Executive Summary Report
Financial Analysis Review

Independent 3rd Party Review of Financial Analysis for the Regional Conveyance System

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Prepared for:

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I. Introduction

The San Diego County Water Authority's (SDCWA) Feasibility Study Consultant *(Black & Veatch)* performed a financial analysis for the Regional Conveyance System (RCS). The following report presents an independent 3rd party review of this existing financial analysis. Sections II (Construction Cost Review), III (Schedule Review) & IV (Risk Register Review) summarize our comments and methodologies. Section V (Cost Comparison) provides detailed cost estimates for each of the three conveyance Alignments (3A, 5A & 5C).

The estimated costs analyzed and prepared for independent review are prepared in accordance with AACE International Class 4 feasibility estimate guidelines.

Due to the limited detail information available at this stage of project development, some of the costs and cost components for complex facilities and systems were developed using information provided in recent published reports such as the MISO (Midcontinent Independent System Operator) "Transmission Cost Estimation Guide MTEP19" and the "Uniform Costing Model User's Guide" prepared by HDR and Freese and Nichols for the Texas Water Development Board. MISO operates in several states throughout the Central and Southern United States and their report provides an extensive amount of cost information pertaining to substations and transmission lines. Likewise, the Texas Water Development Board report provides a great amount of information related to pipelines, dams, pumping stations, treatment plants, and so forth. The costs utilized from these reports were adjusted for regional and time differences. In addition to these guidelines, information from other pertinent comparable projects were used to analyze the reasonableness of costs developed in the Feasibility Study. Finally, in situations where a more detailed approach could be applied to determine reasonableness, a somewhat bottom up approach was utilized for cost comparison.

The adequacy of the project conceptual design and technical requirements is beyond the scope of this review. Accordingly, no opinion has been rendered on the type and sizing of canals, pipelines, and tunnels, including appurtenant facilities such as pumping plants and salinity treatment plants.

II. Construction Cost Review

A. Pre-construction (Soft) Costs

Overall, the soft costs for each Alignment are approximately 3 percent of the total construction costs, including management and contingency. The detailed approach to the personnel required, the hourly rates selected, and the overall percentage all appear reasonable.

On average, the three alignments resulted in Construction Management costs of approximately 16-18 percent of the total construction costs. Based on the details of past projects provided, this estimate is in line with this complex project.

B. Construction (Hard) Costs

1. Alignment 3A

a. <u>Tunnels</u>
1. Anticipated Tunneling Conditions

Tunneling conditions for all three alignments under consideration exhibit difficult tunneling conditions to varying degrees. These conditions include very

long tunnel drives in strong, abrasive, pervasively faulted and jointed rock under high in-situ ground stresses and hydrostatic pressures. Of note:

- Grouting for groundwater control will be required at high pressure to facilitate tunneling and conserve groundwater resources of the overlaying Cleveland National Forest and native American land.
- High in-situ stress in conjunction with jointing, shears, and faults will result in squeezing ground conditions.

These conditions cannot all be effectively addressed by a single type of tunnel boring machine (TBM): a shielded TBM erecting expensive impermeable bolted, gasketed precast concrete segmental lining will help preserve groundwater resources, but it will also require installing lagged steel set rings or precast segments over the full length of the tunnel (i.e., even in reaches where the ground is self-supporting and requires little or no support). On the other hand, a main beam TBM with a more open excavation does not require continuous support as part of the excavation process but the open excavation allows groundwater inflows behind the heading in quantities that will likely exceed the expected stringent inflow thresholds set by regulatory agencies.

Tunnel excavation production is expected to be continually hampered by cutter wear from abrasive ground and poor ground conditions accompanied by very high flush and sustained groundwater flows into the tunnel that can only be addressed by performing pre-excavation grouting ahead of the tunnel face. Efforts to install ground support and deal with groundwater is expected to significantly curtail the utilization rate of the TBMs. The long 40,000+ foot drives, will also impact tunnel production and increase ventilation and groundwater pumping costs. To mitigate some of these impacts, the tunnel must be oversized to a minimum of 16 feet in diameter to accommodate the necessary drilling equipment required to probe the ground and perform grouting. This increase in tunnel size will also relieve the cross-sectional congestion within the tunnel created by the ventilation duct and other air, water, and discharge piping, the continuous conveyor, and the required envelope needed to move workers, equipment, and materials within the tunnel.

For tunnels driven from shafts up to between 550 and 3,100 feet deep, additional production related impacts will be sustained due to the non-continuous nature of the shaft hoisting equipment (continuous conveyors are not feasible for shafts of these depths) being fed concurrently by muck from two tunnel drives. Large shaft hoisting systems will require a large headframe structure and redundant hoisting capabilities to service deep shafts and multiple headings.

The shafts will face similar rock and groundwater conditions that will need to be dealt with using adaptable shaft excavation, support, and final lining systems. Construction sequences could include installation of sections of robust lining systems in top-down sequence as the shaft is excavated.

2. Estimated Tunnel & Shaft Construction Costs

An abbreviated bottom-up production estimate was developed to evaluate the reasonableness of the costs and schedule durations for tunnel and shaft construction. The results of the estimate comparison indicate that the current

estimated construction costs for the tunnel and shafts are understated. Our estimates are based on the following:

- 16-foot diameter main-beam TBM erecting rockbolts, shotcrete, and steel sets
- Continuous conveyor for muck transport in tunnel and high-speed balanced hoist for muck transport in shafts
- Probing and pre-excavation grouting program for groundwater preservation in water bearing reaches.
- Welded steel pipe lining 102" ID with ¾" wall thickness, butt-welded joints, stiffeners for buckling resistance, and cement mortar lining backfilled with cellular concrete in water-bearing reaches and at portals for confinement
- 40-foot diameter shafts excavated using a Hoist/Galloway system and backfilled with shaft muck around stacked circular precast concrete segments equipped with stairs and landings, and an open area for hoisting materials and future elevator build-out

Tunnel excavation rates were assessed using instantaneous penetration rates provided in *Geotechnical Characterization for a 34-Mile-Long Tunnel Through the Peninsular Ranges of San Diego County, California* (Proceedings of the North American Tunneling Conference, 2002) and adjusted for impacts due to bad ground and groundwater inflows as characterized in *Geotechnical Desktop Study Regional Conveyance System Study (RCSS) - Alignment 3a San Diego And Imperial Counties, Ca* (Kleinfelder 2019) and estimated fault and joint conditions for Alignments 5A and 5C as estimated by Black and Veatch.

b. Canals

The costs for the Concrete Lined Channel and Siphons appear at least 30 percent lower than expected. Costs for this project were compared to recent channel projects completed in Riverside County. One item that could lead to an even higher deviation would be the lack of nearby concrete materials. In addition, no costs appear to have been allocated for roadwork that will be required along the alignment. Finally, the canal siphon costs appear considerably less than expected based on the amount of work required. The estimated shortfall is $20 million and may increase to $26.6 million if two sets of roads are anticipated, as shown in the documents.

c. Pipelines

Budgetary costs for pipeline work for the alignments appear reasonable. The one factor making up the majority of the overall cost difference was the higher material pricing for the 102-inch, 0.5-inch thick steel pipe. This higher unit pricing resulted in a shortfall of approximately $14.5 Million.

d. Pumping Plants

Based on the limited detail information prepared as of this analysis and upon a review of comparable projects, it appears that estimated costs the 700-foot and 800-foot TDH pumping plants are reasonable.

e. PGF

Power Generating Facilities costs were not developed for this alignment.

f. Electric-Power

Using the MISO Transmission Cost Estimating 2019 Guide, the transmission line costs appear to be considerably less than expected and should be further evaluated. The cost for the 69 kV substation appears to be in error. The overall shortfall is in the $75 Million range.

g. Salinity Treatment Plant

Costs for the Micro Filtration (MF), Reverse Osmosis (RO), and Closed-Circuit Reverse Osmosis (CCRO) salinity treatment plants could be much higher than those carried in the budget based on analysis of past project costs, which yielded a wide range of results.

There is limited information available for facilities of the magnitude required for this project. In general, it would be reasonable to assume lower costs due to economies of scale. Additionally, technology changes within the next 15 years will also tend to reduce costs.

For pricing purposes, the SDCWA Twin Oaks Water Treatment Plant and the El Paso Kay Bailey Hutchison RO facility were used as benchmarks to determine cost reasonableness. Our analysis of these benchmarks suggests that budgetary cost may be understated by as much as $270 million.

h. Environmental Mitigation

The environmental costs appear reasonable, given the limited information available at this stage of the project.

i. Storage

The 40 MGD storage tank estimate of $30.1 million (for each alignment) appears to be significantly understated. Based on a comparison of the Hauck Mesa storage project estimated in January 2020, a 2018 Texas Water Development Board Storage Tank cost analysis, and the Black & Veatch 2018 Vallecitos Water District Master Plan report, the cost for 40 MGD storage is expected to vary between $62 to $74 million, depending on the amount of tie-in and ancillary work required. The net result is a shortfall of $30 to $40 million.

Based on the description of work required in the documents and high-level assumptions, the operational storage for the 900-acre-foot IID Operational Storage required for all alignments appear reasonable.

Estimated costs for the Dam Raise – Lake Wohlford and the Inlet/Outlet structure are comparable to costs in the Black & Veatch estimate.

j. Office & Warehouse

The expected costs for the Warehouse, Offices, and Storage Yard were based completely on the square footages provided. Using RS Means standard unit costs and making a number of assumptions, the estimated costs yielded results very close to the costs provided in the B-11 Cost Summary report.

2. Alignment 5A

a. Tunnels

1. Anticipated Tunneling Conditions

   Refer to Section II.B.1.a.1.

2. Estimated Tunnel & Shaft Construction Costs

   Refer to Section II.B.1.a.2.

b. Canals

The estimated shortfall is $5 million and may increase to $7 million if two sets of roads are anticipated, as shown in the documents. Refer to Section II.B.1.b for additional details regarding canals.

c. Pipelines

The higher unit pricing for steel pipe increases cost by approximately $6 million for Alignment 5A versus the costs shown in the Table B-3 Cost Summary. Refer to Section II.B.1.c for additional details regarding pipelines.

d. Pumping Plants

Based on the limited detail information provided as of this analysis and upon a review of comparable projects, it appears that the costs for the 700-foot and 800-foot TDH pumping plants are reasonable.

Costs for the 6 MG storage facility are much lower than expected. Costs for the 500-foot TDH plant appear slightly low. The combination of these items is approximately $20 million.

e. PGF

The Power Generating / Pressure Control Facility costs appear to be $8 million (or 27 percent) low based on escalating the prior SDCWA Mira Mesa Pressure Control and Hydroelectric Facility project costs. However, if additional work items were included in the Mira Mesa project costs that are not needed for this project or if the capacity for the new facility is less than the Mira Mesa facility, the budgeted costs may be reasonable.

f. Electric-Power

The estimated shortfall appears to be in the $36 million range. Refer to Section II.B.1.f for additional details.

g. Salinity Treatment Plant

Refer to Section II.B.1.g.

h. Environmental Mitigation

Refer to Section II.B.1.h.

i. Storage

Refer to Section II.B.1.i.

j. Office & Warehouse

Refer to Section II.B.1.i.

3. Alignment 5C

a. Tunnels

1. Anticipated Tunneling Conditions

Refer to Section II.B.1.a.1.

