

# 10.0 Implementation Period Costs

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During 2007, a project configuration including an off-channel storage facility at the Pierce Ranch in Wharton County was selected for further study. While project yield, diversion rates, and other technical aspects have yet to be determined, two variations of the project were included in this PVA. In previous PVAs, cost estimates were provided for project configurations yielding 150,000 acre-feet to the San Antonio area, the maximum that could be delivered per the agreement between LCRA and SAWS. The 2007 PVA estimates costs for two project configurations representing a range lower than the maximum; one that would deliver 95,000 acre-feet per year and one that would deliver 120,000 acre-feet per year. The final yield of the project has not been determined; these scenarios were studied to provide greater understanding of the range of project yields.

Using the state's regional planning cost methodology (annualized cost model) and second quarter 2007 prices, the current project cost estimates to deliver treated water to the SAWS system range from \$1,957 to \$1,876 per acre-foot per year, for 95,000 and 120,000 acre-feet, respectively. When the estimated costs of integrating the water into SAWS distribution system are included, the annual costs are projected to range from \$2,253 to \$2,161 per acre-foot.

The project unit cost estimates in the 2007 PVA are higher than those included in the 2006 PVA. The 2007 costs were updated to include the more current information including:

- Costs are presented for two yields (95,000 and 120,000 acre-feet per year of water) delivered at a constant rate to SAWS using the annualized cost method, which is a decrease from 150,000 acre-feet per year in the 2006 PVA. A description of this methodology is outlined in this section of the PVA. Costs represent total costs of all facilities that will be constructed by both SAWS and LCRA, including the costs of distributing treated water throughout SAWS' existing delivery system.
- The selection of the storage facility site in Wharton County. Site specific land costs including royalty payments are included in this estimate as compared to previous years where general land values were used in the estimate.
- Increased diversion capacity from 1,800 cfs to 2,500 cfs to 6,000 cfs for delivery of raw water diverted from the Colorado River to off-channel storage that will deliver 95,000 acre-feet per year and 120,000 acre-feet per year to SAWS, respectively
- Engineering estimates for various components such as size and depth of off-channel storage facilities, pipeline lengths and diameters, and treatment capacity based on these capacities
- More specific cost estimates for transmission, terminal storage, and treatment for delivery of finished (treated) water to SAWS' distribution system
- Additional detailed cost estimates for agricultural water conservation strategies in LCRA irrigation divisions, specifically the addition of "on-farm" agricultural

conservations strategies. Please note that per the agreement between LCRA and SAWS, annual “on-farm” operations and maintenance costs were not included.

- Optimization of the groundwater well system resulted in an increased estimate of the number of wells from 116 to 125 for 2007. Such a system would provide redundancy and the capacity to shift production to minimize potential effects to nearby existing wells, if necessary. It also would allow sufficient groundwater pumping during a three-month rather than a six-month period for agriculture during the irrigation season. For cost estimating, it was assumed that all of the wells would be new wells, although some wells used for the project will likely be leased existing wells.
- More refined costs were derived from estimates taken from commercial heavy construction costing software, existing bid information, and professional knowledge of local markets from the various study teams, compiled into a single project cost estimate.
- Construction estimates based on second quarter 2007 costs compared to 2004 construction values
- Rural land costs using current data from the Texas A&M Real Estate Center
- Energy costs were increased from \$0.06 per kilowatt hour (kWh) to \$0.08/kWh to reflect the trend of increasing power costs; except for energy costs related to agricultural conservation with ranges from \$0.11 to \$0.17 per kilowatt hour, consistent with current power costs from the Wharton County electrical cooperative.
- Table 10-1 summarized current cost estimates for each alternative, shown both with and without integration costs.

TABLE 10-1  
Project Alternative Cost Comparison, Annualized Cost Model<sup>A</sup>  
LCRA-SAWS Water Project

