaparral
	Mixed Chaparral	Birch Leaf Mountain Mahogany Chaparral
		Canyon Live Oak Chaparral
		Chaparral White Thorn Chaparral
		Coast Live Oak Woodland/Chaparral
		Coast Live Oak Woodland/Grassland
		Cup Leaf Ceanothus Chaparral
		Interior Live Oak Chaparral
		Palmer's Ceanothus Chaparral (< 50% cover)
		Parish's Goldenbush Chaparral
		Pink-bract Manzanita Chaparral
		Point-leaf Manzanita Chaparral
		Point-leaf Manzanita-Palmer's Ceanothus Chaparra
		Scurb Oak Chaparral
		Scrub Oak-Chamise Chaparral
	Monoculture Ceanothus	Palmer's Ceanothus Chaparral (> 50% cover)
Oak woodland	Coastal Oak Woodland	Coast Live Oak Woodland
	Montane Hardwood	Californa Black Oak Forest
		California Black Oak Forest Regenerating
		Canyon Live Oak Forest
Conifer Forest	Montane Hardwood Conifer	Coulter Pine Woodland
	Jeffrey Pine	Jeffrey Pine Forest
	Sierran Mixed Conifer	Sugar White Pine Forest
Riparian Woodland	Valley Foothilll Riparian	Arroyo Willow Thickets
Developed	Developed	Developed

Chaparral white thorn is found in mixed chaparral habitats and is the dominant vegetation cover in the project area as well as in the CRSP. It covers 6,849 acres, or 27.7% of the park and is mostly found in the central and southern portion. Chaparral white thorn is characterized by shrubs, with a scattering of Coulter pine, California black oak, and interior coast live oak. The most common shrubs include chaparral whitethorn, Eastwood’s manzanita, cup-leaf lilac, birch leaf mountain mahogany, chamise, interior live oak, and Torrey’s scrub oak. Scrub oak chaparral is also found within CRSP with less frequency and covers 1,344 acres. The scrub oak chaparral

alliance is also shrub dominated with the most common shrubs observed being Torrey's scrub oak, birch-leaf mountain mahogany, Eastwood's manzanita, chaparral whitethorn, cup leaf lilac, and point leaf manzanita. California black oak and coast live oak are also documented.

The coastal oak woodland habitat that the proposed route would cut through consists solely of the coast live oak woodland alliance. This is a common alliance in the park, and spans 1,442 acres or 5.8% of the park, mostly near major waterways. The dominant tree species is coast live oak, but Jeffrey pine, Coulter pine, and California black oak are also commonly observed.

A wide variety of wildlife depend on the habitats of Cuyamaca Rancho State Park. In total 204 bird species have been documented in near or near the park, with only five species not being recorded since the fire. Some of the common bird species in the park are the red-shouldered hawk, red-tailed hawk, acorn woodpecker, Steller's jay, and mountain chickadee. There have been 40 different mammal species recorded, a list that is likely incomplete as more data is needed regarding small mammals. Large mammal species include the mountain lion, bobcat, and southern mule deer. A few bat species are also present in the region, including Townsend's big-eared bat, western small-footed myotis, and Yuma myotis. A few of the reptiles and amphibians found in CRSP are the arroyo toad, a federally endangered species, California mountain kingsnake, coast horned lizard, and western fence lizard. A number of non-native wildlife resources have also been document in CRSP. These species can be harmful to native flora and fauna through numerous including reduction of biodiversity, transmission of disease, competition for limited resources, and altered habitats. Feral pigs, bullfrogs, opossum, and rainbow trout are invasive animal species that have been observed in CRSP. The gold spotted oak borer is an invasive pest species that has been found on coast live oak, canyon live oak, and California black oak in the park. Several non-native avian species have also been found in the park, including the wild turkey, domestic pigeon, European starling, and house sparrow.

Special Status Species

Forty-two special status animal species, and forty-one special status plant species occur or have the potential to occur in Cuyamaca Rancho State Park. These species are listed in tables 6 and 7. The distribution of the arroyo toad and coast horned lizard, two prominent special status species that occur at CRSP are shown in figures 6 and 7.