2. Estimated Tunnel & Shaft Construction Costs

Refer to Section II.B.1.a.2.

b. Canals
The estimated shortfall is $0.5 million and may increase to $0.7 million if two sets of roads are anticipated, as shown in the documents. Refer to Section II.B.1.b for additional details regarding canals.

c. Pipelines
The higher unit pricing for steel pipe increases cost by approximately $18.5 million for Alignment 5A versus the costs shown in the Table B-3 Cost Summary. Refer to Section II.B.1.c for additional details regarding pipelines.

d. Pumping Plants
Refer to Section II.B.2.d.

e. PGF
Refer to Section II.B.2.e.

f. Electric-Power
The estimated shortfall appears to be in the $62 million range. Refer to Section II.B.1.f for additional details.

g. Salinity Treatment Plant
Refer to Section II.B.1.g.

h. Environmental Mitigation
Refer to Section II.B.1.h.

i. Storage
Refer to Section II.B.1.i.

j. Office & Warehouse
Refer to Section II.B.1.j.

C. Post-Construction Costs (Operation, Maintenance & Replacement Costs)

The post construction costs for items such as the Canals, Pipelines, Storage Facilities, and the Office/Warehouse facilities, appear reasonable from a percentage basis. However, these costs can vary based on the level of quality control during construction, the aggressiveness of the design, and level of care applied during the maintenance period.

Due to the limited data available on items such as the Pumping Plants, the PGF, and the Salinity Treatment Plants, post-construction costs could not be confirmed.

D. Contingencies

Most contingencies have been established at 30 percent, which is reasonable for most situations.

For the tunnels and shafts, this is an appropriate level for Alignment 5A. However, for Alignments 3A and 5C, where the subsurface conditions are less well known, we believe that contingency should be increased. We recommend increasing Alignment 5C contingency to 35 percent and Alignment 3A contingency to 40 percent.

Contingency and risk must be considered in parallel. For the tunnels and shafts, the contingency levels are highly sensitive to the assumptions related to the length and ground conditions through fault zones and groundwater control efforts at shaft and in tunnels. These factors have the potential to drive significant changes in construction means and methods, production rates and schedule, and final tunnel and shaft lining systems.

E. Escalation Rates

The escalation rates used for all three alignments are reasonable.

However, major additional escalation costs are anticipated since the midpoint of construction has moved from 2037 to 2040. Using 2037 as the base, the total escalation is 65 percent of the original cost, based on a compounded 3 percent rate per year. Moving the midpoint of construction to 2040 changes the total escalation to 81 percent of the total cost. This increased escalation is applied to the capital cost plus the construction management.

The escalation of the soft costs should be analyzed differently since the work is ongoing until the start of the construction period. Therefore, the midpoint of escalation for the soft costs would be year 10 (2030) versus year 20 (2040). Applying a shorter escalation period to the soft costs will substantially reduce the cost associated with this item of work.

F. Discount Rates

The discount rates and durations utilized in the estimates are reasonable based on the scope of the project and available information.

G. Estimated Facility Life

The estimated facility life appears reasonable but is highly dependent upon the quality and design of the initially constructed facilities and the level of maintenance applied to maintain the facilities.

H. Timing of Costs Over Facility Life

Based on the information available, the estimates are reasonable.

III. Schedule Review

The schedules for all three alignments appear to be commensurate with the level of planning for Phase A. The phase B planning should include:

- A more detailed duration estimate
- Schedule logic that has a clear critical path
- Cost distribution curves (where applicable)

- Detailed project delivery and construction packaging.
- Migration of the schedule to Oracle Primavera P6 to align with the SDCWA standard scheduling software.
- Coding to better group and sort activities
- Formatting of dates and durations to better facilitate understanding of time in relation to months and years

We recommend that each contract schedule provide the following activities and durations where noted:

- Design
- TBM procurement (12 months)
- Site development (1 month), with consideration of starter tunnels at portals (1 month), and starter/tail tunnels and hoist pits at shafts (6 months)
- Shaft excavation and support
- TBM assembly or refit (2months) and disassembly (1 month)
- Tunnel excavation and support
- Welded steel lining and final tunnel cleanup

A. Activities Durations

The activity durations for all three alignments are in line with what is expected at this planning stage of the program. The phase B planning should include a more detailed duration estimate.

B. Schedule Logic

The logic for the schedules for all three alignments are based on finishing all of the activities as soon as possible, which is reasonable at this stage of the project.

C. Activity Cost Distribution Curves

The Microsoft project schedules do not provide activity cost distribution curves. Cost curves are typically included for a cost estimate at the present level of detail. We recommend that they are included in Phase B by migrating to P6.

D. Project Delivery & Construction Packaging

The project estimate is based on a design-bid-build delivery method. We concur with the use of design-bid-build in lieu of design-build but recommend that this subject be revisited in the future. A brief discussion of the project packaging for the tunnel contracts only, along with our recommendations is included below:

1. Alignment 3A

The schedule shows three tunnel contract packages; a single large contract for all tunnels connected with shafts, a contract for the westernmost tunnel reach, and a contract for the shaft construction. We believe this is not an optimum construction contract packaging method; a single construction contract for 17 miles of tunnel entails a significant amount of risk that will limit the number of bidders from an already small pool of contractors with the required bonding capacity, that is further reduced by the formation of joint ventures. We suggest that until a detailed analysis is made, contracts be packaged as shown in **Figure 3A** (see following page).

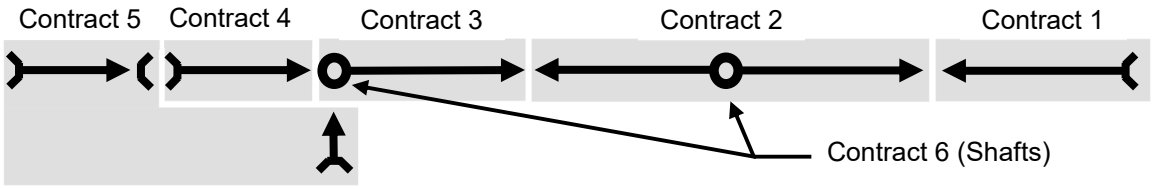

Figure 3A – Alignment 3A Contract Packaging

2. Alignment 5A

   The schedule indicates three tunnel contract packages; one for Tunnels 1 and 2, one for Tunnels 3 and 4 and a shaft contract. This arrangement calls for 17 miles of tunneling for two of the contracts which will create significant costs for ventilation and travel time for the tunnel crew material deliveries. We suggest that an additional contract be added driving from the shaft east and west. This will reduce construction schedule by approximately 50 percent and halve the lengths of the individual tunnel drives.

3. Alignment 5C

   The schedule shows two contract packages; one for Tunnels 1 and 2 and one for Tunnels 3 and 4. Each contract refits the TBM for the second drive. This appears to be the most logical method of packaging the contracts.

IV. Risk Register Review

A. Risk Identification

1. Alignment 3A

   Risk Identification items 1, 6, 13, 20, 21, 32, 41, 42, 43, 44, & 46 should be updated to be consistent with a format that identifies a risk that is triggered by an event and results in an impact.

   Risk Identification item 6 needs to identify the agreement consequences for the pump power station and San Diego Gas & Electric; the added costs of construction may be less than the cost incurred due to the critical path of the schedule being lengthened due to mitigation.

2. Alignment 5A

   Risk Identification items 2, 7, 14, 22, 23, 38, 39, & 47 should be updated to be consistent with a format that identifies a risk that is triggered by an event and results in an impact.

   Risk Identification item 7 needs to identify the agreement consequences for the pump power station and San Diego Gas & Electric; the added costs of construction may be less than the cost incurred due to the critical path of the schedule being lengthened due to mitigation.

3. Alignment 5C

   Risk Identification items 3, 8, 15, 24, 25, & 48 should be updated to be consistent with a format that identifies a risk that is triggered by an event and results in an impact.

Risk Identification item 8 needs to identify the agreement consequences for the pump power station and San Diego Gas & Electric; the added costs of construction may be less than the cost incurred due to the critical path of the schedule being lengthened due to mitigation.

4. Additional Risk, Trigger Event, or Impact Considerations

- Strict regulatory limits on groundwater resource protection, including the period between tunnel excavation and installation of the welded steel lining. The only means of mitigating this risk to the greatest extent possible is by using a shielded TBM erecting bolted gasketed precast concrete segments, maintaining a probe hole ahead of the excavation and, when a specified inflow rate through the probe hole is triggered, performing pre-excavation grouting.

- Longer fault zones:
  - Main beam TBM's grippers inability to bear against sheared and gouged rock and clay, resulting in lower production rates
  - More extensive pre-excavation grouting
  - Increased length of steel lining

- Thicker than expected steel lining or more extensive use of stiffeners, especially at portals where confinement is required, pending hydraulic analysis

- Development of localized stress induced ground failures causing overbreak, wedge like notches, and cavities in the tunnel walls and crown. This will result in additional ground support, and depending on hydraulic analysis, will require backfill shotcrete or concrete.

- Seismic activity on active faults. Such fault zones will likely require over-excavation and backfill to accommodate offset, if a distributed offset, and other solutions for a knife-edge offset. Design solutions for inspection and access for repairs would also be required.

- Limited market competition. Contract packaging as related to the future tunneling market and number of joint ventures made up of qualified contractors who can bond the work and setting contract limits in manner that spreads contractor risk and maximizes construction efficiencies.

V. Cost Comparison

The cost comparison is separated into two sections: (1) Tunnels and Shafts (2) Other scope of work (Canals, Pipelines, Pumping Plants, Power Generating/Pressure Control Facilities, Electric Distribution, Water Treatment, Operational Storage, and Office/Warehouse). These data are presented in **Appendix A**.

Appendix A. Cost Comparison

TUNNELING

Tunnel and shaft construction costs were evaluated using an abbreviated project-specific bottom-up estimating model using agreed upon parameters including length of faulted and jointed ground requiring pre-excavation grouting, and the amount of steel pipe lining as discussed in Section II.B.1 of the report.

TUNNELING	BLACK & VEATCH	HUNTER PACIFIC	DELTA	%
Alignment 3A	$1,586,845,000	$2,010,991,470	$424,146,470	+26.7
Alignment 5A	$1,561,152,000	$1,821,670,838	$260,518,838	+16.7
Alignment 5C	$564,930,000	$584,666,988	$19,736,988	+3.5

CANALS & PIPELINES

For the remainder of the project items, Hunter Pacific Group's team used figures from Midcontinent Independent System Operator (MISO) and Freese & Nichols, Inc. (FNI); these sources along with material quotes from local vendors provided data for the canal and pipeline construction, utility plants and electric transmission lines.

CANALS	BLACK & VEATCH	HUNTER PACIFIC	DELTA	%
Alignment 3A	$59,676,000	$79,673,255	$19,997,255	+33.5
Alignment 5A	$17,105,000	$22,546,040	$5,441,040	+31.8
Alignment 5C	$1,788,000	$2,320,090	$532,090	+29.8

PIPELINES	BLACK & VEATCH	HUNTER PACIFIC	DELTA	%
Alignment 3A	$466,639,000	$485,346,527	$18,707,527	+4.0
Alignment 5A	$514,599,000	$522,406,990	$7,807,990	+1.5
Alignment 5C	$1,342,951,000	$1,367,061,939	$24,110,939	+1.8

PLANTS & UTILTIES

The annual costs for plant operation and maintenance (O&M) were not adjusted as per direction these costs were historical figures used by SDCWA, so these costs were maintained at their Estimate Annual Costs in the Black & Veatch report and rolled into the Amortization Annual Capital Costs section of the Hunter Pacific Group report.