	95,000 acre-feet/year Capacity	95,000 acre-feet/year Capacity w/ Integration <sup>G</sup>	120,000 acre- feet/year Capacity	120,000 acre-feet/year Capacity w/ Integration
<b>Capital Construction Costs<sup>A</sup></b>				
Off-Channel Storage Facility	\$ 232,200,000	\$ 232,200,000	\$ 232,200,000	\$ 232,200,000
Land Costs (Region K) <sup>F</sup>	\$ 8,100,000	\$ 8,100,000	\$ 8,700,000	\$ 8,700,000
Raw Water Intake <sup>I</sup>	\$ 56,500,000	\$ 56,500,000	\$ 109,500,000	\$ 109,500,000
Raw Water Line (R.W.L.) <sup>I</sup>	\$ 67,300,000	\$ 67,300,000	\$ 156,100,000	\$ 156,100,000
Facility Relocations (roads, pipelines, elec TMs)	\$ 32,600,000	\$ 32,600,000	\$ 32,600,000	\$ 32,600,000
Additional Construction Costs <sup>B</sup> (Pipeline)	\$ 30,000,000	\$ 30,000,000	\$ 56,600,000	\$ 56,600,000
Additional Construction Costs <sup>B</sup> (Non-pipeline)	\$ 101,000,000	\$ 101,000,000	\$ 119,600,000	\$ 119,600,000
Environmental Mitigation	\$ 14,800,000	\$ 14,800,000	\$ 14,900,000	\$ 14,900,000
<b>Total OCSF System Construction Cost (\$)</b>	<b>\$ 542,600,000</b>	<b>\$ 542,600,000</b>	<b>\$ 730,300,000</b>	<b>\$ 730,300,000</b>
Pipeline in LCRA Service Area	\$ 72,400,000	\$ 72,400,000	\$ 88,900,000	\$ 88,900,000
Land Costs (Region K)	\$ 2,400,000	\$ 2,400,000	\$ 2,400,000	\$ 2,400,000
Environmental Mitigation (Region K)	\$ 600,000	\$ 600,000	\$ 600,000	\$ 600,000
Facility Relocations (Region K)	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000
Pipeline to Terminal Storage	\$ 432,000,000	\$ 432,000,000	\$ 538,100,000	\$ 538,100,000
Terminal Storage	\$ 50,500,000	\$ 50,500,000	\$ 60,200,000	\$ 60,200,000
Pump Station in LCRA Service Area	\$ 13,000,000	\$ 13,000,000	\$ 12,400,000	\$ 12,400,000
Raw Water Pump Station	\$ 64,300,000	\$ 64,300,000	\$ 63,800,000	\$ 63,800,000
Terminal Storage Pump Station	\$ 8,400,000	\$ 8,400,000	\$ 9,600,000	\$ 9,600,000
<b>Total Transmission System Cost<sup>C,D</sup> (\$)</b>	<b>\$ 643,700,000</b>	<b>\$ 643,700,000</b>	<b>\$ 776,200,000</b>	<b>\$ 776,200,000</b>
<b>Total Treatment<sup>C</sup> (\$)</b>	<b>\$ 233,700,000</b>	<b>\$ 233,700,000</b>	<b>\$ 298,300,000</b>	<b>\$ 298,300,000</b>
Integration Pipelines	\$ -	\$ 187,600,000	\$ -	\$ 217,800,000
Integration Pump Stations	\$ -	\$ 37,500,000	\$ -	\$ 46,000,000
<b>Total Integration Cost (\$)</b>	<b>\$ -</b>	<b>\$ 225,100,000</b>	<b>\$ -</b>	<b>\$ 263,800,000</b>
Production Wells	\$ 75,400,000	\$ 75,400,000	\$ 75,400,000	\$ 75,400,000
Monitoring Wells	\$ 2,900,000	\$ 2,900,000	\$ 2,900,000	\$ 2,900,000
Additional Construction Costs <sup>B</sup>	\$ 27,400,000	\$ 27,400,000	\$ 27,400,000	\$ 27,400,000
<b>Total Groundwater Cost (\$)</b>	<b>\$ 105,700,000</b>	<b>\$ 105,700,000</b>	<b>\$ 105,700,000</b>	<b>\$ 105,700,000</b>
On Farm BMPs	\$ 100,000,000	\$ 100,000,000	\$ 100,000,000	\$ 100,000,000
Off Farm BMPs	\$ 112,800,000	\$ 112,800,000	\$ 112,800,000	\$ 112,800,000
Land Costs	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000	\$ 1,300,000
Environmental Mitigation	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000	\$ 1,000,000
Additional Construction Costs <sup>B</sup>	\$ 77,000,000	\$ 77,000,000	\$ 77,000,000	\$ 77,000,000
<b>Total Agricultural Conservation Cost (\$)</b>	<b>\$ 292,100,000</b>	<b>\$ 292,100,000</b>	<b>\$ 292,100,000</b>	<b>\$ 292,100,000</b>
<b>Total Capital Construction Costs</b>	<b>\$ 1,817,800,000</b>	<b>\$ 2,042,900,000</b>	<b>\$ 2,202,600,000</b>	<b>\$ 2,466,400,000</b>
<b>Other Capitalized Cost</b>				
Interest Accrued During Construction	\$ 257,600,000	\$ 289,500,000	\$ 312,200,000	\$ 349,500,000
Interest Earned on Unused Principal	\$ (98,300,000)	\$ (110,500,000)	\$ (119,200,000)	\$ (133,400,000)
<b>Total LSWP Capital Cost<sup>E</sup> (\$)</b>	<b>\$ 1,977,100,000</b>	<b>\$ 2,221,900,000</b>	<b>\$ 2,395,600,000</b>	<b>\$ 2,682,500,000</b>
<b>Annual Cost</b>				
Debt Service-Principal & Interest	\$ 122,000,000	\$ 137,600,000	\$ 147,300,000	\$ 165,500,000
O&M and Power	\$ 58,700,000	\$ 71,200,000	\$ 71,200,000	\$ 87,200,000
Committed Purchase Fee	\$ 3,000,000	\$ 3,000,000	\$ 3,800,000	\$ 3,800,000
Royalties Paid To Land Owner	\$ 2,185,000	\$ 2,185,000	\$ 2,760,000	\$ 2,760,000
<b>Total Annual Cost (\$)</b>	<b>\$ 185,900,000</b>	<b>\$ 214,000,000</b>	<b>\$ 225,100,000</b>	<b>\$ 259,300,000</b>
<b>Total Annual Cost (\$/ac-ft)<sup>H</sup></b>	<b>\$ 1,957</b>	<b>\$ 2,253</b>	<b>\$ 1,876</b>	<b>\$ 2,161</b>