Table 6. Special status animal species at CRSP

Common Name	Scientific Name	Element Type	Federal Status	State Status	CDFW Status
American badger	Taxidea taxus	Animals - Mammals	None	None	SSC
American peregrine falcon	Falco peregrinus anatum	Animals - Birds	Delisted	Delisted	FP
arroyo toad	Anaxyrus californicus	Animals - Amphibians	Endangered	None	SSC
bald eagle	Haliaeetus leucocephalus	Animals - Birds	Delisted	Endangered	FP
blunt-nosed leopard lizard	Gambelia sila	Animals - Reptiles	Endangered	Endangered	FP
California glossy snake	Arizona elegans occidental	Animals - Reptiles	None	None	SSC
California red-legged frog	Rana draytonii	Animals - Amphibians	Threatened	None	SSC
California Spotted Owl	Strix occidentalis occidenta	Animals - Birds	None	None	SSC
coast horned lizard	Phrynosoma blainvillii	Animals - Reptiles	None	None	SSC
coast patch-nosed snake	Salvadora hexalepis virgult	Animals - Reptiles	None	None	SSC
coastal California gnatcatcher	Polioptila californica califo	Animals - Birds	Threatened	None	SSC
coastal whiptail	Aspidoscelis tigris stejnege	Animals - Reptiles	None	None	SSC
Dulzura pocket mouse	Chaetodipus californicus fe	Animals - Mammals	None	None	SSC
gray vireo	Vireo vicinior	Animals - Birds	None	None	SSC
Hermes copper butterfly	Lycaena hermes	Animals - Insects	Proposed Threatened	None	
Kern primrose sphinx moth	Euproserpinus euterpe	Animals - Insects	Threatened	None	
least Bell's vireo	Vireo bellii pusillus	Animals - Birds	Endangered	Endangered	
loggerhead shrike	Lanius ludovicianus	Animals - Birds	None	None	SSC
Northern California legless lizard	Anniella pulchra	Animals - Reptiles	None	None	SSC
northwestern San Diego pocket mouse	Chaetodipus fallax fallax	Animals - Mammals	None	None	SSC
pallid bat	Antrozous pallidus	Animals - Mammals	None	None	SSC
pallid San Diego pocket mouse	Chaetodipus fallax pallidus	Animals - Mammals	None	None	SSC
pocketed free-tailed bat	Nyctinomops femorosaccu	Animals - Mammals	None	None	SSC
quino checkerspot butterfly	Euphydryas editha quino	Animals - Insects	Endangered	None	
red-diamond rattlesnake	Crotalus ruber	Animals - Reptiles	None	None	SSC
San Diego banded gecko	Coleonyx variegatus abbot	Animals - Reptiles	None	None	SSC
San Diego desert woodrat	Neotoma lepida intermedi	Animals - Mammals	None	None	SSC
San Joaquin kit fox	Vulpes macrotis mutica	Animals - Mammals	Endangered	Threatened	
Southern California legless lizard	Anniella stebbinsi	Animals - Reptiles	None	None	SSC
southwestern willow flycatcher	Empidonax traillii extimus	Animals - Birds	Endangered	Endangered	
steelhead - southern California DPS	Oncorhynchus mykiss iride	Animals - Fish	Endangered	None	
Townsend's big-eared bat	Corynorhinus townsendii	Animals - Mammals	None	None	SSC
tricolored blackbird	Agelaius tricolor	Animals - Birds	None	Threatened	SSC
Tulare grasshopper mouse	Onychomys torridus tulare	Animals - Mammals	None	None	SSC
two-striped gartersnake	Thamnophis hammondii	Animals - Reptiles	None	None	SSC
unarmored threespine stickleback	Gasterosteus aculeatus wi	Animals - Fish	Endangered	Endangered	FP
western mastiff bat	Eumops perotis californicu	Animals - Mammals	None	None	SSC
western pond turtle	Emys marmorata	Animals - Reptiles	None	None	SSC
western red bat	Lasiurus blossevillii	Animals - Mammals	None	None	SSC
western spadefoot	Spea hammondii	Animals - Amphibians	None	None	SSC
white-tailed kite	Elanus leucurus	Animals - Birds	None	None	FP
yellow warbler	Setophaga petechia	Animals - Birds	None	None	SSC