PUMPING PLANTS	BLACK & VEATCH	HUNTER PACIFIC	DELTA	%
Alignment 3A	$186,809,000	$179,902,619	($6,906,381)	-3.7
Alignment 5A	$176,382,000	$205,869,318	$29,514,318	+16.7
Alignment 5C	$375,210,000	$407,068,362	$31,858,362	+8.5

POWER GENERATING / PRESSURE CONTROL	BLACK & VEATCH	HUNTER PACIFIC	DELTA	%
Alignment 3A	-	-	-	-
Alignment 5A	$40,426,000	$51,258,285	$10,832,285	+26.8
Alignment 5C	$175,336,000	$205,033,139	$29,697,139	+16.9

ELECTRIC TRANSMISSION	BLACK & VEATCH	HUNTER PACIFIC	DELTA	%
Alignment 3A	$64,001,000	$159,023,303	$95,022,303	+148.5
Alignment 5A	$51,042,000	$97,659,526	$46,617,526	+91.3
Alignment 5C	$67,668,000	$148,973,411	$81,305,411	+120.2

WATER TREATMENT	BLACK & VEATCH	HUNTER PACIFIC	DELTA	%
Alignment 3A	$872,350,000	$1,223,165,927	$350,815,927	+40.2
Alignment 5A	$1,048,082,000	$1,369,912,974	$321,830,974	+30.7
Alignment 5C	$1,077,486,000	$1,394,467,150	$316,981,150	+29.4

STORAGE & OFFICES

OPERATIONAL STORAGE	BLACK & VEATCH	HUNTER PACIFIC	DELTA	%
Alignment 3A	$222,853,000	$271,065,711	$48,212,711	+21.6
Alignment 5A	$112,353,000	$159,440,133	$47,087,133	+41.9
Alignment 5C	$112,353,000	$159,440,133	$47,087,133	+41.9

OFFICE AND WAREHOUSE	BLACK & VEATCH	HUNTER PACIFIC	DELTA	%
Alignment 3A	$8,788,000	$8,440,288	($347,715)	-4.0
Alignment 5A	$8,788,000	$8,440,288	($347,715)	-4.0
Alignment 5C	$8,788,000	$8,440,288	($347,715)	-4.0

CONSTRUCTION MANAGEMENT

The Black & Veatch report had Construction Management costs at approximately 23% of the construction subtotal – based on the new construction costs, Hunter Pacific Group is showing Construction Management as 23% of that construction costs.

CONSTRUCTION MANAGEMENT	BLACK & VEATCH	HUNTER PACIFIC	DELTA	%
Alignment 3A	$619,502,000	$786,792,321	$167,290,321	+27.0
Alignment 5A	$635,148,000	$757,317,231	$122,169,231	+19.2
Alignment 5C	$608,481,000	$762,859,700	$154,378,700	+25.4

SOFT COSTS

Soft Cost were difficult to analyze due to the unknowns involved with real estate costs, but Hunter Pacific Group has adjusted the Environmental rates that are rolled into the Soft Costs.

SOFT COSTS	BLACK & VEATCH	HUNTER PACIFIC	DELTA	%
Alignment 3A	$135,357,000	$122,508,750	($12,848,250)	-9.5
Alignment 5A	$120,675,000	$112,609,750	($8,065,250)	-6.7
Alignment 5C	$140,995,000	$126,126,000	($14,869,000)	-10.5

ESCALATION

Based on resources provided by Rider Levett Bucknall (RLB), Turner Construction, and the Bureau of Labor Statistics, a 3% escalation rate is the suggested number to use for projects extending beyond five years; with market conditions impossible to project 40 years into the future, 3% is the favorable number to be used for a project of this duration.

Two items led to the large increases in Escalation: 1) the increased construction cost of the base estimate, and 2) the schedule being pushed out three years to a January 2040 Midpoint at 3% escalation, in lieu of the January/February 2037 midpoint. These items are detailed in the charts below for each alignment with “Construction” being the increase due to the base estimate increase, and “Schedule” being the increase due to the increase in duration of the project.

ESCALATION (ALIGNMENT 3A)	BLACK & VEATCH	HUNTER PACIFIC
Construction Cost	$2,756,858,000	$3,477,660,693
Schedule Increase	-	$816,421,443
TOTAL 3A ESCALATION	**$2,756,858,000**	**$4,294,082,136**

ESCALATION (ALIGNMENT 5A)	BLACK & VEATCH	HUNTER PACIFIC
Construction Cost	$2,815,413,000	$3,369,467,238
Schedule Increase	-	$788,052,057
TOTAL 5A ESCALACTION	**$2,815,413,000**	**$4,157,519,295**

ESCALATION (ALIGNMENT 5C)	BLACK & VEATCH	HUNTER PACIFIC
Construction Cost	$2,903,936,000	$3,351,900,781
Schedule Increase	-	$789,881,781
TOTAL 5C ESCALACTION	**$2,903.936.000**	**$4,141,782,562**

ALIGNMENT 3A

ESTIMATED CAPITAL COSTS (WITHOUT CONTINGENCY)			
ITEM	**BLACK & VEATCH**	**HUNTER PACIFIC**	**DELTA**
Canals	54,251,000	72,430,232	18,179,232
Pipelines	358,953,000	373,343,483	14,390,483
Tunnels	1,220,650,000	1,546,916,515	326,266,515
Pumping Plants	155,674,000	149,918,849	(5,755,151)
Power Generating/Pressure Control Facilities	-	-	-
Electric Distribution	49,231,000	122,325,618	73,094,618
Water Treatment	671,039,000	940,896,867	269,857,867
Operational Storage	171,425,000	208,512,085	37,087,085
Office and Warehouse	6,760,000	6,492,530	(267,470)
SUBTOTAL	2,687,983,000	3,420,836,178	732,853,178
Construction Management	619,502,000	786,792,321	167,290,321
Soft Costs[1]	135,357,000	121,476,000	(13,881,000)
Contingency (10-30%)	779,978,000	997,805,672	217,827,672
TOTAL (2020 Dollars)	4,222,820,000	5,326,910,172	1,104,090,172

[1] Soft costs include the initial studies, engineering, right of way and property acquisition, CEQA/NEPA, public outreach, legal, environmental, owners representative, and staff support.

ESTIMATED CAPITAL COSTS (CONTINGENCY INCLUDED IN EACH LINE ITEM)			
ITEM	**BLACK & VEATCH**	**HUNTER PACIFIC**	**DELTA**
Canals	59,676,000	79,673,255	19,997,255
Pipelines	466,639,000	485,346,527	18,707,527
Tunnels	1,586,845,000	2,010,991,470	424,146,470
Pumping Plants	186,809,000	179,902,619	(6,906,381)
Power Generating/Pressure Control Facilities	-	-	-
Electric Transmission Lines	64,001,000	159,023,303	95,022,303
Water Treatment	872,350,000	1,223,165,927	350,815,927
Operational Storage	222,853,000	271,065,711	48,212,711
Office and Warehouse	8,788,000	8,440,288	(347,712)
SUBTOTAL	3,467,961,000	4,417,609,101	949,648,101
Construction Management	619,502,000	786,792,321	167,290,321
Soft Costs[1]	135,357,000	122,508,750	(12,848,250)
TOTAL (2020 Dollars)	4,222,820,000	5,326,910,172	1,104,090,172

[1] Soft costs include the initial studies, engineering, right of way and property acquisition, CEQA/NEPA, public outreach, legal, environmental, owners representative, and staff support.

ESTIMATED ANNUAL COSTS			
ITEM	**BLACK & VEATCH**	**HUNTER PACIFIC**	**DELTA**
Energy Cost - Pumping	71,875,000	71,875,000	
Energy Cost - Treatment	13,080,000	13,080,000	
O&M and Replacement	13,590,000	13,590,000	
Water Treatment (excluding energy)	30,922,000	30,922,000	
Energy Recovery	-	-	
TOTAL ANNUAL COSTS (2020 Dollars)	**129,467,000**	**129,467,000**	

ALIGNMENT 5A

ESTIMATED CAPITAL COSTS (WITHOUT CONTINGENCY)			
ITEM	**BLACK & VEATCH**	**HUNTER PACIFIC**	**DELTA**
Canals	15,550,000	20,496,400	4,946,400
Pipelines	395,845,000	401,851,530	6,006,530
Tunnels	1,200,886,000	1,401,285,260	200,399,260
Pumping Plants	146,985,000	171,580,265	24,595,265
Power Generating/Pressure Control Facilities	31,097,000	39,429,450	8,332,450
Electric Distribution	39,263,000	75,122,712	35,859,712
Water Treatment	806,217,000	1,053,779,211	247,562,211
Operational Storage	86,425,000	122,646,256	36,221,256
Office and Warehouse	6,760,000	6,492,530	(267,470)
SUBTOTAL	2,729,028,000	3,292,683,615	563,655,615
Construction Management	635,148,000	757,317,231	122,169,231
Soft Costs[1]	120,675,000	111,982,000	(8,693,000)
Contingency (10-30%)	800,900,000	967,175,528	166,275,528
TOTAL (2020 Dollars)	4,285,751,000	5,129,158,374	843,407,374

[1] Soft costs include the initial studies, engineering, right of way and property acquisition, CEQA/NEPA, public outreach, legal, environmental, owners representative, and staff support.

ESTIMATED CAPITAL COSTS (CONTINGENCY INCLUDED IN EACH LINE ITEM)			
ITEM	**BLACK & VEATCH**	**HUNTER PACIFIC**	**DELTA**
Canals	17,105,000	22,546,040	5,441,040
Pipelines	514,599,000	522,406,990	7,807,990
Tunnels	1,561,152,000	1,821,670,838	260,518,838
Pumping Plants	176,382,000	205,896,318	29,514,318
Power Generating/Pressure Control Facilities	40,426,000	51,258,285	10,832,285
Electric Transmission Lines	51,042,000	97,659,526	46,617,526
Water Treatment	1,048,082,000	1,369,912,974	321,830,974
Operational Storage	112,353,000	159,440,133	47,087,133
Office and Warehouse	8,788,000	8,440,288	(347,712)
SUBTOTAL	3,529,929,000	4,259,231,392	729,302,392
Construction Management	635,148,000	757,317,231	122,169,231
Soft Costs[1]	120,675,000	112,609,750	(8,065,250)
TOTAL (2020 Dollars)	4,285,752,000	5,129,158,374	843,406,374

[1] Soft costs include the initial studies, engineering, right of way and property acquisition, CEQA/NEPA, public outreach, legal, environmental, owners representative, and staff support.

ESTIMATED ANNUAL COSTS			
ITEM	**BLACK & VEATCH**	**HUNTER PACIFIC**	**DELTA**
Energy Cost - Pumping	72,705,000	72,705,000	
Energy Cost - Treatment	13,080,000	13,080,000	
O&M and Replacement	13,599,000	13,599,000	
Water Treatment (excluding energy)	32,949,000	32,949,000	
Energy Recovery	-	-	
TOTAL ANNUAL COSTS (2020 Dollars)	**132,333,000**	**132,333,000**	

ALIGNMENT 5C

ESTIMATED CAPITAL COSTS (WITHOUT CONTINGENCY)			
ITEM	**BLACK & VEATCH**	**HUNTER PACIFIC**	**DELTA**
Canals	1,626,000	2,109,172	483,172
Pipelines	1,033,039,000	1,051,586,107	18,547,107
Tunnels	434,562,000	449,743,837	15,181,837
Pumping Plants	312,675,000	339,223,635	26,548,635
Power Generating/Pressure Control Facilities	134,874,000	157,717,799	22,843,799
Electric Distribution	52,053,000	114,594,931	62,541,931
Water Treatment	828,836,000	1,072,667,038	243,831,038
Operational Storage	86,425,000	122,646,256	36,221,256
Office and Warehouse	6,760,000	6,492,530	(267,470)
SUBTOTAL	2,890,850,000	3,316,781,306	425,931,306
Construction Management	608,481,000	762,859,700	154,378,700
Soft Costs[1]	140,995,000	125,437,500	(15,557,500)
Contingency (10-30%)	835,662,000	961,378,694	125,716,694
TOTAL (2020 Dollars)	4,475,988,000	5,166,457,199	690,469,199

[1] Soft costs include the initial studies, engineering, right of way and property acquisition, CEQA/NEPA, public outreach, legal, environmental, owners representative, and staff support.

