Appendix B: Parameter Assumptions for the CBP Alternatives Economic Analysis

Chino Basin Program Economic Analysis - General Assumptions

Note#	Assumption Description	Value	Notes
1.0 Chino Basin Program Funding Assumptions			
1.1	**Grants & Financing by Others**	***$212.0 mil***	2019 Total Grants and Financing by Others (no escalation or interest)
1.1.1	- Prop 1 WSIP	$212.0 mil	2019 Investment Amount (no escalation or interest)
1.1.2	- WIIN Act Grant	-	2019 Grant Amount (no escalation or interest)
1.1.3	- Title XVI USBR Grant	-	Grant Amount (no escalation or interest)
1.1.4	- SWRCB Grant	-	Grant Amount (no escalation or interest)
1.1.5	***Local Funds (Connection Fees, Property Tax)***	**-**	
1.1.5.1	- One-Water and Wastewater Connection Fees	-	2019 Estimate (no escalation or interest)
1.1.5.2	- Property Taxes	-	2019 Estimate (no escalation or interest)
1.1.5.3	- Other Local Funds	-	
1.2	**Prop 1 Water Exchange Assumptions**		
1.2.1	- WSIP Investment Amount	$212.0 mil	Prop 1 WSIP Investment Amount conditionally awarded by CA Water Commission
1.2.2	- Average Annual Exchange Quantity	15,000 AF	Average Annual State Water Project Exchange per WSIP Application (without carriage water savings)
1.2.3	- Prop 1 Water Exchange Period	25 years	Period during which Water Exchanges will occur per WSIP Application
1.2.4	- Number of Call Events	7.5	Average number of Call Events over Exchange Period per WSIP Application
1.2.5	- Assumed SWP Carriage Water Savings Allocated to CBP	20%	SWP Delta Operations carriage water savings percentage allocated to CBP reducing total exchange obligation.
1.3	**Design Assumptions**		
1.3.1	Maximum AWPF/PUT Capacity	1.25 TAFM	Maximum AWPF and Injection Well Capacity for Program Alternatives (15.0 TAFY)
2.0 Economic Analysis			
2.1	Base Year for Capital and O&M Cost	2019	Base year of the capital and O&M cost estimates.
2.2	Base Year for NPV Calculations	2019	Base year for Net Present Value analysis.
2.3	Project Life Duration	50 years	Project life (after construction) for Net Present Value analysis.
2.4	**Discount, Inflation, and Escalation Rates**		
2.4.2	- Economic Discount Rate	2.50%/yr	Economic Discount Rate (2.5% Default - 2021 Federal Water Project Discount Rate)
2.4.3	- Treatment of Inflation based on Analysis Type	Economic (Remove Inflation)	Adjustment to remove general inflation in estimates for Economic Analysis
2.4.4	- General Inflation Rate	2.50%/yr	General annual inflation, used for financial analysis. (Removed from specific escalation rates for economic analysis.)
2.4.5	- O&M Escalation Rate	0.00%/yr	Annual escalation rate for O&M costs relative to inflation.
2.4.6	- Capital Cost Escalation Rate	0.00%/yr	Annual escalation rate for capital costs relative to inflation.
2.5	**Construction Cost Markups**		
2.5.1	- Capital Cost Contingency	30%	Contingency for unknown costs to be added to the project cost.
2.5.2	- Engineering, Admin & CM	28%	Engineering, Admin, and CM cost to be added to the project cost.
2.6	**Project Replacement Cost**		
2.6.3	- Mech./Electrical Replacement Percent	60%	Percentage of capital cost used as replacement cost estimate.
2.6.4	- Mech./Electrical Replacement Period	25 years	Life cycle of mechanical and electrical equipment.
2.6.5	- Infrastructure Replacement Percent	60%	Percentage of capital cost used as replacement cost estimate.
2.6.6	- Infrastructure Replacement Period	50 years	Life cycle of infrastructure (e.g., pipe lines).
2.6.7	- Well Replacement Percent	40%	Percentage of capital cost used as replacement cost estimate.
2.6.8	- Well Replacement Period	25 years	Life cycle of well equipment.
2.6.9	- AWPF Replacement Percent	40%	Percentage of capital cost used as replacement cost estimate.
2.6.10	- AWPF Replacement Period	25 years	Life cycle of replacement components of the plant.
2.6	**Construction Loan Terms**		
2.6.1	- Loan Period	30 years	Payback period of capital loans.
2.6.2	- Loan Interest	2.00%/yr	Interest rate on capital loans.
3.0 PUT and TAKE Alternatives Assumptions			
3.1	**Project Schedule**		
3.1.1	- Design and Construction Start Year	2021	Start year of the predesign, design, and construction phase. (Input by Project Alterative in Program_Alts tab)
3.1.2	- Project Design & Construction Period	7 years	Estimated number of years to complete construction of project.