<sup>A</sup> While land cost are explicitly mentioned for Region K, Region L facilities include land costs in cost estimate  
<sup>B</sup> Additional construction costs include construction contingencies, engineering, administration, legal, financing, and bond counsel  
<sup>C</sup> Includes additional construction costs; does not include potential groundwater mitigation costs  
<sup>D</sup> Possible environmental mitigation is included for all facilities except possible bay impacts  
<sup>E</sup> Due to rounding, total cost may not equal the summation of specific element cost.  
<sup>F</sup> Includes land costs for OCSF, Intake, and Raw Water Line  
<sup>G</sup> Region L Facilities Included in 'Total LSWP Cost'  
<sup>H</sup> Cost per acre-foot includes committed purchase fee paid by SAWS  
<sup>I</sup> Intake structure and pipeline are from Lane City diversion, project 8A-1

## Cost Estimating Methodology

### Annualized Cost Method

The annualized cost method is consistent with the state's regional planning cost comparison methods, but only reflects costs during the project debt service period (30 years for most facilities and 40 years for the off-channel storage facilities). Therefore, it differs considerably from the conditions for this project, which include a 50-year contract period with an option to extend an additional 30 years. The annualized cost method does not account for project costs and benefits prior to, and after, the debt service period (e.g., the study period costs described in more detail in Section 9). Historically, the annualized cost method model has been used for initial screening of projects.

In presenting the project costs as estimated using the annualized cost method (dollars per acre-foot, during the period when debt is paid), costs were developed using methodology and assumptions consistent with the 2006 Regional Water Plan, Region L (HDR, January 2006) and the Guidelines for Regional Water Plan Development (Exhibit B, TWDB, 2002) as directed by the Texas Water Development Board. Capital costs were developed primarily from estimates taken from commercial heavy construction costing software, existing bid information, and professional knowledge of local markets for the various components. In some cases, particularly for costs associated with the SAWS facilities, cost estimates were computed using capital cost curves that varied by facility size (length, diameter, storage capacity, etc.) or projected flow rate. Costs for operations and maintenance, engineering, legal, and contingencies were established using the regional water planning methodologies. Please note that costs for environmental mitigation that may potentially be required for the bay are not included. Costs potentially associated with mitigation that may be established for impacts to groundwater resources were also not included. Debt service calculations used the same methods and financial assumptions as the regional water plans, except that an interest rate of 4.8 percent was used in the amortization calculations, rather than 6.0 percent as used in the regional water plans. The interest estimate was updated to reflect current conditions and future anticipated conditions for LCRA and SAWS.

One of the requirements of the agreement between SAWS and LCRA is that 75 percent of fees paid by SAWS be used to pay for construction of capital components within the LCRA basin. If both the full debt service against all capital components, and the full “Committed Purchase Fee” (the amount SAWS pays for the water on an annual basis) were included in the annualized cost model, this would result in over-counting of costs. To avoid this over-counting, the full debt service on all capital components was included in the model, and the “Committed Purchase Fee” was decreased to 25 percent. This 25 percent of the total “Committed Purchase Fee” represents that portion that is not contractually committed toward payment of any project costs.