ESTIMATED CAPITAL COSTS (CONTINGENCY INCLUDED IN EACH LINE ITEM)			
ITEM	**BLACK & VEATCH**	**HUNTER PACIFIC**	**DELTA**
Canals	1,788,000	2,320,090	532,090
Pipelines	1,342,951,000	1,367,061,939	24,110,939
Tunnels	564,930,000	584,666,988	19,736,988
Pumping Plants	375,210,000	407,068,362	31,858,362
Power Generating/Pressure Control Facilities	175,336,000	205,033,139	29,697,139
Electric Transmission Lines	67,668,000	148,973,411	81,305,411
Water Treatment	1,077,486,000	1,394,467,150	316,981,150
Operational Storage	112,353,000	159,440,133	47,087,133
Office and Warehouse	8,788,000	8,440,288	(347,712)
SUBTOTAL	3,726,510,000	4,277,471,499	550,961,499
Construction Management	608,481,000	762,859,700	154,378,700
Soft Costs[1]	140,995,000	126,126,000	(14,869,000)
TOTAL (2020 Dollars)	4,475,986,000	5,166,457,199	690,471,199

[1] Soft costs include the initial studies, engineering, right of way and property acquisition, CEQA/NEPA, public outreach, legal, environmental, owners representative, and staff support.

ESTIMATED ANNUAL COSTS			
ITEM	**BLACK & VEATCH**	**HUNTER PACIFIC**	**DELTA**
Energy Cost - Pumping	206,224,000	206,224,000	
Energy Cost - Treatment	13,080,000	13,080,000	
O&M and Replacement	19,726,000	19,726,000	
Water Treatment (excluding energy)	33,289,000	33,289,000	
Energy Recovery	(33,401,000)	(33,401,000)	
TOTAL ANNUAL COSTS (2020 Dollars)	**238,918,000**	**238,918,000**	

ALIGNMENT 3A	Unit Price	Quantity	Cost/Duration	
T1 (PS3 to Vent)				
TBM Tunnel Excavation	$5,198 /LF	92,085 LF	$478,645,200	61 mo
Bad Ground/Pre-excavation Grout	$8,603 /LF	840 LF	$7,226,429	3 mo
WSP Installation/Backfill/CML	$5,783 /LF	780 LF	$4,510,906	3 mo
	$5,426 /LF	92,085 LF	$490,382,536	67 mo
T2 (Vent to Moss Tree Portal)				
TBM Tunnel Excavation	$4,511 /LF	126,720 LF	$571,584,560	55 mo
Bad Ground/Pre-excavation Grout	$7,115 /LF	5,400 LF	$38,420,257	14 mo
WSP Installation/Backfill/CML	$3,852 /LF	40,760 LF	$157,016,527	21 mo
	$6,053 /LF	126,720 LF	$767,021,344	90 mo
T3 (I-15 to Twin Oaks WTP)				
TBM Tunnel Excavation	$4,717 /LF	11,125 LF	$52,471,280	21 mo
Bad Ground/Pre-excavation Grout	$5,982 /LF	6,600 LF	$39,482,286	17 mo
WSP Installation/Backfill/CML	$4,183 /LF	5,200 LF	$21,750,227	6 mo
	$10,221 /LF	11,125 LF	$113,703,793	44 mo
T4 (Tnl Vent 2 to Lake Wohlford)				
TBM Tunnel Excavation	$5,434 /LF	15,700 LF	$85,308,160	26 mo
Bad Ground/Pre-excavation Grout	$8,963 /LF	420 LF	$3,764,468	1 mo
WSP Installation/Backfill/CML	$5,138 /LF	1,140 LF	$5,856,947	3 mo
	$6,046 /LF	15,700 LF	$94,929,575	30 mo
Shafts				
Shaft Excavation/Backfill	$36,510 /VF	1,650 VF	$60,241,470	21 mo
Shaft Excavation/Backfill	$37,523 /VF	550 VF	$20,637,797	10 mo
			$80,879,267	
TOTAL – ALIGNMENT 3A			**$1,546,916,515**	

Table 1 – Summarized Costs and Durations, Alignment 3A

ALIGNMENT 5A	Unit Price	Quantity	Cost/Duration	
T1 (Bow Willow Portal to Vent)				
TBM Tunnel Excavation	$5,130 /LF	88,176 LF	$452,333,360	60 mo
Bad Ground/Pre-excavation Grout	$6,903 /LF	14,477 LF	$99,924,222	36 mo
WSP Installation/Backfill/CML	$3,991 /LF	10,151 LF	$40,509,146	8 mo
	$6,723 /LF	88,176 LF	$592,766,728	104 mo
T2 (Vent to El Capitan)				
TBM Tunnel Excavation	$4,747 /LF	92,928 LF	$441,127,200	52 mo
Bad Ground/Pre-excavation Grout	$7,097 /LF	6,900 LF	$48,969,054	17 mo
WSP Installation/Backfill/CML	$4,155 /LF	5,100 LF	$21,188,538	5 mo
	$5,502 /LF	92,928 LF	$511,284,791	75 mo
T3 & T4 (El Capitan to San Vicente)				
TBM Tunnel Excavation	$4,689 /LF	37,488 LF	$175,784,880	43 mo
Bad Ground/Pre-excavation Grout			$0	0 mo
WSP Installation/Backfill/CML	$4,502 /LF	2,000 LF	$9,004,174	3 mo
	$4,929 /LF	37,488 LF	$184,789,054	46 mo
Shaft				
Shaft Excavation/Backfill	$36,272 /VF	3,100 VF	$112,444,687	35 mo
TOTAL – ALIGNMENT 5A			**$1,401,285,260**	

Table 2 – Summarized Costs and Durations, Alignment 5A

ALIGNMENT 5C	Unit Price	Quantity	Cost/Duration	
T1 (In-Ka-Pah Gorge PS3 to PS4)				
TBM Tunnel Excavation	$4,273 /LF	12,100 LF	$51,704,720	22 mo
Bad Ground/Pre-excavation Grout			$0	0 mo
WSP Installation/Backfill/CML	$3,970 /LF	12,100 LF	$48,031,046	9 mo
	$8,243 /LF	12,100 LF	$99,735,766	31 mo
T2 (In-Ka-Pah Gorge PS4 to PS5)				
TBM Tunnel Excavation	$5,341 /LF	6,336 LF	$33,841,554	19 mo
Bad Ground/Pre-excavation Grout			$0	0 mo
WSP Installation/Backfill/CML	$4,089 /LF	6,336 LF	$25,906,011	6 mo
	$9,430 /LF	6,336 LF	$59,747,565	25 mo
T3 & T4 (El Capitan to San Vicente)				
TBM Tunnel Excavation	$3,845 /LF	37,488 LF	$144,156,720	43 mo
Bad Ground/Pre-excavation Grout			$0	0 mo
WSP Installation/Backfill/CML	$3,897 /LF	37,488 LF	$146,103,786	23 mo
	$7,743 /LF	37,488 LF	$290,260,506	66 mo
TOTAL – ALIGNMENT 5C			**$449,743,837**	

Table 3 – Summarized Costs and Durations, Alignment 5C

Canals Review

Concrete Lined Channel Analysis

	Alignment 3A	Alignment 5A	Alignment 5C
Quantity:	222,900	68,700	7,800
Cost / LF:	$ 208	$ 208	$ 208
Concrte Lined Channel cost in estimate:	**$ 46,461,276**	**$ 14,319,828**	**$ 1,625,832**
Comparison estimate Cost / LF:	$ 270	$ 270	$ 270
Comparison estimate total:	**$ 60,273,655**	**$ 18,576,941**	**$ 2,109,172**
Delta (Estimate - Comparison):	**$ (13,812,379)**	**$ (4,257,113)**	**$ (483,340)**
	-30%	**-30%**	**-30%**

Per a B&V team discussion, they estimated the canal in great detail. Used $353 for concrete and used 8% to 10% for waste. Section comparable to Coachilla canal.

Past benchmarks

Heacock Channel - Riverside County 2017, CL A Concrete Channel Paving $300/CY+
South Norco Channel - Riverside County 2019, CL A Channel Slope Paving $300/CY+

Estimated based off Canal Cross Section

Concrete Canal - 3" Thick, Unreinforced:	$ 88	Due to thin section, 15%-25% concrete waste, and anchors shown in details - used $375/CY
Compacted Embankment:	$ 39	Estimate utilizing canal excavation for embankment
Common Embankment:	$ 63	Using imported material, considered good level of fine grading to reduce waste
Operation and Maintenance Road:	$ 23	Estimated $7/SY for light gravel section - one road each side
Subtotal:	$ 213	
General Contractor overhead, bond, etc:	$ 21	
Los Angeles Location Factor:	$ 29	
2019 - 2020 adjustment factor:	$ 8	
Comparison estimate total:	**$ 270**	

Canal Siphon Analysis

	Alignment 3A	Alignment 5A	Alignment 5C
Quantity:	19	3	-
Cost / EA:	$ 410,000	$ 410,000	
Concrte Lined Channel cost in estimate:	**$ 7,790,000**	**$ 1,230,000**	**$ -**
Comparison estimate Cost / EA:	$ 639,820	$ 639,820	
Comparison estimate total:	**$ 12,156,577**	**$ 1,919,460**	
Delta (Estimate - Comparison):	**$ (4,366,577)**	**$ (689,460)**	
	-56%	**-56%**	

Comparison estimate costs for all Siphons along alignment 3A

Boring / Receiving Pits (5 Locations, 2 Pits/Location):	$ 1,000,000
Road bores (132" Dia, 1,100 LF):	$ 5,500,000
Pipe Crossing 132" Dia (15 Locations, 600 LF Total):	$ 906,477
Roadwork costs for pipe crossings (15 each):	$ 1,260,000
Site restoration / misc (19 Locations):	$ 475,000
Subtotal:	$ 9,141,477
General Contractor overhead, bond, etc:	$ 1,371,222
Los Angeles Location Factor:	$ 1,293,062
2019 - 2020 adjustment factor:	$ 350,817
Comparison estimate total (per each):	**$ 639,820**

Estimate appears lower than expected.
Note: no costs were allocated for road work, guardrails, etc…

Canal and Siphons Combined Analysis

	Alignment 3A	Alignment 5A	Alignment 5C
Canal + Siphon in estimate:	**$ 54,251,276**	**$ 15,549,828**	**$ 1,625,832**
Comparison Estimate Total:	$ 72,430,232	$ 20,496,400	$ 2,109,172
Delta (Estimate - Comparison):	**$ (18,178,956)**	**$ (4,946,572)**	**$ (483,340)**
	-34%	**-32%**	**-30%**