Chino Basin Program Economic Analysis - General Assumptions

Note#	Assumption Description	Value	Notes
3.1.3	- Project Life Cycle Start Year	2028	Start year of project life-cycle
3.2	**Construction Cost Extrapolation Parameters for Secondary Project Alternatives**		
3.2.1	- Exponent Factor for Economies of Scale Cost Extrapolation	0.60	$C_1/C_2 = C1(X_1/X_2)^{\alpha}$ where α denotes the scale coefficient, C denotes Cost, and X denotes capacity.
3.2.2	**Put Alternative Cost Scaling**		
3.2.2.1	-Base Alternative for Put Scaling	Put_5	Put alternative from PDR to use for construction cost scaling of secondary alternatives.
3.2.2.2	-Base Put Alternative Physical Capacity	15 TAFY	Physical Capacity of Base Put Alternative for Scaling.
3.2.2.3	-Base Put Alternative Throughput	15 TAFY	Throughput of Base Put Alternative for Scaling.
3.2.3	**Take Alternative Cost Scaling**		
3.2.3.1	-Base Alternative for Take Scaling	Take_7b	Take alternative from PDR to use for construction cost scaling of secondary alternatives.
3.2.3.2	-Base Take Alternative Capacity	40 TAFY	Physical Capacity of Base Take Alternative for Scaling.
4.0 Metropolitan Water Supply Costs & Benefits Assumptions			
4.1	**Pre-Delivery Terms**		
4.1.1	Pre-delivery Benefits and Costs	Negotiated Credit by MWD	Options for valuing predelivery water to MWD
4.1.2	Negotiated Predelivery MWD Credit Amount (in NPV Year $s)	$150/AFY	Credit/Payment by MWD for Predelivered Water in NPV Year $ (Consider energy savings and reoperation costs)
4.1.3	Negotiated Predelivery MWD Credit Escalation	2.50%	Annual Escalation of Credit by MWD for Predelivered Water (Includes inflation)
4.2	**Pump-In Terms**		
4.2.1	Pump-In Delivery Benefits and Costs	Negotiated Credit by MWD	Options for valuing Direct Delivery water to MWD
4.2.2	Negotiated Pump Back Delivery MWD Credit Amount (in NPV Year $s)	$250/AFY	Credit/Payment by MWD for Direct Delivery Water in NPV Year $
4.2.3	Negotiated Pump Back Delivery MWD Credit Escalation	2.50%	Annual Escalation of Credit by MWD for Direct Delivery Water (Includes inflation)
4.3	**In Lieu Terms**		
4.3.1	In Lieu Delivery Benefits and Costs	MWD TW Rate	Options for valuing In Lieu Delivery water in place of MWD deliveries
4.3.2	Negotiated In Lieu Delivery MWD Credit Amount (in NPV Year $s)	$800/AFY	Credit/Payment by MWD for In Lieu Delivery Water in NPV Year $ (Only used if negotiated rate option is selected in 5.2.3.1)
4.3.3	Negotiated In Lieu Delivery MWD Credit Escalation	2.50%	Annual Escalation of Credit by MWD for Direct Delivery Water (Includes inflation)
4.4	**Demand Offset Terms**		
4.4.1	Demand Offset Benefits	MWD TW Rate	Options for valuing Demand Offset of MWD deliveries
4.5	**Metropolitan Water Rate Assumptions - Assume Inflation is included in these escalation rates**		
4.5.1	Full Service (Tier 1) Untreated Rate Increase (Until 2050)	3.5%/yr	Escalation after 2028 - Use published rates for 2018-2028
4.5.2	Full Service (Tier 1) Treated Rate Increase (Until 2050)	3.5%/yr	Escalation after 2028 - Use published rates for 2018-2028
4.5.3	Readiness-to-Serve Charge Increase (Until 2050)	3.5%/yr	Escalation after 2028 - Use published rates for 2018-2028
4.5.4	Capacity Charge Increase (Until 2050)	3.5%/yr	Escalation after 2028 - Use published rates for 2018-2028
4.5.5	System Access Rate Increase (Until 2050)	3.5%/yr	Escalation after 2028 - Use published rates for 2018-2028
4.5.6	Water Stewardship Rate Increase (Until 2050)	3.5%/yr	Escalation after 2028 - Use published rates for 2018-2028
4.5.7	Wheeling Service Rate Increase (Until 2050)	3.5%/yr	Escalation after 2028 - Use published rates for 2018-2028
4.5.8	All MWD Rates Escalation after 2050	3.0%/yr	Escalation for all rate after 2050
4.5.9	Readiness-to-Serve Percentage	3.75%	FY 2019/20 MWD Rate Structure Administrative Procedures Handbook
4.5.10	Capacity Charge Flow Rate	148 cfs	FY 2019/20 MWD Rate Structure Administrative Procedures Handbook
4.5.11	IEUA MWD Allocation	58,335 AF	Rolling Ten-Year Average Firm Deliveries FY08/09 - FY17/18
4.5.12	Water Loss Factor	5.0%	Percentage of treated water distribution losses in the MWD system.
5.0 NRW Disposal Cost			
5.1	- Average Disposal Rate	$940/MG	Volumetric charge for monthly average discharge flow.
5.2	- Peak Disposal Rate	$357/MG	Volumetric charge for peak monthly discharge flow.
5.3	- COD Strength Rate	$166/Klb	COD load charge (per 1,000 lb. dry weight).
5.4	- TSS Strength Rate	$470/Klb	TSS load charge (per 1,000 lb. dry weight).
5.5	- Agency O&M and CIP Charges	$28.25/CU	Connection fee per NRWCU/Month.
5.6	*NRW Disposal Cost Projections*		
5.6.1	- Base Year of Disposal Rates	2019	Base year for the listed NRW Disposal Cost rates.
5.6.2	- Escalation Rate of Disposal Cost	2.5%/yr	Estimated annual increase in the NRW Disposal rates (including inflation).