The annualized cost method represents only those project costs for which debt is issued, plus operational and maintenance expenditures during the debt payoff period. Therefore, the impact of costs not included in the amortized debt payments and operations and maintenance costs after the debt is paid off, and the benefit gained by water flowing to SAWS after the debt payment is complete are not reflected in this methodology.

This cost estimate is not a socioeconomic cost analysis, nor is it intended to reflect an accurate construction cost estimate or cash flow projection for the proposed facilities. Rather, costs are presented based on the Region L Water Plan costing methodology with updated unit costs and facility sizes where available. In those cases where the unit costs and requirements have not been updated by the study teams, the assumptions used during the region water planning process were used.

## Bases of Cost Estimates

Costs presented in this analysis include capital and annual costs associated with the following constructed facilities:

- Diversion and storage facilities – intake, raw water line, and off-channel storage facilities for conceptual project 8A-1 (Pierce Ranch in Wharton County, with southern intake at Lane City)

- Transmission facilities – pump station(s) and associated storage, and pipelines, including 12,000 or 15,000 acre-feet of terminal storage at or near Bexar County for the 95,000 or 120,000 acre-feet per year delivery scenario, respectively
- Agricultural conservation measures (best management practices in the delivery systems as well as on-farm measures); however, per the agreement between LCRA and SAWS, annual on-farm operations and maintenance costs were not included.
- Groundwater facilities (wells and delivery systems to irrigation canals)
- Water treatment facility, storage, pipelines, pump stations, etc. to distribute the treated water into the existing SAWS system (integration costs) for both project alternatives

Capital costs will be refined as specific facility locations and designs are finalized prior to commencement of the project. They currently include estimates for construction costs, engineering, legal, financing, bond counsel contingencies, survey, land acquisition costs, environmental mitigation (except as noted above), and relocation of conflicting facilities such as roads, oil and gas pipelines, and irrigation canals. Some of the basic assumptions used in the current cost estimates are included in Table 10-2.

TABLE 10-2  
 Project Facility Sizing Assumptions  
 LCRA-SAWS Water Project

Element	95,000 AF Alternative (Wharton County)	120,000 AF Alternative (Wharton County)
Channel	None	None
River	Diversion rate = 2,500 cfs; Intake size = 44,232 hp	Diversion rate = 6,000 cfs; Intake size = 109,968
Raw Water Line pipe between intake and OCSF (project 8A-1)	4.6 miles of 2-144" pipes	4.6 miles of 5-138" pipes
Off-Channel Storage Facility (OCSF)	217,500 acre-feet	217,500 acre-
Transmission Pump/Booster Stations	4 stations delivering 84 mgd	3 stations delivering 112 mgd
Transmission Water Line (pipe OCSF to San Antonio)	121 miles of 66" of polyethylene-wrapped and concrete-bar-wrapped steel cylinder pipe delivering 84 mgd	121 miles of 78" of polyethylene-wrapped and concrete-bar-wrapped steel cylinder pipe delivering 112 mgd
Treatment Facility	109 mgd capacity with 12,000 acre- feet of terminal storage	146 mgd capacity with 15,000 acre-feet terminal

Annual costs include debt service payments (annual “cost of capital”), operations and maintenance costs such as general estimates for chemicals, maintenance, staff time for the SAWS facilities (O&M), power costs, royalty payments to the landowner at the proposed off-channel storage facility and when applicable, reservation and/or purchase fees for water. Note that under the agreement between SAWS and LCRA, operational costs of the yield-producing facilities in Region K are included in the “Committed Purchase Fee” and will, therefore, not be an additional cost. To remain consistent with the regional planning methodology; however, they are included in this estimate.

## Cost Summary

This cost estimate is not a true engineering estimate due to the level of design completed to date, but rather an evaluation of costs using similar methodologies to the 2006 Region L Water Plan (HDR, January 2006). Many of the capital costs have been updated by the study teams to reflect refined facility size estimates using current prices based on estimates taken from commercial heavy construction costing software, existing bid information, and professional knowledge of local markets. As noted previously in this section, if updated information was not developed by the study teams, assumptions used in the regional planning process were used. Dollars should be considered current as of second quarter 2007.