Estimate appears low, based on assumptions used for analysis.
Note: no costs appeared to be allocated for roadwork costs such as paving, guardrails, etc…

Pipeline Review

Pipeline Analysis

Pipeline analysis:

	Unit Cost	Expected Unit Cost	UOM	Alignment 3A Quantity	Alignment 3A Total Cost	Alignment 3A Total Expected	Alignment 3A Delta Total Expected	Alignment 5A Quantity	Alignment 5A Total Cost	Alignment 5A Total Expected	Alignment 5A Delta Total Expected	Alignment 5C Quantity	Alignment 5C Total Cost	Alignment 5C Total Expected	Alignment 5C Delta Total Expected
102 inch Diameter Pipe (50ksi)															
102" Pipe - 0.500 inch wall	$ 1,210	$ 1,315	LF	139,475	$ 168,820,540	$ 183,363,834	$ (14,543,294)	116,930	$ 141,532,072	$ 153,724,561	$ (12,192,489)	239,950	$ 290,435,480	$ 315,455,472	$ (25,019,992)
102" Pipe - 0.625 inch wall	$ 1,516	$ 1,548	LF	38,970	$ 59,094,108	$ 60,312,766	$ (1,218,658)	20,550	$ 31,162,020	$ 31,804,653	$ (642,633)	63,725	$ 96,632,590	$ 98,625,379	$ (1,992,789)
102" Pipe - 0.750 inch wall	$ 1,821	$ 1,692	LF	26,300	$ 47,893,352	$ 44,490,965	$ 3,402,387	22,500	$ 40,973,400	$ 38,062,613	$ 2,910,787	47,375	$ 86,271,770	$ 80,142,946	$ 6,128,824
102" Pipe - 0.875 inch wall	$ 1,995	$ 1,907	LF		$ -	$ -	$ -	-	$ -	$ -	$ -	22,215	$ 44,321,591	$ 42,356,712	$ 1,964,879
102" Pipe - 1.000 inch wall	$ 2,132	$ 2,165	LF		$ -	$ -	$ -	-	$ -	$ -	$ -	31,625	$ 67,439,680	$ 68,462,207	$ (1,022,527)
102" Pipe - 1.125 inch wall	$ 2,331	$ 2,360	LF		$ -	$ -	$ -	-	$ -	$ -	$ -	12,350	$ 28,788,344	$ 29,143,689	$ (355,345)
102" Pipe - 1.250 inch wall	$ 2,591	$ 2,569	LF		$ -	$ -	$ -	-	$ -	$ -	$ -	4,900	$ 12,694,920	$ 12,587,183	$ 107,737
102" Pipe - 1.375 inch wall	$ 2,850	$ 2,774	LF		$ -	$ -	$ -	-	$ -	$ -	$ -	3,960	$ 11,287,194	$ 10,984,299	$ 302,895
102" Pipe - 1.500 inch wall	$ 3,110	$ 2,911	LF		$ -	$ -	$ -	-	$ -	$ -	$ -	2,500	$ 7,775,800	$ 7,277,032	$ 498,768
Trenching - Main Alignments															
Type 1E1B1 (Open Trench/Use Backfill)	$ 218	$ 231	LF		$ -	$ -	$ -	17,424	$ 3,791,462	$ 4,019,224	$ (227,761)	63,888	$ 13,902,029	$ 14,737,153	$ (835,124)
Type 1E1B2 (Open Trench/Process Backfill)	$ 479	$ 468	LF		$ -	$ -	$ -	76,032	$ 36,398,039	$ 35,620,827	$ 777,212	163,152	$ 78,104,125	$ 76,436,358	$ 1,667,767
1E2B2 (Open Trench/Localized Blasting/Process Backfill)	$ 725	$ 744	LF	4,750	$ 3,443,750	$ 3,533,852	$ (90,102)	1,056	$ 765,600	$ 785,631	$ (20,031)	159,984	$ 115,988,400	$ 119,023,122	$ (3,034,722)
Type 1E3B2 (Wide Trench/Process Backfill)	$ 479	$ 468	LF		$ -	$ -	$ -	65,472	$ 31,342,756	$ 30,673,490	$ 669,266	20,064	$ 9,605,038	$ 9,399,940	$ 205,098
Type 1E3B1 (Wide Trench/Native Backfill)	$ 218	$ 231	LF	149,996	$ 32,639,184	$ 34,599,889	$ (1,960,705)	-	$ -	$ -	$ -		$ -	$ -	$ -
Type 2 (Shored Trench)	$ 268	$ 263	LF	49,999	$ 13,399,665	$ 13,133,184	$ 266,481	-	$ -	$ -	$ -	21,648	$ 5,801,664	$ 5,686,286	$ 115,378
72 inch Diameter Pipe (36 ksi) - Aqueduct Improvements															
72" Pipe - 0.375 inch wall	$ 629	$ 673	LF		$ -	$ -	$ -	16,850	$ 10,593,608	$ 11,345,886	$ (752,278)	16,850	$ 10,593,608	$ 11,345,886	$ (752,278)
72" Pipe - 0.500 inch wall	$ 836	$ 806	LF		$ -	$ -	$ -	18,735	$ 15,669,954	$ 15,106,899	$ 563,055	18,735	$ 15,669,954	$ 15,106,899	$ 563,055
72" Pipe - 0.625 inch wall	$ 972	$ 961	LF		$ -	$ -	$ -	28,775	$ 27,980,810	$ 27,662,742	$ 318,068	28,775	$ 27,980,810	$ 27,662,742	$ 318,068
72" Pipe - 0.750 inch wall	$ 1,087	$ 1,071	LF		$ -	$ -	$ -	1,850	$ 2,010,284	$ 1,981,991	$ 28,293	1,850	$ 2,010,284	$ 1,981,991	$ 28,293
Trenching - Aqueducts															
Type 2 (Shored Trench)	$ 268	$ 231	LF		$ -	$ -	$ -	66,210	$ 17,744,280	$ 15,265,343	$ 2,478,937	66,210	$ 17,744,280	$ 15,265,343	$ 2,478,937
Accessories/Crossings/Specials															
Appurtenances	$ 50	$ 50	LF	204,745	$ 10,237,250	$ 10,237,250	$ -	226,194	$ 11,309,700	$ 11,309,700	$ -	494,946	$ 24,747,300	$ 24,747,300	$ -
Highway Crossings	$ 3,154	$ 3,150	LF	250	$ 788,535	$ 787,500	$ 1,035	150	$ 473,121	$ 472,500	$ 621	4,250	$ 13,405,095	$ 13,387,500	$ 17,595
River Crossings	$ 3,154	$ 3,150	LF		$ -	$ -	$ -	-	$ -	$ -	$ -	450	$ 1,419,363	$ 1,417,500	$ 1,863
Surface/Utilities	$ 98	$ 98	LF	204,745	$ 20,052,725	$ 20,065,010	$ (12,285)	226,194	$ 22,153,440	$ 22,167,012	$ (13,572)	494,946	$ 48,475,011	$ 48,504,708	$ (29,697)
San Vicente Outfall Structure	$ 1,944,640	$ 1,848,459	LS		$ -	$ -	$ -	1	$ 1,944,640	$ 1,848,459	$ 96,181	1	$ 1,944,640	$ 1,848,459	$ 96,181
Borrego Springs Turnout	$ 2,584,000	$ 2,819,232	LS	1	$ 2,584,000	$ 2,819,232	$ (235,232)	-	$ -	$ -	$ -		$ -	$ -	$ -
Total:					$ 358,953,109	$ 373,343,483	$ (14,390,373)		$ 395,845,187	$ 401,851,530	$ (6,006,343)		$ 1,033,038,971	$ 1,051,586,107	$ (18,547,135)
							4%				2%				2%

Benchmarks and other information

Material pricing listed below is from indicative pricing from NW Pipe
Material required is CMLC (Cement Lined Steel Pipe with tape wrap)

Per a B&V team discussion, they've been seeing $1.50/# for cement lined pipe from NW

Estimated pipeline costs only, Trenching Separate:

	LB/LF	Unit Cost	UOM	Material $	Install $	Material % of total	$/LB
102" Pipe - 0.500 inch wall	542.5	$ 1,315	LF	$ 1,084	$ 231	82%	$ 2.00
102" Pipe - 0.625 inch wall	677.3	$ 1,548	LF	$ 1,317	$ 231	85%	$ 1.94
102" Pipe - 0.750 inch wall	811.8	$ 1,692	LF	$ 1,461	$ 231	86%	$ 1.80
102" Pipe - 0.875 inch wall	946	$ 1,907	LF	$ 1,676	$ 231	88%	$ 1.77
102" Pipe - 1.000 inch wall	1079.8	$ 2,165	LF	$ 1,836	$ 329	85%	$ 1.70
102" Pipe - 1.125 inch wall	1213.2	$ 2,360	LF	$ 2,031	$ 329	86%	$ 1.67
102" Pipe - 1.250 inch wall	1346.3	$ 2,569	LF	$ 2,240	$ 329	87%	$ 1.66
102" Pipe - 1.375 inch wall	1479.1	$ 2,774	LF	$ 2,445	$ 329	88%	$ 1.65
102" Pipe - 1.500 inch wall	1611.6	$ 2,911	LF	$ 2,582	$ 329	89%	$ 1.60
72" Pipe - 0.375 inch wall	287.2	$ 673	LF	$ 562	$ 111	83%	$ 1.96
72" Pipe - 0.500 inch wall	382.2	$ 806	LF	$ 695	$ 111	86%	$ 1.82
72" Pipe - 0.625 inch wall	476.9	$ 961	LF	$ 850	$ 111	88%	$ 1.78
72" Pipe - 0.750 inch wall	571.3	$ 1,071	LF	$ 960	$ 111	90%	$ 1.68
Comparison estimate total:							

Install Cost Pipe Estimate 102" Dia (<1" Wall)

Using RS Means crew (2 each), Set pipe, mortar joints:	$ 171	Estimate 50'/day (1 joint)
Welded Joint:	$ 2	
Subtotal:	$ 173	
General Contractor overhead, bond, etc:	$ 26	
Los Angeles Location Factor:	$ 25	
2019 - 2020 adjustment factor:	$ 7	
Estimate total:	**$ 231**	

Install Cost Pipe Estimate 102" Dia (>1" Wall)

Using RS Means crew (2 each), Set pipe, mortar joints, larger eqpt:	$ 240	Estimate 50'/day (1joint)
Welded Joint:	$ 7	
Subtotal:	$ 247	
General Contractor overhead, bond, etc:	$ 37	
Los Angeles Location Factor:	$ 35	
2019 - 2020 adjustment factor:	$ 9	
Estimate total:	**$ 329**	

Install Cost Pipe Estimate 72" Dia

Using RS Means crew (2 each), Set pipe, mortar joints:	$ 77	Estimate 100'/day (2 joints)
Welded Joint:	$ 7	
Subtotal:	$ 84	
General Contractor overhead, bond, etc:	$ 13	
Los Angeles Location Factor:	$ 12	
2019 - 2020 adjustment factor:	$ 3	
Estimate total:	**$ 111**	

Trenching 102" Pipe - Open Trench / Use Backfill

Excavation:	$ 89
Bedding:	$ 19
Backfill:	$ 61
Subtotal:	$ 169
General Contractor overhead, bond, etc:	$ 25
Los Angeles Location Factor:	$ 24
2019 - 2020 adjustment factor:	$ 6
Estimate total:	**$ 225**