Table 7. Special status plant species at CRSP

Common Name	Scientific Name	Element Type	Federal Status	State Status	CA Rare Plant Rank
California jewelflower	Caulanthus californicus	Plants - Vascular	Endangered	Endangered	1B.1
chaparral nolina	Nolina cismontana	Plants - Vascular	None	None	1B.2
Cove's cassia	Senna covesii	Plants - Vascular	None	None	2B.2
Davidson's bush-mallow	Malacothamnus davidsoni	Plants - Vascular	None	None	1B.2
delicate clarkia	Clarkia delicata	Plants - Vascular	None	None	1B.2
desert beauty	Linanthus bellus	Plants - Vascular	None	None	2B.1
Dunn's mariposa-lily	Calochortus dunnii	Plants - Vascular	None	Rare	1B.2
felt-leaved monardella	Monardella hypoleuca ssp	Plants - Vascular	None	None	1B.2
Hammitt's clay-cress	Sibaropsis hammittii	Plants - Vascular	None	None	1B.2
Jacumba milk-vetch	Astragalus douglasii var. p	Plants - Vascular	None	None	1B.2
Kern mallow	Eremalche parryi ssp. kern	Plants - Vascular	Endangered	None	1B.2
Laguna Mountains goldenbush	Ericameria cuneata var. m	Plants - Vascular	None	None	1B.3
Lakeside ceanothus	Ceanothus cyaneus	Plants - Vascular	None	None	1B.2
Lemmon's jewelflower	Caulanthus lemmonii	Plants - Vascular	None	None	1B.2
long-spined spineflower	Chorizanthe polygonoides	Plants - Vascular	None	None	1B.2
Moreno currant	Ribes canthariforme	Plants - Vascular	None	None	1B.3
Nuttall's scrub oak	Quercus dumosa	Plants - Vascular	None	None	1B.1
Orcutt's brodiaea	Brodiaea orcuttii	Plants - Vascular	None	None	1B.1
Orcutt's linanthus	Linanthus orcuttii	Plants - Vascular	None	None	1B.3
Otay manzanita	Arctostaphylos otayensis	Plants - Vascular	None	None	1B.2
pale-yellow layia	Layia heterotricha	Plants - Vascular	None	None	1B.1
Ramona horkelia	Horkelia truncata	Plants - Vascular	None	None	1B.3
recurved larkspur	Delphinium recurvatum	Plants - Vascular	None	None	1B.2
San Bernardino aster	Symphyotrichum defoliatu	Plants - Vascular	None	None	1B.2
San Bernardino blue grass	Poa atropurpurea	Plants - Vascular	Endangered	None	1B.2
San Diego goldenstar	Bloomeria clevelandii	Plants - Vascular	None	None	1B.1
San Diego gumplant	Grindelia hallii	Plants - Vascular	None	None	1B.2
San Diego milk-vetch	Astragalus oocarpus	Plants - Vascular	None	None	1B.2
San Diego sunflower	Hulsea californica	Plants - Vascular	None	None	1B.3
San Diego thorn-mint	Acanthomintha ilicifolia	Plants - Vascular	Threatened	Endangered	1B.1
San Jacinto mariposa-lily	Calochortus palmeri var. m	Plants - Vascular	None	None	1B.2
singlewhorl burrobrush	Ambrosia monogyra	Plants - Vascular	None	None	2B.2
southern jewelflower	Streptanthus campestris	Plants - Vascular	None	None	1B.3
southern mountains skullcap	Scutellaria bolanderi ssp. a	Plants - Vascular	None	None	1B.2
sticky geraea	Geraea viscida	Plants - Vascular	None	None	2B.2
Tecate cypress	Hesperocyparis forbesii	Plants - Vascular	None	None	1B.1
vanishing wild buckwheat	Eriogonum evanidum	Plants - Vascular	None	None	1B.1
velvety false lupine	Thermopsis californica var	Plants - Vascular	None	None	1B.2
Viejas Mountain ceanothus	Ceanothus foliosus var. vie	Plants - Vascular	None	None	1B.2
Vine Hill ceanothus	Ceanothus foliosus var. vir	Plants - Vascular	None	None	1B.1
Yucaipa onion	Allium marvinii	Plants - Vascular	None	None	1B.2

