Methodology Used to Prepare Capital and Operation and Maintenance Cost Opinions of the Proposed Recharge Facilities

This Section of Appendix D describes the method used to compute the capital cost, operations and maintenance (O&M) costs, and the unit cost of new recharge at each proposed recharge facility.

The financial analysis assumptions, unit construction costs and operations and maintenance (O&M) unit costs are listed in Table D-7. The financial assumptions and construction unit costs listed in Table D-7 were developed in the 2010 Recharge Master Plan. The O&M unit costs were developed by IEUA based on their experience in the Chino Basin Facilities Improvement Project (CBFIP) and were provided to WEI in February 2013. Some of the unit costs used in the 2010 RMPU were estimated from the review and adjustment of construction bids received from the CBFIP bid packages. The CBFIP bid packages were prepared in July of 2003 and were escalated to 2009 values using the Bureau of Reclamation Construction Cost Trend Index from July 2003 to July 2009[1]. The remaining unit construction costs were developed from discussions with contractors and suppliers. IEUA is in the process of updating the unit construction costs in Table D-7 to current cost values.

Table D-8 is an example of a cost opinion for the 2010 RMPU Wineville Basin Project. The proposed improvements of the Wineville Basin include the installation of a gate for the low-elevation outlet, replacement of the embankment with a dam, and construction of a pneumatic gate on the spillway. The capital cost was estimated to be about $5,990,000, and the annual cost was estimated to be about $390,000 exclusive of operations and maintenance. The current and potential recharge volumes at infiltration rates of 0.25 and 0.5 ft/day at Wineville Basin were estimated by WEI based on its recharge model for the Chino Basin drainage system. To be conservative, the new yield was estimated at 90 percent of the model-estimated yield[2]. The difference between the pre-project and potential project recharge is the new yield generated by the proposed improvements. The annual O&M cost of the improved Wineville Basin is calculated by multiplying the new yield by the basin O&M unit cost from Table D-7. In this example, the annual O&M unit cost was assumed to be $37 per acre foot which corresponds to a basin that is primarily used to capture storm water. The total unit cost of new yield (recharge) was calculated by dividing the sum of the annual cost of improvements and O&M by the new yield. In the example shown in Table D-8, the unit cost of new recharge was estimated to be $217 and $177 per acre-ft for infiltration rates at 0.25 and 0.5 ft/day, respectively.

[1] Applying this approach from July of 2009 to October 2012 suggests that construction costs have increased about 6 percent from the values used in the 2010 RMPU.

[2] This is consistent with the evaluation criteria described in Section 7.

Table D-7
Summary of Unit Costs

Items	Unit	Unit Cost	Source
Financial Analysis Assumptions			
Mobilization @ 3% Other Direct Construction Cost	Rate	3%	2
Contingency @ 25%	Rate	25%	1
Engineering, Construction Inspection and Contract Admin. @ 10%	Rate	10%	2
Amortization Rate	Rate	5%	1
Amortization Period	Years	30	1
Conveyance Facilities			
Pipelines installed	$/in-dia/lf	$15	1
Booster Pump Station	$ /HP	$5,000	1
18" Diameter	Lin. Ft.	$249	2
24" Diameter	Lin. Ft.	$294	2
30" Diameter	Lin. Ft.	$338	2
36" Diameter	Lin. Ft.	$383	2
42" Diameter	Lin. Ft.	$428	2
Recharge Basin Facilities			
36" Dia. RCP	Lin. Ft.	$270	2
48" Dia. RCP	Lin. Ft.	$335	2
60" Dia. RCP Outlet Conduit	Lin. Ft.	$600	2
8' x 10' RCB	Lin. Ft.	$830	2
Basin Discharge Concrete Structure	Cu. Yds.	$1,200	2
Basin Excavation & Haul Offsite	Cu. Yds.	$13	2
Berm Overflow Concrete Structure	Cu. Yds.	$1,200	2
Channel Demolition	Cu. Yds.	$55	2
Channel Demolition	Cu. Yds.	$24	2
Coarse Drain Material	Ton	$23	2
Compacted Embankment	Cu. Yds.	$6	2
Concrete Channel & Weir	Cu. Yds.	$500	2
Concrete Inlet Spillway Structure	Cu. Yds.	$700	2
Concrete Spillway Structure	Cu. Yds.	$800	2
Concrete Structure	Cu. Yds.	$1,200	2
Excavation	Cu. Yds.	$5	2
Foundation Excavation	Cu. Yds.	$3	2
Interior Berm Compacted Fill	Cu. Yds.	$6	2
Interior Berm Excavation	Cu. Yds.	$3	2
Modify Channel for Conduit Inlet	Cu. Yds.	$1,200	2
Replace Compacted Fill	Cu. Yds.	$15	1
Mass Excavation	Cu. Yds.	$10	1
Fine Grading	Cu. Yds.	$15	1
Perimeter Fence	Lin. Ft.	$15	1
Instrumentation	Lump Sum	$100,000	1
Operations and Maintenance			
Basins Recharge SW/IW/RW	$/acre-ft	$24	3
Basins Recharge SW/RW	$/acre-ft	$37	3
Pipelines - general	$/mile	$4,000	1
Pump Stations - general	% construction cost	2%	1
Misc. well maintenance	$/year/well	25,000	1

1) From the 2010 RMPU Technical Memorandum, Black & Veatch and WEI, March 19, 2009
2)From the 2010 RMPU Section 5, Wagner & Bonsignore and WEI, June 2010. Cost estimates dated July 2009 used the Bureau of Reclamation Construction Cost trend to compare July 2003 and July 2009 prices.

3) Per Andy Campbell of IEUA, 2/11/2013.

Table D-8
Cost Opinion for the 2010 RMPU Wineville Project

		Quantity	Unit	Unit Cost	Total Cost
Direct Construction Costs					
1	Mobilization @ 3% Other Direct Construction Cost	1	Job	Lump Sum	$127,000
2	Compacted Embankment				
	Foundation Excavation	122,000	Cu. Yds.	$3.00	$366,000
	Compacted Embankment	122,000	Cu. Yds.	$6.00	$732,000
3	Basin Spillway/Discharge Structure				
	Spillway Gate	1	Job	$720,000	$720,000
	Concrete/Building Components	1	Job	$1,038,000	$1,038,000
4	Basin Cleaning and Contouring				
	Basin Excavation	110,000	Cu. Yds.	$12.50	$1,375,000
	Subtotal Direct Construction				**$4,358,000**
	Contingency @ 25%				**$1,089,500**
	Total Construction				**$5,447,500**
Engineering and Administration Costs					
	Engineering, Construction Inspection and Contract Admin. @ 10%				$545,000
	Total Engineering and Administration				**$545,000**
Total Estimated Cost					**$5,992,500**
Total Estimated Cost - Rounded					**$5,990,000**
Annual Cost - 30 Years @ 5% Interest					**$389,800**

Description	0.25 ft/day Infiltration Rate	0.5 ft/day Infiltration Rate
Storm Water Recharge		
Current Recharge (acre-ft/yr)	176	346
Potential Recharge @ 90% of model estimate (acre-ft/yr)	2,337	3,127
New Yield (acre-ft/yr)	**2,161**	**2,781**
Annual Cost of Improvements and O&M		
Annualized Capital Cost	$389,800	$389,800
Basin O&M from New Yield	$79,582	$102,385
Total Annual Cost of Improvements and O&M	**$469,382**	**$492,185**
Total Unit Cost of New Recharge ($/acre-ft)	**$217**	**$177**