Trenching 102" Pipe - Open Trench / Process Backfill / Blasting (LOCALIZED)

Excavation:	$ 296
Bedding:	$ 19
Backfill:	$ 244
Subtotal:	$ 559
General Contractor overhead, bond, etc:	$ 84
Los Angeles Location Factor:	$ 79
2019 - 2020 adjustment factor:	$ 21
Estimate total:	**$ 744**

Trenching 72" Pipe - Shored Trench

Excavation:	$ 37
Bedding:	$ 18
Backfill:	$ 118
Subtotal:	$ 173
General Contractor overhead, bond, etc:	$ 26
Los Angeles Location Factor:	$ 25
2019 - 2020 adjustment factor:	$ 7
Estimate total:	**$ 231**

Outfall Structure

Concrete / Riprap Outlet Structure:	$ 1,390,000
Subtotal:	$ 1,390,000
General Contractor overhead, bond, etc:	$ 208,500
Los Angeles Location Factor:	$ 196,616
2019 - 2020 adjustment factor:	$ 53,343
Comparison estimate total:	**$ 1,848,459**

Overall estimate apprears reasonable, however 102" 0.5" wall seemed low due to higher anticipated material cost

Trenching 102" Pipe - Open Trench / Process Backfill

Excavation:	$ 89
Bedding:	$ 19
Backfill:	$ 244
Subtotal:	$ 352
General Contractor overhead, bond, etc:	$ 53
Los Angeles Location Factor:	$ 50
2019 - 2020 adjustment factor:	$ 14
Estimate total:	**$ 468**

Trenching 102" Pipe - Shored Trench

Excavation:	$ 53
Bedding:	$ 21
Backfill:	$ 124
Subtotal:	$ 198
General Contractor overhead, bond, etc:	$ 30
Los Angeles Location Factor:	$ 28
2019 - 2020 adjustment factor:	$ 8
Estimate total:	**$ 263**

Borrego Springs Turnout

Concrete / Riprap Outlet Structure:	$ 1,520,000
Misc. Items:	$ 600,000
Subtotal:	$ 2,120,000
General Contractor overhead, bond, etc:	$ 318,000
Los Angeles Location Factor:	$ 299,874
2019 - 2020 adjustment factor:	$ 81,358
Comparison estimate total:	**$ 2,819,232**

Pumping Plants Review

800 Foot TDH Pumping Plant Analysis

	Alignment 3A	Alignment 5A	Alignment 5C
Quantity:		2	5
Cost / EA:		$ 55,230,000	$ 55,230,000
Cost for 40 acre-feet Forebay:	$ 2,555,000	$ 2,555,000	$ 2,555,000
800' TDH Plant / Forebay cost in estimate:	**$ 2,555,000**	**$ 113,015,000**	**$ 278,705,000**
Comparison estimate Cost / EA:		$ 55,881,123	$ 55,881,123
Cost for 40 acre-feet Forebay:	$ 3,230,900	$ 3,230,900	$ 3,230,900
Comparison estimate total:	**$ 3,230,900**	**$ 114,993,147**	**$ 282,636,517**
Delta (Estimate - Comparison):	**$ (675,900)**	**$ (1,978,147)**	**$ (3,931,517)**
	-26%	**-2%**	**-1%**

Benchmark Information

Per Texas Water Board Study, 12,500 HP for 700 TDH booster pump station cost $38,440,000

Pump Station per TX Water Board - adjusted proportionately:	$ 43,931,429	
Subtotal:	$ 43,931,429	
General Contractor overhead, bond, etc:	$ 4,393,143	
Los Angeles Location Factor:	$ 5,943,922	
2019 - 2020 adjustment factor:	$ 1,612,630	
Comparison estimate total:	**$ 55,881,123**	**$ 55,881,123**

Estimation of Forebay

Excavation / Backflill:	$ 1,140,000	Based on similar channal analysis above
Plastic liner w/ install and ground preparation:	$ 550,000	Per aqua habitat - material $45K/Acre
Outfall, Spillway, Pipeline:	$ 750,000	Determined proportionately to Dam analysis above
Sitework:	$ 100,000	
Subtotal:	$ 2,540,000	
General Contractor overhead, bond, etc:	$ 254,000	
Los Angeles Location Factor:	$ 343,662	
2019 - 2020 adjustment factor:	$ 93,238	
Comparison estimate total:	**$ 3,230,900**	**$ 3,230,900**

Per analysis of information provided, cost appears reasonable

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700 Foot TDH Pumping Plant Analysis

	Alignment 3A	Alignment 5A	Alignment 5C
Quantity:	3		
Cost / EA:	$ 51,891,445		
700' TDH Plant cost in estimate:	**$ 155,674,335**	**$ -**	**$ -**
Comparison estimate Cost / EA:	$ 48,895,983		
Comparison estimate total:	**$ 146,687,949**	**$ -**	
Delta (Estimate - Comparison):	**$ 8,986,386**	**$ -**	
	6%		

Benchmark Information

Per Texas Water Board Study, 12,500 HP booster pump station cost $38,440,000

Pump Station per TX Water Board:	$ 38,440,000	
Subtotal:	$ 38,440,000	
General Contractor overhead, bond, etc:	$ 3,844,000	
Los Angeles Location Factor:	$ 5,200,932	
2019 - 2020 adjustment factor:	$ 1,411,051	
Comparison estimate total:	**$ 48,895,983**	**$ 48,895,983**

Per analysis of information provided, cost appears reasonable

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500 Foot TDH Pumping Plant Analysis

	Alignment 3A	Alignment 5A	Alignment 5C
Quantity:		1	1
Cost / EA:		$ 36,525,000	$ 36,525,000
500' TDH Plant + 6 MG Storage Tank cost in estimate:	**$**	**$ 36,525,000**	**$ 36,525,000**
Comparison estimate Cost / EA:		$ 56,587,118	$ 56,587,118
Comparison estimate total:	**$**	**$ 56,587,118**	**$ 56,587,118**
Delta (Estimate - Comparison):	**$**	**$ (20,062,118)**	**$ (20,062,118)**
		-55%	**-55%**

Benchmark Information

Per Texas Water Board Study, 5,000 HP booster pump station cost $29,750,000

Per a B&V team discussion, 6MG tank should be a DYK tank versus open - they plan to adjust their estimate to match this approach

Estimated based off Canal Cross Section

Pump Station per TX Water Board (Adj for location):	$ 40,682,520	
6 MG Storage tank per costs shown in Storage Section:	$ 9,275,766	
Subtotal:	$ 49,958,286	
General Contractor overhead, bond, etc:	$ 4,995,829	
Los Angeles Location Factor (already included):		
2019 - 2020 adjustment factor:	$ 1,633,003	
Comparison estimate total:	**$ 56,587,118**	**$ 56,587,118**

Per analysis of information provided, the plant cost appears reasonably close but the 6MG storage tank cost looks very low

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Pumping Plant Combined Analysis

	Alignment 3A	Alignment 5A	Alignment 5C
800', 700', 500' Plants, forebay, 6MG Storage in estimate:	**$ 158,229,335**	**$ 149,540,000**	**$ 315,230,000**
Comparison Estimate Total:	$ 149,918,849	$ 171,580,265	$ 339,223,635
Delta (Estimate - Comparison):	**$ 8,310,486**	**$ (22,040,265)**	**$ (23,993,635)**
	5%	**-15%**	**-8%**

Estimates for 5A and 5C appear somewhat low due to costs associated with 6 MG storage and it does not appear that the forebar costs are included

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Pressure Control Facility Review

Power Generating / Pressure Control Facility Analysis

	Alignment 3A	Alignment 5A	Alignment 5C
Quantity (Each):		1	4
Cost / EA:		$ 31,096,540	$ 31,096,540
PG/PC Facilty cost in estimate:	**$ -**	**$ 31,096,540**	**$ 124,386,160**
Comparison estimate Cost / EA:		$ 39,429,450	$ 39,429,450
Comparison estimate total:	**$ -**	**$ 39,429,450**	**$ 157,717,799**
Delta (Estimate - Comparison):	**$ -**	**$ (8,332,910)**	**$ (33,331,639)**
		-27%	**-27%**

Benchmark Information

Using SDCWA Mira Mesa facility constructed in 2004, the total cost was $21 Million

SDCWA Mira Mesa Pressure Control Facility (2004):	$ 21,000,000	
Subtotal:	$ 21,000,000	
General Contractor overhead, bond, etc (in base number):		
Los Angeles Location Factor:	$ 2,697,248	
2004 - 2020 adjustment factor:	$ 15,732,202	
Comparison estimate total:	**$ 39,429,450**	**$ 39,429,450**

Although the costs appear low, without knowing the complete scope of the Mira Mesa 2004 project costs, it appears that the overall cost for this facility is somewhat low to reasonable.

Power Review

Power Analysis

Electric Power Cost Estimate

				Alignment 3A				Alignment 5A				Alignment 5C			
	Unit Cost	Expected UnitCost	UOM	Quantity	Total Cost	Total Expected	Delta Total Expected	Quantity	Total Cost	Total Expected	Delta Total Expected	Quantity	Total Cost	Total Expected	Delta Total Expected
69 kV Substation	$ 236,480	$ 3,024,890	EA		$ -	$ -	$ -	-	$ -	$ -	$ -	3	$ 709,440	$ 9,074,670	$ (8,365,230)
69 kV Transmission Line	$ 236,480	$ 1,610,953	MI		$ -	$ -	$ -	-	$ -	$ -	$ -	10	$ 2,364,800	$ 16,109,528	$ (13,744,728)
230 kV Substation (90 MW load)	$ 23,385,507	$ 24,984,903	EA		$ -	$ -	$ -	1	$ 23,385,507	$ 24,984,903	$ (1,599,396)	-	$ -	$ -	$ -
230 kV Substation (220 MW load)	$ 29,231,293	$ 27,054,466	EA		$ -	$ -	$ -	-	$ -	$ -	$ -	1	$ 29,231,293	$ 27,054,466	$ 2,176,827
230 kV Transmission Line	$ 667,131	$ 2,106,631	MI	7	$ 4,936,771	$ 15,589,067	$ (10,652,296)	24	$ 15,877,724	$ 50,137,809	$ (34,260,086)	30	$ 19,747,085	$ 62,356,267	$ (42,609,182)
161/92 kV Transmission Line	$ 307,274	$ 1,982,711	MI	15	$ 4,578,389	$ 29,542,397	$ (24,964,007)		$ -	$ -	$ -		$ -	$ -	$ -
12.7 kV Distribution Line	$ 234,386	$ 177,734	MI	13	$ 2,953,270	$ 2,239,446	$ 713,824		$ -	$ -	$ -		$ -	$ -	$ -
Alignment 3A Substations	$ 12,254,297	$ 24,984,903	LS	3	$ 36,762,892	$ 74,954,708	$ (38,191,817)		$ -	$ -	$ -		$ -	$ -	$ -
Total:					$ 49,231,322	$ 122,325,618	$ (73,094,296)		$ 39,263,231	$ 75,122,712	$ (35,859,481)		$ 52,052,618	$ 114,594,931	$ (62,542,313)
							148%				91%				120%

Benchmarks and other information

Per B&V Discussion, they did say that the 69kV Substation cost will be re evaluated. Also mentioned that all substation costs should be somewhat comparable to one another.