Chino Basin Program Economic Analysis - General Assumptions

Note#	Assumption Description	Value	Notes
5.7	**PUT NRW Assumptions**		
5.7.1	- NRW Capacity Units	2,602 CU	AWPF's assessed NRWCUs
5.7.2	- Average Disposal Volume	31.2 MG	Average month NRW discharge flow.
5.7.3	- Peak Disposal Volume	0.0 MG	Peak month NRW discharge flow.
5.7.4	- COD Load	7939 lb	Monthly COD Load (dry weight).
5.7.5	- TSS Load	33 lb	Monthly TSS Load (dry weight).
5.7.6	- Annual NRW Cost	$1,251,000/yr	Estimated 2019 NRW brine disposal cost for 15 TAFY AWPF (not including NRWSCU Acquistion).
6.0 Imported Recycled Water Resources Assumptions			
6.1	**JCSD RW Supply to 930 PZ (WRCWRA)**		
6.1.1	**Project Schedule**		
6.1.1.1	- Design and Construction Start Year	2024	Start year of the predesign, design, and construction phase. (INPUT by Alternative in Program_Alts tab.)
6.1.1.2	- Project Design & Construction Period	4 years	Estimated number of years to complete construction of the project.
6.1.1.3	- Project Life-Cycle Start Year	2028	Start year of project life-cycle (≥ Project Start Year + const. period).
6.1.2	**Project Cost**	**$26.16 mil**	Total Project Capital Cost (Updated 3/2021)
6.1.2.1	- Pipe Lines	$16.08 mil	Cost of pipe line from WRCRWA plant to the 930 PZ
6.1.2.2	- Pumping Station	$4.36 mil	Two Pumping Station - at WRCRWA Plant and at Heros Park
6.1.2.3	- Eng., Admin & CM Cost	$5.72 mil	Engineering, administration and CM cost.
6.1.2.4	- Land Acquisition	$0.00 mil	Land acquisition cost for pumping stations.
6.1.3	**Calculated Annual Cost**		
6.1.3.1	- Infrastructure Replacement	$114,070/yr	Infrastructure replacement cost.
6.1.3.2	- Mechanical/Electrical Replacement	$81,673/yr	Mechanical and electrical replacement cost.
6.1.3.3	- O&M Cost	$663,000/yr	System operation and maintenance cost. (Costs from CBP PUT 5 O&M Breakdown)
6.1.3.3.1	- O&M Cost Variable	$537,000/yr	System operation and maintenance cost.
6.1.3.3.2	- O&M Cost Fixed	$126,000/yr	System operation and maintenance cost.
6.1.4	**Imported RW Acquisition**		
6.1.4.1	Annual Import	2.50 TAFY	Annual average volume of imported recycled water (RW) - year round.
6.1.4.2	Unit RW Cost Base Year	2019	Base year of RW Purchase Agreement Terms.
6.1.4.3	Unit RW Cost Increase	2.50%/yr	Annual escalation in RW Cost per IEUA-JCSD Agreement (includes inflation)
6.1.4.4	RW Purchase Rates	$225.00/AF	Unit RW Rate per IEUA-JCSD Agreement
6.2	**Riverside RW Project**		
6.2.1	Capital Investment in RPU Project	$0.00 mil	Investment amount in Riverside Public Utility project.
6.2.2	**Investment Schedule**		
6.2.2.1	- Year of Project Investment	2027	Year of investment in the project (INPUT by Alternative Selection in BC_Analysis)+ 3 years
6.2.2.2	- Project Life-Cycle Start Year	2028	Start year of project life-cycle (≥ Project Investment Year).
6.2.3	**Imported RW Acquisition**		
6.2.3.1	Annual Recycle Water Allocation	-	Annual average volume of recycled water allocated as a IEUA Benefit.
6.2.3.2	Unit RW Cost Base Year	2019	Base year of RW Purchase Agreement Terms.
6.2.3.3	Unit RW Cost Increase	0.00%/yr	Annual escalation in RPU RW Cost per IEUA-RPU Agreement (includes inflation)
6.2.3.4	RW Purchase Rates	$0.00/AFY	Unit RW Rate per IEUA-JCSD Agreement
6.3	**Rialto RW Supply to 1158 PZ**		
6.3.1	**Project Schedule**		
6.3.1.1	- Design and Construction Start Year	2024	Start year of the predesign, design, and construction phase.
6.3.1.2	- Project Design & Construction Period	4 years	Number of years to complete the project.
6.3.1.3	- Project Life-Cycle Start Year	2028	Start year of project life-cycle
6.3.2	**Project Cost**	$52.83 mil	Total Project Capital Cost (Updated 3/2021)
6.3.2.1	- Pipe Lines	$38.47 mil	Cost of pipe line from WRCRWA plant to the 930 PZ
6.3.2.2	- Pumping Station	$2.80 mil	Two Pumping Station - at WRCRWA Plant and at Heros Park
6.3.2.3	- Eng., Admin & CM Cost	$11.56 mil	Engineering, administration and CM cost.