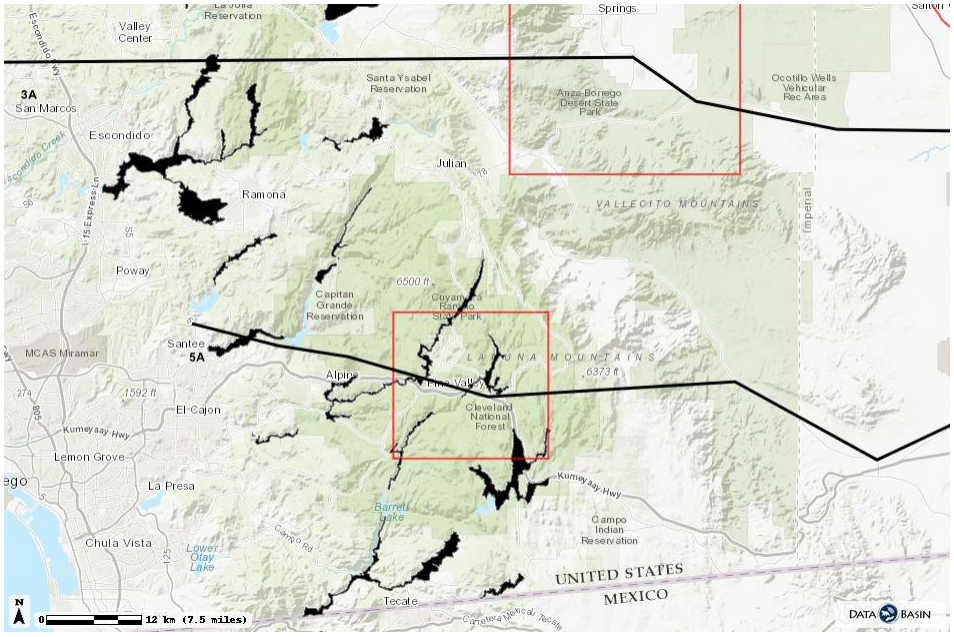

Figure 6. Species distribution of the arroyo toad

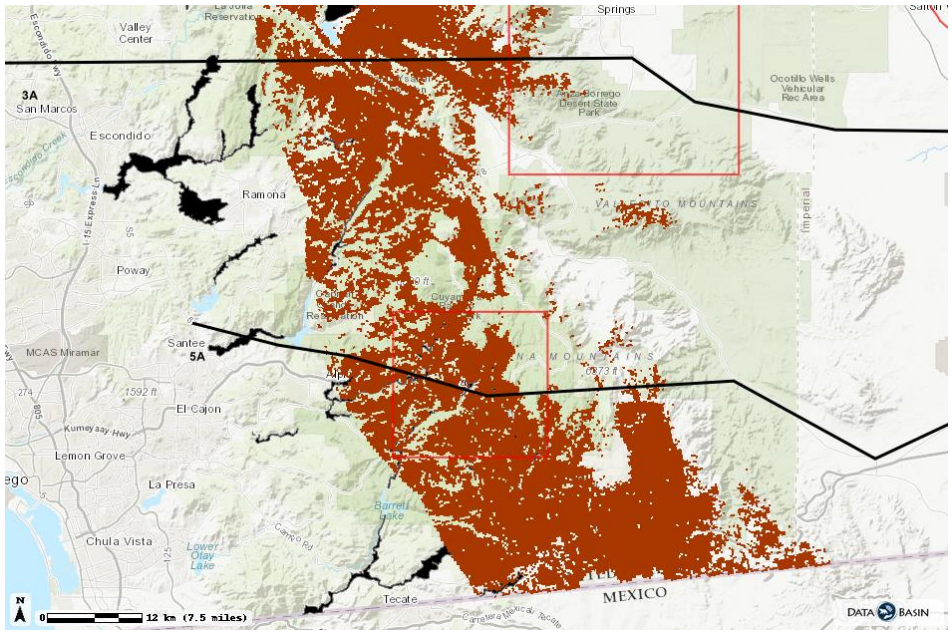

Figure 7. Species distribution of the coast horned lizard

Environmental Impacts and Mitigation Measures

This section addresses the potential impacts to the site's special-status biological resources during both construction and operations. Impacts include any modification, destruction, or loss to a natural habitat which can in turn directly and indirectly affect the plants and wildlife species that depend on that habitat. According to Appendix G of the state CEQA guidelines, a project may have a significant environmental impact if it were to:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by the CDFW or USFWS;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the CDFW or USFWS;
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state Habitat Conservation Plan

a. Construction Impacts

The following impacts have the potential to occur during construction of the proposed project:

1. Temporary and permanent vegetation displacement
2. Vegetation degradation
3. Introduction of invasive, non-native, or noxious plant species
4. Direct or indirect loss of wildlife

Impact 1: Construction activities would result in temporary and permanent loss of native vegetation

The construction activities required to build the pipelines, canals, and water treatment facility lead to both temporary and permanent vegetation loss. Temporary losses will occur during vegetation clearing, while permanent losses will be a result of the permanent project features. Construction activities can also alter the soil conditions in a number of ways, which could impact the ability of the site to support native vegetation after construction is completed. This includes

the loss of native seed banks and changes to topography and drainage. Changing the site's grade by adding or removing soil can damage the roots of nearby trees and plants. Adding soil may reduce the movement of oxygen to trees, while removing soil can disturb the roots. Heavy equipment can compact soil, again reducing the flow of oxygen, and cause mechanical damage to tree trunks and vascular tissue.