MISO Transmission Cost Estimating Guide - 2019

MISO (Indiana Base)

69 kV Substation

site work	1	$ 340,153	$	340,153
circuit breaker	4	$ 67,116	$	268,464
disconnects	8	$ 39,973	$	319,784
transformers	1	$ 65,022	$	65,022
transformers	1	$ 85,266	$	85,266
bus spt	12	$ 21,312	$	255,744
deadend	2	$ 67,650	$	135,300
enclosure	1	$ 653,580	$	653,580
relay	4	$ 56,250	$	225,000
conduit	1,200	$ 5.40	$	6,480
cable	12,000	$ 4.63	$	55,500
trench	120	$ 256	$	30,720
		Total:	$	2,441,013
		Converted to LA Base:	**$**	**3,024,890**

69 kV Transmission Line

Total Signle Circuit T Line (IN Base)	1	$ 1,300,000	$	1,300,000
		Converted to LA Base:	**$**	**1,610,953**

230 kV Substation (90 MW load)

site work	5	$ 340,153	$	1,530,689
circuit breaker	12	$ 388,928	$	4,667,136
disconnects	24	$ 106,164	$	2,547,936
transformers	8	$ 141,663	$	1,133,304
current transformers	8	$ 282,463	$	2,259,704
bus spt	20	$ 50,194	$	1,003,880
deadend	6	$ 634,164	$	3,804,984
enclosure	1	$ 703,580	$	703,580
relay	14	$ 146,250	$	2,047,500
conduit	6,000	$ 5.40	$	32,400
cable	60,000	$ 4.63	$	277,500
trench	600	$ 256	$	153,600
		Total:	$	20,162,213
		Converted to LA Base:	**$**	**24,984,903**

230 kV Substation (220 MW load)

site work	6	$ 500,000	$	3,000,000
circuit breaker	12	$ 388,928	$	4,667,136
disconnects	24	$ 106,164	$	2,547,936
transformers	8	$ 141,663	$	1,133,304
current transformers	8	$ 282,463	$	2,259,704
bus spt	24	$ 50,194	$	1,204,656
deadend	6	$ 634,164	$	3,804,984
enclosure	1	$ 703,580	$	703,580
relay	14	$ 146,250	$	2,047,500
conduit	6,000	$ 5.40	$	32,400
cable	60,000	$ 4.63	$	277,500
trench	600	$ 256	$	153,600
		Total:	$	21,832,300
		Converted to LA Base:	**$**	**27,054,466**

230 kV Transmission Line

Total Signle Circuit T Line (IN Base)	1	$ 1,700,000	$	1,700,000
		Converted to LA Base:	**$**	**2,106,631**

161/92 kV Transmission Line

Total Signle Circuit T Line (IN Base)	1	$ 1,600,000	$	1,600,000
		Converted to LA Base:	**$**	**1,982,711**

12.7 kV Distribution Line

Total Signle Circuit T Line (2013)	1	$ 124,800	$	124,800
		Converted to LA Base:	**$**	**177,734**

Alignment 3A Substations

Used 230 kV as base	1	$ 20,162,213	$	20,162,213
		Converted to LA Base:	**$**	**24,984,903**

Salinity Treatment Plant Review

Salinity Treatment Plant Analysis

	Costs in Black & Veatch Estimate				Comparison Estimate - Potential Costs			
	Unit Cost	UOM	Quantity	Total Cost	Unit Cost	Total Cost	FNI 2017	Total 2020 FNI $
MF Plant cost in estimate:	$ 2.26	MGD	141,000,000	$ 318,660,000	$ 2.70	$ 380,700,000	$ 293,200,000	$ 434,031,707
RO Plant cost in estimate:	$ 1.87	MGD	135,000,000	$ 252,450,000	$ 3.00	$ 405,000,000	$ 293,200,000	$ 434,031,707
Solids/Screening cost in estimate:				$ 40,000,000		with plant costs		with plant costs
5.8 MG Forebay in estimate:				$ 1,450,000		$ 1,139,923		$ 1,139,923
CCRO Plant cost in estimate:	$ 2.24	MGD	20,300,000	$ 45,553,200	$ 3.00	$ 60,900,000		$ 60,900,000
			Total Plant Cost in B&V Estimate:	$ 658,113,200		$ 847,739,923		$ 930,103,336
					Delta (Estimate - Comparison):	$ (189,626,723)		$ (271,990,136)
						-29%		-41%

Solids/Screening included with total costs for Plant Costs. Forebay based on analysis for pumping plant work and adjusted proportionately.

Per a B&V team discussion, They've seen these lower unit costs as typical. However, mentioned typically see $3-$4/MG ($6 Incl, contingency). Facility costs were all inclusive incl. civil works. Some costs based off of 95 acre treatment site in Texas (though not RO or MF). Did say that in some cases, used 2.25% escalation rate.

Comparable Project Information

The FNI 2017 costs provided are the results from 2017 costs available in the 2018 Texas Water Development Board Unified Costing Tool

SDCWA Twin Oaks WTP Membrane Facility - 100 MGD, $159 Million (2005 cost) => $268 Million (2020 cost), **$2.69/MGD**
Twin Oaks $159 M Cost provided on CMD and Texas Design-Build Ch2M Project; Voice of San Diego reports cost of approx $160M

Minneapolis membrane treatment 70 MGD, $56 Million (2005) => $92.45 Millon (2020, LA), **$1.32/MGD (upgrade project, not complete)**

Thornton, CO membrane treatment plant - 20 MGD, $75 Million (2016) = $107.6 Million (2020, LA), **$5.38/MGD**

El Paso, TX Kay Bailey Hutchison Desalination RO - 27.5 mgd, $40 Million (2007) => $82 Million (2020, LA), **$2.99/MGD**
Cost details from texasdeals.com which break down the costs into plant, wells, and disposal
Anticipating a drawdown unit cost for scale based on the WateReuse information, only a minimal adjustment would be encountered

Brownsville Southmost Regional Water Authority RO 7.5 MGD, $22 Million (2002) => $58 Million (2020, LA), **$7.71/MGD**
Details reviewed on Texas Water board site - paper from Joseph Norris "Southmost Regional Water Authority Regional Desalination Plant"

Camarillo, CA RO North Pleasant Valley Groundwater Desaltier Plant - 3.4 MGD, $44 Million (2019) => $47 Million (2020, LA), **$13.73/MGD**
Details from VC Star report and City of Camarillo website

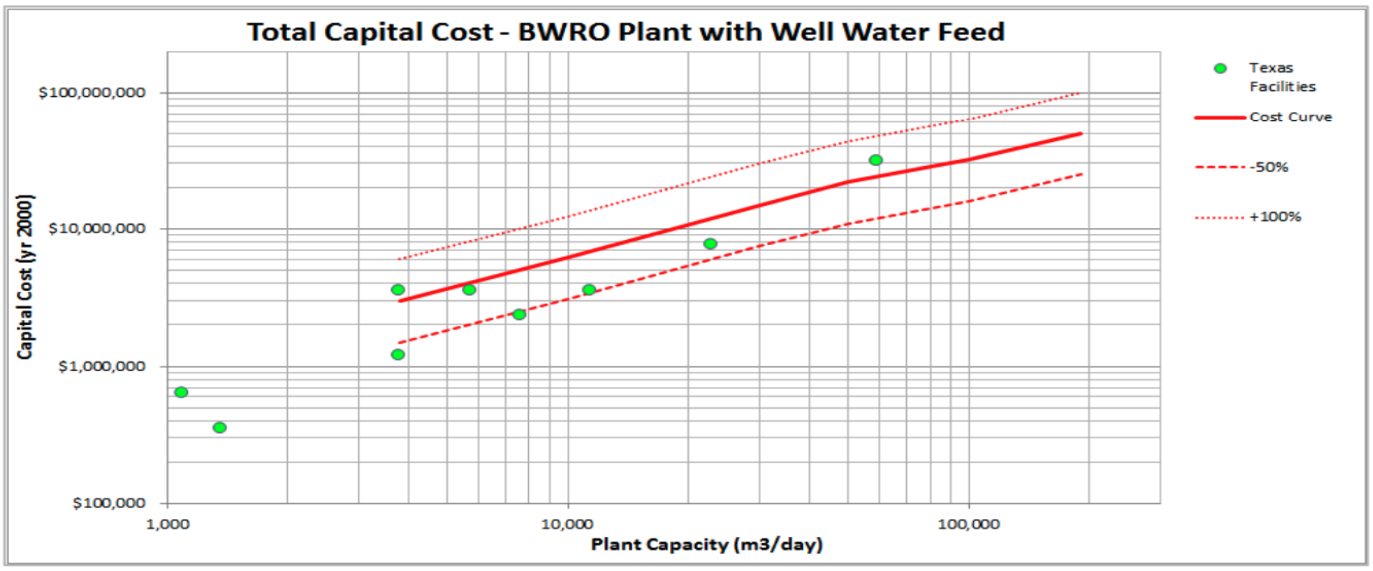
Tampa Bay Seawater RO Plant 25 MGD $158 Million (2001), => $409 Million (2020), LA, **$16.37/MGD (Seawater)**
Contract issues and remediation work, total cost obtained from water-technology.net website

EMWS Perris II RO Desalter 5.4 MGD, $51.6 Million (2019) => $54.5 Million (2020, LA), **$10.50/MGD**

WateReuse Association "Seawater Desalination Costs White Paper" January 2012

US Department of the Interior, Bureau of Reclamation

"Estimating the Cost of Brackish Groundwater Desalination in Texas" July 2014



Using the above RO Plant curve, the 135 MGD RO Plant would cost approximately $90 Million (2000) => $230 Million (2020, LA) **$1.70/MGD**

Other plants requiring further analysis - More Details Needed

San Antonio, TX RO Desalination facility, 12 MGD $118 Million (2014 cost) (Includes 12 miles of pipeline, pump stations, injection wells, 13 raw water wells)
EMWD Perris I Desalter RO 5.6 MGD, $59.8 Million (2004)
Modesto 36 MGD $106 million (2005) => $161 Million (2020, LA), $4.48/MGD
San Diego North City - 30 MGD, Est $398 Million, $13.36/MGD

Brine Pipeline Analysis

	Alignment 3A	Alignment 5A	Alignment 5C
Quantity:	12,672	145,200	167,375
Cost / LF:	$ 1,020	$ 1,020	$ 1,020
Brine Pipeline 30" cost in estimate:	**$ 12,925,440**	**$ 148,104,000**	**$ 170,722,500**
Comparison estimate Cost / LF:	$ 852	$ 852	$ 852
Comparison estimate total:	**$ 10,793,531**	**$ 123,675,875**	**$ 142,563,702**
Delta (Estimate - Comparison):	**$ 2,131,909**	**$ 24,428,125**	**$ 28,158,798**
	16%	**16%**	**16%**

Estimated costs / LF for Brine Pipeline

30" Pipe and Installation Cost:	$	520
Excavation / Backfill:	$	85
Site and Pavement restoration / misc:	$	96
Subtotal:	$	701
General Contractor overhead, bond, etc:	$	105
Los Angeles Location Factor:	$	21
2019 - 2020 adjustment factor:	$	25
Comparison estimate total:	**$**	**852**

$ 852

Pipeline costs appear at least 15% higher than expected.

Salinity Treatment Plant Combined Analysis

	Alignment 3A	Alignment 5A	Alignment 5C
Plants plus Pipeline in estimate:	**$ 671,038,640**	**$ 806,217,200**	**$ 828,835,700**
Comparison Estimate Total:	$ 940,896,867	$ 1,053,779,211	$ 1,072,667,038
Delta (Estimate - Comparison):	**$ (269,858,227)**	**$ (247,562,011)**	**$ (243,831,338)**
	-40%	**-31%**	**-29%**

Plant costs for all Alignments appear significantly less than required, however, the brine pipeline costs appear higher than expected.