Chino Basin Program Economic Analysis - General Assumptions

Note#	Assumption Description	Value	Notes
6.3.2.4	- Land Acquisition	$0.00 mil	Land acquisition cost for pumping stations.
6.3.2.5	- Santa Ana River Well	$0.00 mil	Allowance for a well adjacent to the Santa Ana River per Agreement.
6.3.3	**Calculated Annual Cost**		
6.3.3.1	- Infrastructure Replacement	$272,903/yr	Infrastructure replacement cost.
6.3.3.2	- Mechanical/Electrical Replacement	$52,450/yr	Mechanical and electrical replacement cost.
6.3.4	- O&M Cost	$444,000/yr	System operation and maintenance cost.
6.3.4.1	- O&M Cost Variable	$323,000/yr	System operation and maintenance cost.
6.3.4.2	- O&M Cost Fixed	$121,000/yr	System operation and maintenance cost.
6.3.4	**Imported RW Acquisition**		
6.3.4.1	*Annual Import*		
6.3.4.1.1	- Summer Import	3.50 TAFY	Annual average volume of imported water during the summer.
6.3.4.1.2	- Winter Import	-	Annual average volume of imported water during the winter.
6.3.4.2	Unit RW Cost Base Year	2019	Base year of RW Purchase Agreement Terms.
6.3.4.3	Unit RW Cost Increase	2.50%/yr	Annual increase in Rialto RW Cost per IEUA-Rialto Agreement (Assume includes Inflation)
6.3.4.4	Summer RW Purchase Rates	$225.00/AF	Summer rates applicable from 2028 to 2078.
6.3.4.5	Winter RW Purchase Rates	$300.00/AF	Winter rates applicable from 2028 to 2078.
6.4	**Additional Energy Costs for RW Transport in IEUA System**		
6.4.1.1	- Project Life-Cycle Start Year for CBP Alternatives	2028	Start year of project life-cycle (Use project start year for Rialto - CBP)
6.4.2	- Construction Cost	$0.00 mil	No Capital Costs in current formulation.
6.4.3	- O&M Cost	-	O&M Data for Recycled Water in Cbp_PUTCosts Tab.
6.5	**CBP PUT Alternative for RW O&M Costs**		
6.5.1	CBP PUT Alternative for RW O&M Costs Data	1	Source of O&M Data for Imported Recycled Water Projects (in Cbp_PUTCosts Tab)
7.0 Water Management Benefit Assumptions			
7.1	**Water Banking Analysis Assumptions**		
7.1.1	**Modeling Assumptions**		
7.1.1.1	CalSim Hydrology for Banking Ops	CALSIM 2030	Selected CALSIM Hydrology to use for Banking Analysis.
7.1.2	**Water Value Ratios by Water Year Type**	Custom	Ratios for WY Type Value vs. Average Annual Value used for Banking Benefits
7.1.2.1	- Dry Year Value Ratio	1.250	Dry Year Value Ratio for Cost Ratio Set 'Custom'.
7.1.2.2	- Critical Year Value Ratio	1.500	Critical Year Value Ratio for Cost Ratio Set 'Custom'.
7.1.3	**Water Value Assumptions**		
7.1.3.1	- PUT Water Value to Cost Ratio	0.80	Imported water value relative to the MWD Tier 1 Untreated Water Rate.
7.1.3.2	- TAKE Water Value to Cost Ratio	1.00	Banked water value relative to the MWD Tier 1 Treated Water Rate.
7.1.3.2	-Water Value Escalation	0.00%/yr	Escalation for water supply value for Dry and Critical Year Banking Delivery above Inflation and MWD Rate escalation.