Impact 2: Construction activities would create dust that would result in degradation of vegetation

Construction activities, including grading, excavation, and the use of heavy equipment on unpaved roads can generate high levels of dust that settle on the surrounding vegetation. Dust can adversely impact vegetation because reduces photosynthesis, respiration, and transpiration abilities and can allow the penetration of phytotoxic gaseous pollutants [15].

Impact 3: Introduction of invasive, non-native, or noxious plant species

Construction activities such as use of vehicles, construction equipment, or earth materials that are contaminated with non-native plant seed can introduce non-native, invasive, or noxious plant species into the proposed project site. Invasive species can greatly disrupt ecosystems by reducing biodiversity, competing with native organisms, and altering habitats [16].

Impact 4: Construction activities would result in disturbance to wildlife and wildlife mortality

Construction activities associated with the proposed project can disturb the behaviors of wildlife in the site area, and indirectly or directly cause wildlife mortality. Construction activities, including habitat clearing, earth removal, grading, digging, and movement of equipment, could cause direct mortality to small animals, reptiles, eggs and nestlings of bird species. The use of access roads by heavy construction and maintenance vehicles could lead to increased vehicle-caused mortality. Other activities create noise, dust, visual disturbances, and exhaust fumes that reduce the attractiveness of a habitat and temporarily displace wildlife species. Construction activities will have associated noise and vibration that could indirectly affect the wildlife. However, studies have found that the effects of noise and vibration on wildlife from mining, oil and gas activity, and military activity are not substantial. There have also been studies conducted that show most wildlife become accustomed to urban noise and similar disturbances [17]. Construction activities can also interfere with breeding, foraging, and movement patterns, and may discourage animals from temporarily using habitats in the construction zone.

b. Operation Impacts

The following impacts have the potential to occur during operations of the proposed project:

1. Temporary and permanent vegetation displacement
2. Direct or indirect loss of wildlife
3. Direct or indirect impacts to jurisdictional waters

Impact 1: Operations temporarily and permanently displace vegetation

The canals, pipelines, tunnels, pump stations, treatment plant, storage, and reservoirs associated with the proposed project would permanently displace vegetation communities, resulting in habitat loss.

Impact 2: Operations would result in disturbance to wildlife and wildlife mortality

The project operations have the potential to disturb wildlife in several ways. First, the physical structures could impact wildlife movement and displace animals that previously used the land as habitat. The water treatment facility would be the only building constructed in one of the regions identified as significant, and it would be located in agricultural lands which are low quality habitat for the wildlife near the Salton Sea. The canal and pipeline segments will result in habitat loss and fragmentation at the Salton Sea, ABDSP, and CRSP, but the total area will be relatively small. Mortality as a result of collision is another direct impact of the proposed project. The Salton Sea has high concentrations of migratory birds that could be highly impacted, however the water treatment facility is the only structure that could cause collisions.

Impact 3: Operations could indirectly or directly impact jurisdictional waters

In both proposed routes, there are plans to deposit the brine byproduct, estimated 20 million gallons per day, from the water treatment facility into the Salton Sea and surrounding wetlands. In a typical lake, the salinity content of the brine could have detrimental impacts on the ecosystem. However, the salinity of the brine is between 5,600 to 11,000 TDS, while the salinity of the Salton Sea is approaching 60,000 TDS [18]. Therefore, introducing the byproduct into the lake could overall improve the water quality of the lake, and as a result improve the habitat conditions for fish species and the birds that feed on them.

c. Cumulative Impacts

Route 3A runs though agricultural, developed land, low-quality desert scrub habitats near the Salton Sea and in Anza-Borrego Desert State Park. There is not high potential for special status plant species to occur in these areas or special status animal species. Therefore, the effects of vegetation displacement would be low. Similarly, effects of dust or invasive species on the surrounding vegetation would be low. There are some special status animal species that have been observed along the project area, which means there is risk of disturbance or mortality to

wildlife during construction. This is a moderate impact, because there is not high potential for these animals to occur at the project site. The operation of the proposed project has little disturbance to the biological resources. The water treatment facility is the only structure that would significantly displace vegetation, habitat, or disrupt wildlife movement, but it is to be located in an agriculture habitat which is of low quality habitat without any special status plant species. There is also little risk of bird collisions with the water treatment facility because it will have relatively low height. For both routes, bine byproduct will be disposed into the lake. This will actually have positive impacts on the lake because it can improve water quality and overall benefit the ecosystem. There are no adverse impacts to the jurisdictional waters from operation.