Environmental Review

Environmental Mitigation Analysis

	Alignment 3A	Alignment 5A	Alignment 5C
Quantity (Miles):	138	84	92
Cost / Mile:	$ 125,806	$ 128,859	$ 194,472
Environmental cost in estimate:	**$ 17,323,500**	**$ 10,785,500**	**$ 17,852,500**

Based on the Feasibility information provided, the environmental cost is agreed to and is expected to have a more in depth review within the next level of development.

Storage Review

Minimal quantative information provided, therefore assumptions shown below used for determination of reasonableness.
Per a note on page 8-3 of Black & Veatch 2018 Proposed Capital Improvement Program at the Vallecitos Water District - reservoir capital cost is $1.39 per gallon

40 MG Day Storage Tanks Analysis (Same for 3A, 5A, 5C)

	Unit Cost		Quantity	Total Cost
40 MG Day Storage Tank pricing in estimate	**$ 754,381.00**		40	**$ 30,175,240**

Comparable Pricing Analysis:	$/MG	% of 2 MG	MG	Price
RS Means, Prestressed, no foundation or other works	$ 589,500		2	$ 1,179,000
	$ 415,500	**70%**	6	$ 2,493,000
	$ 388,600	66%	10	$ 3,886,000
RS Means, Steel Tank, no foundation or other works	$ 574,000		2	$ 1,148,000
	$ 567,500	99%	6	$ 3,405,000
	$ 555,450	97%	10	$ 5,554,500
Texas Water Board Study 2017 costs (converted to 2020) tank only-no seismic:	$ 945,822		2	$ 1,891,644
Texas Water Board Study 2017 costs (converted to 2020) tank only-no seismic:	$ 634,316	**67%**	6	$ 3,805,899
Hauck Mesa Storage Tank Only, minor indirects (2.1 MG-2020):	$ 2,143,618		2.1	$ 4,501,598
Hauck Mesa Storage Tank site complete, no contingency (2.1 MG-2020):	$ 5,727,372		2.1	$ 12,027,481
6 MG Tank based on Hauck Mesa - tank only, minor indirects @ 70%:	$ 1,500,533		6	$ 9,003,196

Based on RS Means (Prestressed) and Texas Water Board Study, the unit cost of a 6 MG tank is approximately 70% of a 2 MG tank.
Using this approach, the unit cost of the Hauck Mesa TANK ONLY would result in $1,500,533 per MG which is comparable to the 2018 B&V Study showing a 2018 unit cost of $1.39 per gallon ($1.49 per gallon in 2020).
Per a B&V team discussion, their $30M total cost included piping, earthwork, etc…

	Unit Cost		Quantity	Total Cost
Prestressed Tank Price Analysis anticipating minor earthwork, piping, etc… required for the Storage Tanks				
Prestressed Storage Tank pricing based on info above (TANK ONLY):	$ 1,500,533			
Additional costs for earthwork, piping, etc… based on Hauck Mesa Estimate:	$ 285,714			
Subtotal:	$ 1,786,247			
San Diego to Los Angeles Location Factor:	$ 54,079			
No time adjustment factor needed (2020 base):	$			
Comparison estimate total:	**$ 1,840,326**		40	**$ 73,613,053**
Delta (Estimate - Comparison):	-144.0%			$ (43,437,813)

Prestressed Tank Price Analysis anticipating NO additional earthwork, piping, etc… required for the Storage Tanks				
Prestressed Storage Tank pricing based on info above (TANK ONLY):	$ 1,500,533			
Excluding costs for earthwork, piping, etc… based on Hauck Mesa Estimate:	$			
Subtotal:	$ 1,500,533			
San Diego to Los Angeles Location Factor:	$ 45,429			
No time adjustment factor needed (2020 base):	$			
Comparison estimate total:	**$ 1,545,962**		40	**$ 61,838,479**
Delta (Estimate - Comparison):	-104.9%			$ (31,663,239)

Estimate appears very low

900 ac-ft IID Operational Storage Analysis (Same for 3A, 5A, 5C)

	Unit Cost		Quantity	Total Cost
900 ac-ft IID Operational Storage cost in estimate:	**$ 56,250,000.00**		1	**$ 56,250,000**

Estimated based on constructing new facility SW of Lake Turner. Quantities determined using contour information from Google Earth

2019 RS Means basis, Earthen Embankment Section:	$ 23,613,333		
2019 RS Means basis, 18" Riprap Protection both sides:	$ 6,296,767		
Roadway Realignment , inc embankment:	$ 8,316,000	Anticipating significant embankment / excavation, wall work	
Misc Structures:	$ 7,500,000		
Subtotal:	$ 45,726,101		
General Contractor overhead, bond, etc:	$ 6,858,915		
Los Angeles Location Factor:	$ 6,467,957		
2019 - 2020 adjustment factor:	$ 1,754,804		
Comparison estimate total:	**$ 60,807,777**	1	**$ 60,807,777**
Delta (Estimate - Comparison):	-8.1%		$ (4,557,777)

Estimate appears reasonable, however, no details provided for exact location or design of dam. VERY rough assumptions used for analysis

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Dam Raise - Lake Wohlford Analysis (Alignment 3A Only)

	Unit Cost		Quantity	Total Cost
Dam Raise - Lake Wohlford cost in estimate:	**$ 65,000,000.00**		1	**$ 65,000,000**

Estimated based on constructing a new dam structure immediately to west of existing.

2019 RS Means basis, Earthen Embankment Section:	$ 25,760,000		
2019 RS Means basis, 18" Riprap Protection both sides:	$ 6,869,201		
Roadway Realignment , inc embankment:	$ 5,940,000	Anticipating significant embankment / excavation, wall work	
Wetland mitigation:	$ 9,000,000	Based off of information from 4/28/29 San Diego Union-Tribune Report	
Subtotal:	$ 47,569,201		
General Contractor overhead, bond, etc:	$ 7,135,380		
Los Angeles Location Factor:	$ 6,728,663		
2019 - 2020 adjustment factor:	$ 1,825,536		
Comparison estimate total:	**$ 63,258,780**	1	**$ 63,258,780**
Delta (Estimate - Comparison):	2.7%		$ 1,741,220

Estimate appears reasonable, however, no details provided for exact location or design of dam. VERY rough assumptions used for analysis

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Inlet/Outlet Structure Lake Wohlford Analysis (Alignment 3A Only)

	Unit Cost		Quantity	Total Cost
Inlet/Outlet Structure - Lake Wohlford cost in estimate:	**$ 20,000,000.00**		1	**$ 20,000,000**

Estimate based off of comparable TX study inlet structures and anticipated section for outlet structure

Inlet structure - based off of TX Study, 100' HD:	$ 12,000,000		
Concrete Outlet Structure:	$ 5,000,000		
Subtotal:	$ 17,000,000		
General Contractor overhead, bond, etc:	$ 2,550,000		
Los Angeles Location Factor:	$ 2,404,650		
2019 - 2020 adjustment factor:	$ 652,399		
Comparison estimate total:	**$ 22,607,049**	1	**$ 22,607,049**
Delta (Estimate - Comparison):	-13.0%		$ (2,607,049)

Estimate appears reasonable, however, no details provided design of inlet/outlet structure. VERY rough assumptions used for analysis

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Office & Warehouse Review

Quantities and configuration for the warehouse, office, and storage yard cannot be confirmed, therefore the quantities provided were used for determination of reasonableness.

Warehouse Analysis (Same for 3A, 5A, 5C)

	Unit Cost	Quantity	Total Cost
Warehouse Unit cost in estimate:	**$ 260.00**	10,000	**$ 2,600,000**
2019 RS Means SF cost for Precast exterior warehouse space:	$ 203.45		
Perimeter adjustment for rectangular building:	$ 9.65		
Los Angeles Location Factor:	$ 26.21		
2019 - 2020 adjustment factor:	$ 7.11		
Square foot comparison estimate total:	**$ 246.42**	10,000	**$ 2,464,226**
Delta (Estimate - Comparison):	5.2%		$ 135,774

Since no additional information is available, this pricing appears reasonable

Office Analysis (Same for 3A, 5A, 5C)

	Unit Cost	Quantity	Total Cost
Office Unit cost in estimate:	**$ 380.00**	2,000	**$ 760,000**
2019 RS Means SF cost for brick veneer office space:	$ 322.10		
Perimeter adjustment for rectangular building:	$ 14.85		
Los Angeles Location Factor:	$ 41.44		
2019 - 2020 adjustment factor:	$ 11.24		
Square foot comparison estimate total:	**$ 389.64**	2,000	**$ 779,278**
Delta (Estimate - Comparison):	-2.5%		$ (19,278)

Since no additional information is available, this pricing appears reasonable

Storage Yard Analysis (Same for 3A, 5A, 5C)

	Unit Cost	Quantity	Total Cost
Storage Yard Unit cost in estimate:	**$ 125.00**	20,000	**$ 2,500,000**
2019 RS Means Site Grading (convert to SF):	$ 0.25		
Exc / haul off - est rock, 5' avg delta (Hauck Mesa conv loc) (convert to SF):	$ 2.97		
2019 RS Means 8" Crushed stone base (convert to SF):	$ 2.01		
2019 RS Means Site paving 10" thick, small area w/ rebar (convert to SF):	$ 7.75		
Curb & Gutter, markings, parking bars (convert to SF):	$ 1.68		
Security Fencing, security (Hauck Mesa, convert location) (convert to SF):	$ 10.78		
2019 RS Means Site Utilities, Lighting, Utility establishment (convert to SF):	$ 33.40		
2019 RS Means Site Development Landscaping, Misc (convert to SF):	$ 5.35		
Site mobilization (convert to SF):	$ 11.25		
Subtotal:	$ 75.44		
General Contractor overhead, bond, etc:	$ 26.40		
Los Angeles Location Factor:	$ 12.22		
2019 - 2020 adjustment factor:	$ 3.39		
Square foot comparison estimate total:	**$ 117.45**	20,000	**$ 2,349,025**
Delta (Estimate - Comparison):	6.0%		$ 150,975

Equipment / Tools	$ 500,000
Vehicles	$ 400,000

Since no additional information is available, this pricing appears reasonable

Appendix B. SDCWA Documents Provided for Financial Analysis Review

3Ax (nor) RCS Alignment Scheduling 6 years	3/17/2020
5A (mid) RCS Alignment Scheduling 10 years	3/17/2020
5C (sou) RCS Alignment Scheduling 9 years	3/17/2020
BOE Regional Conveyance Project	1/23/2020
Confidential RCS Cost 02 20 2020 WQ Soft Cost Inputs	2/20/2020
RCS Risk Register	Mod 3/2020
SDCWA RCS Cost Estimate – Summary Tables	Mod 3/2020
Confidential Attorney – Client Privilege RCS Draft Geotechnical Desktop Study	12/4/2019
Confidential RCS 5.0 Power Supply Alternatives	1/2020
Confidential Treatment, Blending, and Brine Management 12 23 2019	12/2019
SDCWA RCSS Draft Chapter 2.0 RCS Operations and Sizing	11/2019
SDCWA RCSS Draft Chapter 3.0 Aqueduct Operations and Integration of RCS	11/2019
SDCWA RCSS Draft Chapter 6.0 Risk, Cost Opinions and Economic Comparisons	2/2020
CVWD CCLP Lining Canal Section Only	4/13/2020