7.2 Emergency Water Supply Assumptions			
7.2.1	Value of Emergency Water	4 X MWD Tier 2 Untreated Rate	The estimated value of the Emergency Water Supply (see notes)
7.2.3	Annual Probability of Emergency Event	4.20%	The estimated annual probability the an "All Hazard" event could occur.
7.2.4	Emergency Water Escalation Rate	0.00%/yr	Escalation of Emergency Water valuations above general inflation rate, MWD escalation rates, and Water Value Escalation Rate.
7.3 Water Quality Improvement Assumptions			
7.3.1	WQ Single Purpose Alternative (Initial Phase)	NWSIP:Put_A|Take_0|NB-0	Alternative used to establish single purpose WQ Project Cost - Initial Phase used for 1st level Water Quality benefits.
7.3.2	WQ Single Purpose Alternative (Secondary Phase)	NWSIP:Put_AP|Take_0|NB-0	Alternative used to establish single purpose WQ Project Cost - Secondary Phase used for 2nd level Water Quality benefits.
7.4 Subsidence Avoidance Assumptions			
7.4.1	Avoided Groundwater Delivery Cost	$250/AF	Estimated cost to deliver groundwater. (Avoided cost when replaced by MWDSD deliveries.)
7.4.2	Effectiveness Factor	50%	Assumed effectiveness of imported water supplies replacing groundwater extractions in avoiding subsidence.
7.5 Ecosystem Improvement Assumptions			
7.5.1	Alternative Ecosystem Valuation Methodology	Physical Benefit	Approach for valuing Base Year ecosystem benefits
7.5.2	CWC Ecosystem Benefit Valuation Base Year	2015	Date of Ecosystem Improvement Valuations provided by CWC.
7.5.3	Physical Benefit Escalation Rate	0.0%/yr	Escalation of Ecosystem Valuations above general inflation rate.
7.5.4	Include Water Transfer Option Cost	TRUE	Include Water Transfer Option Cost for least Cost Alternative Methodology
7.5.5	Transfer Cost Escalation Rate	0.0%/yr	Escalation of Transfer Water Costs above general inflation rate.
7.6 Water Shortage Avoidance Assumptions			
7.6.1	Reduction Factor for Shortage Estimates	50%	Factor for reducing MWD IRP Scenario D shortages for melding with Scenario A (no shortage) estimates.
8.0 No Action Alternative Assumptions			
8.1	Year New Imported Water Supply is Required	2031	Assumed date new imported water supply is required due to groundwater quality degradation.
8.2	Option for Volume of Required Imported Water	UWMP Values	Select static value of impacted RW water or future interpolated values from UWMP.

Chino Basin Program Economic Analysis - General Assumptions

Note#	Assumption Description	Value	Notes
8.2	Static Volume of Required New Imported Water Supply	35 TAFY	Required annual volume of new imported water supply for use if "Static Amount" is selected in 8.2.
8.3	Cost Basis of New Imported Water Supply	MWD UW Rate +RTS +CC	MWDSC rate basis for required new imported water supply.