Route 5A runs through the mixed chaparral and coastal oak woodland habitats in Cuyamaca Rancho State Park. In these habitats, there is low potential for special status plant species to occur. However, there are special status animal species that depend on the habitat. Notably, the federally endangered arroyo toad is known to occur in the park and the Sweetwater River that runs through the park has been designated as critical habitat. Figure # 6 shows the population distribution of the arroyo toad in the proposed project site area and surrounding region. There are also several endangered bird species, including Swainson's hawk, southwestern willow flycatcher, California condor, and bald eagle that rely on CRSP habitat. Destruction of the surrounding vegetation could potentially harm these special-status animals. Therefore, vegetation loss from construction activities along the proposed route of CRSP would have significant impacts. Similarly, degradation of the vegetation from dust or introduction of native species would have significant impacts. Construction of the project could also indirectly and directly harm the special status wildlife in the region as it would displace them from their habitats and heavy equipment and vehicles could increase mortality, a significant impact. The operations of the proposed project have lower impacts. The displaced vegetation is not special status, but there are special status animal species that will have loss of habitat. The impact to wildlife is still low, because a relatively small area of habitat will be permanently displaced. However, the canals will disrupt the vegetation that these animals rely on, potentially causing habitat fragmentation.

d. Mitigation Measures

Several steps can be taken to minimize the impacts to biological resources from the proposed project during construction and operation. In any instance where the proposed project will cut through special status plants, an area of equal size will be allotted offsite for conservation. Standard dust control measures of the South Coast Air Quality Management can be implemented, to limit impacts to surrounding vegetation and wildlife. These controls include quickly replacing ground cover in disturbed areas, irrigating sites, and halting dust-producing construction activities during high winds. The construction area will also be kept clean and free of debris, with animal-proof storage for spoils, equipment, materials, and any other potentially harmful construction supplies. The impact to wildlife can be limited by avoiding construction

during nesting or mating season of any special status animal species present at the project site. In the case when construction must occur during these periods, a survey can be conducted by a qualified biologist within the project footprint to ensure there are no active nests present. A buffer will be established between any active nests to prevent disturbance, and the nest will be continuously monitored. The water treatment facility can sited as to minimize the loss of quality habitat, and built to a lower height to avoid any possible bird collisions

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Air Quality Impact Analysis

3.1 Introduction

In this analysis, California Emissions Estimator Model (CalEEMod) software, built for the California Air Pollution Officers Association (CAPCOA) with the California Air Districts, was utilized to estimate and quantify the emission rate of criteria pollutants (e.g., NOx, PM_{10}, $PM_{2.5}$) related to the construction and operation stages of the San Diego Regional Water Conveyance System (RCS). This model is widely used for the air quality analysis and preparation of California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) reports.

3.2 Methodology

3.2.1 Construction Emissions

As mentioned in the project description, Alternative 3A of San Diego Regional Water Conveyance System will have 46.7 miles of canals, 38.8 miles of pipelines, and 46.5 miles of tunnels in addition to three pumping stations, a treatment plant, and 2.4 miles of brine management. Similarly, Alternative 5A will consist of the same components but with different dimensions and quantities (e.g., 8.8 miles of canals, 34.8 miles of pipelines, and 2 pumping stations). The above-mentioned information and the time period in Table 1 were manually inputted to the CalEEMod to estimate the daily emission from mobile sources.

Table 1: The time period (in days) of the project's components*.

Component	Alternative 3A	Alternative 5A
WMC Parallel Conveyance	760	360
Imperial Valley Operational Storage	240	240

Salinity Treatment Plant	960	960
PS 1	960	960
Forebay	960	960
Salinity Treatment and PS 1 Operating Power Facilities	240	240
Pipeline Reach 1	660	-
Pipeline Reach 2	-	669
Pump Station 2	480	480
PS 2 Operating Power Facilities	180	180
Pipeline Reach 2 & 3	500	
Pipeline Reach 3	-	480
Pump Station 3	480	-
PS3 Operating Power Facilities	180	-
Excavation and Lining Tunnel 1	1693	2340
Excavation and Lining Tunnel 2	1572	2427
Excavation and Lining Tunnel 4	692	-

Vertical Shafts	409	370
Excavation and Lining Tunnel 3	-	804
Excavation and Lining Tunnel 4	-	874
Pipeline Reach 5	-	30
Pressure control facility	-	480
Lake Wohlford Operational Storage Improvements	100	-
Pipeline Reach 4 & 5	100	-
Tunnel 3 Excavation and Lining	556	-
40 MG Day Tank Construction	380	380
Pipeline construction (12.5 miles)	-	380
Pump station	-	480

*Above is the construction time for the proposed project as provided in the RCS design study's final report by Black&Veatch.

Since the detailed information regarding the construction methods, equipment types and power, etc., were unknown at the time period of this analysis, typical construction equipment used for similar previous infrastructure projects was assumed to estimate the potential effects of the construction on emissions the criteria pollutants. Tables 2, 3, 4, and 5 show the construction equipment used for trench, tunnel, pump, and facility construction, respectively. Considering that

two contractors might concurrently take over the pipe construction (trenching and tunneling), we doubled the number of the used equipment in our emissions analysis.

Table 2. Construction Equipment – 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

Table 3. Construction Equipment – 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
Tunnel Excavation	Dozer	1	2
	Excavator	1	2
	Tractors/Loaders/Backhoes	1	2
	Trencher	1	2
	Crushing/Processing Equipment	1	2
Pipe Installation	Tractors/Loaders/Backhoes	1	2
	Crane	1	2
	Welders	2	4
Pipe connections	Other General Industrial Equipment	4	4
Site Restoration	Tractors/Loaders/Backhoes	1	2

Table 4. Construction Equipment – Pump Stations

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	Pavers	1
	Rollers	1
	Paving equipment	1

Table 5. Construction Equipment – Storage and Facilities

Construction Phase	Equipment	Quantity

Site preparation	Dozers	1
	Tractors/loaders/backhoes	1
Grading	Excavators	1
	Tractors/loaders/backhoes	2
	Dozers	1
	Compactors	1
Facility construction	Cranes	1
	Forklifts	1
	Generator sets	1
	Tractors/loaders/backhoes	2
	Welders	2
Paving	Pavers	1
	Paving equipment	1

Moreover, we assumed that heavy off-road equipment would be running for about 8 hours per day and 5 days per week. The default assumptions available in CalEEMod were also used to estimate worker trips for each construction stage (e.g., pipeline and facility construction). For example, one worker per construction equipment with a foreman and several additional workers would be needed daily (about five workers). Additionally, we assumed that approximately two trucks would be daily used for general material deliveries. It is worth noting that pipelines and facilities were considered to be constructed simultaneously with other construction components, including pump stations and treatment facilities, to achieve the worst-case scenario.

Using CalEEMod, we divided the construction phase into three stages: site preparation, grading, construction, and paving. While grading and construction continued throughout the whole period (2340 days), the site preparation and paving were set to last for 356 days and 261,

respectively. It should be noted that the construction stage includes pipe, pump and facility construction. The paving was assumed to occur at the end of the project. Finally, the emissions during each period of construction were then compared with the South Coast AQMD Air Quality Significance Thresholds in table 6.

Table 6: Thresholds of significance for criteria pollutants

South Coast AQMD Air Quality Significance Thresholds

Mass Daily Thresholds [a]		
Pollutant	**Construction [b]**	**Operation [c]**
NO_x	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
$PM_{2.5}$	55 lbs/day	55 lbs/day
SO_x	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day

3.2.2 Operational Emissions

The San Diego Regional Water Conveyance System's operation would result in direct emissions mainly from the treatment process and vehicular traffic. Therefore, we solely include these two parameters for this analysis. According to similar previous projects, approximately 15 to 7 workers are required to run the treatment and power facility.These workers would generate 44 one-way trips during the regular operation with about a 35-mile travel distance each. However, we assumed on a worst-case day, an additional 20 operation and maintenance-related trips would occur; therefore, in total, the San Diego Regional Water Conveyance System operations would have about 64 average daily trips (ADT). Regarding the operation emissions from the treatment processes, the build-in assumptions in the model (i.e., CalEEMod) were used. It also should be noted that annual emissions from vehicle trips were also quantified using CalEEMod.

3.3. Results

3.3.1 Construction Emissions

Table 7(a-e) shows our results for the daily emissions of reactive organic gases (ROG), nitrogen oxides (NOx), carbon monoxide (CO), sulfur dioxide (SO2), PM_{10}, and $PM_{2.5}$ during each period

of construction. According to the outputs of CalEEMod., the emissions of the criteria pollutants mentioned above were significantly under the threshold of significance for all different construction phases, revealing no significant impacts regarding air quality during the construction time.

Table 7. Estimated emissions of criteria pollutants during different phases of construction: a) Site preparation; b) Grading; c) construction; and d) Paving as well as e) overall estimated emissions.

Site Preparation						
Category	**ROG**	**NOx**	**CO**	**SO_2**	**PM_{10} Total**	**$PM_{2.5}$ Total**
On-site (tons/yr)	0.4469	1.3420	3.0587	0.0108	0.6191	0.1012
Off-site (tons/yr)	9.5700e-003	5.8000e-003	0.0675	3.10E-04	0.0485	0.0130
Total (tons/yr)	0.45647	1.34780	3.12620	0.01111	0.66760	0.11420
Total (Ib/day)	**2.50121**	**7.38521**	**17.12986**	**0.06088**	**3.65808**	**0.62575**
Threshold	**75**	**100**	**550**	**150**	**150**	**55**

Grading						
Category	**ROG**	**NOx**	**CO**	**SO_2**	**PM_{10} Total**	**$PM_{2.5}$ Total**
On-site (tons/yr)	0.4844	1.7802	3.3810	0.0112	2.4185	1.3527

Off-site (tons/yr)	0.0198	0.0120	0.1394	6.4000e-004	0.1001	0.0268
Total (tons/yr)	0.5042	1.7922	3.5204	0.01184	2.5186	1.3795
Total (Ib/day)	2.762739726	9.820273973	19.28986301	0.064876712	13.80054795	7.558904111
Threshold	75	100	550	150	150	55

Construction						
Category	**ROG**	**NOx**	**CO**	**SO_2**	**PM_{10} Total**	**$PM_{2.5}$ Total**
On-site (tons/yr)	1.0730	4.8747	12.1482	0.0257	0.1044	0.1044
Off-site (tons/yr)	0.0832	0.0504	0.5868	2.7100e-003	0.4216	0.1130
Total (tons/yr)	1.1562	4.9251	12.735	0.02841	0.526	0.2174
Total (Ib/day)	**6.335342466**	**26.98684932**	**69.78082192**	**0.155671233**	**2.882191781**	**1.191232877**
Threshold	**75**	**100**	**550**	**150**	**150**	**55**

Paving						
Category	**ROG**	**NOx**	**CO**	**SO_2**	**PM_{10} Total**	**$PM_{2.5}$ Total**

On-site (tons/yr)	0.4192	1.2329	4.9979	0.0110	0.0406	0.0406
Off-site (tons/yr)	0.0247	0.0164	0.1910	9.7000e-004	0.1574	0.0421
Total (tons/yr)	0.4439	1.2493	5.1889	0.01197	0.198	0.0827
Total (Ib/day)	**2.432328767**	**6.845479452**	**28.43232877**	**0.065589041**	**1.084931507**	**0.453150685**
Threshold	**75**	**100**	**550**	**150**	**150**	**55**

Overall						
Category	**ROG**	**NOx**	**CO**	**SO_2**	**PM_{10} Total**	**$PM_{2.5}$ Total**
Total (tons/yr)	12	8.0650	19.3814	0.0513	3.7122	1.7111
Total (Ib/day)	**11.59890411**	**44.19178082**	**106.1994521**	**0.28109589**	**20.34082192**	**9.375890411**
Threshold	**75**	**100**	**550**	**150**	**150**	**55**

3.3.2 Operational Emissions

The results of air quality analysis for the San Diego Regional Water Conveyance System's operation period are illustrated in Table 8.

Table 8. calculated emissions of criteria pollutants during operation

Category	ROG	NOx	CO	SO_2	PM_{10} Total	$PM_{2.5}$ Total
Total (tons/yr)	.32180	.7263	.66660	.0129	0.91050	.2526
Total (Ib/day)	1.763287671	3.979726027	3.65260274	0.070684932	4.989041096	1.384109589
Threshold	75	100	550	150	150	55

As shown in Table 8, the operation-related emissions were significantly below the operational threshold for ROG, CO, SO_2, PM_{10}, and $PM_{2.5}$. Thus, this project will have no significant impact during the operation phase.