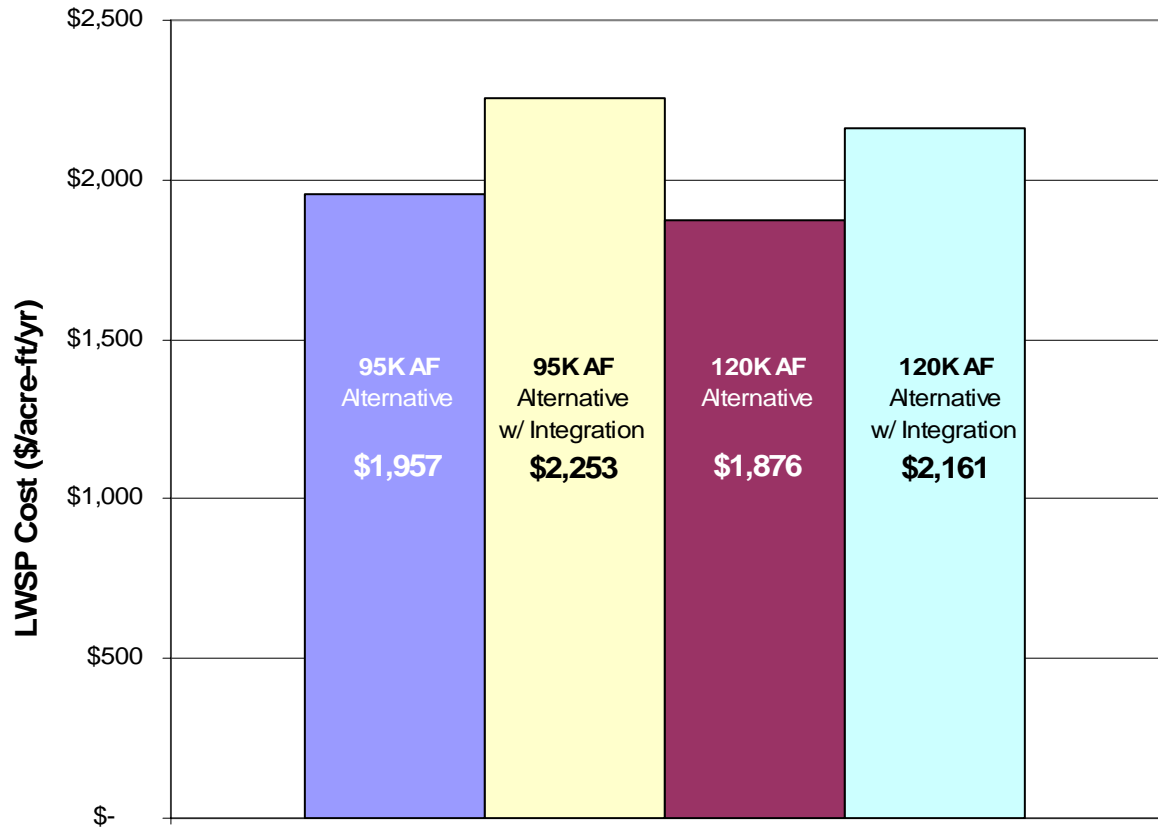
In general, unit cost estimates (per acre-foot) increased for the projects due to a variety of reasons. The most significant factor is the smaller yield as compared to the 150,000 acre-foot yield estimated in previous years. Other factors that contribute to higher cost estimates from previous years are described below.

- The construction industry has experienced a significant escalation (between 15 and 30 percent) in capital costs between 2002 and 2007, the primary driver in this analysis. Prices noted in the 2006 PVA were based on 2004 dollars; the 2007 PVA has used second quarter 2007 costs.
- Another factor resulting in the increased cost estimate from 2006 is that more rigorous engineering analysis performed during this year has modified design parameters such as length, volume, and/or diameter. For example, greater pipeline distances from the off-channel storage facility sites to the western boundary of the LCRA service area and size/depth of facilities have been estimated.
- Increased maximum diversion rates have resulted in a 75 percent increase in the cost of intake facilities for the 120,000 acre-foot facility.
- Projected costs for the groundwater network system increased primarily due to the cost estimates for diesel to run the wells. Other increases resulted from an increase in the number of estimated wells needed to meet simulated peak demands. The wells were also distributed such that water level drawdowns would be minimized and potential effects from the project reduced, thus increasing the pipe lengths needed in the well network. For costing purposes, it is assumed that all of the wells would be new wells rather than leased wells.

These cost estimates, while preliminary, do reflect current local market conditions and should be considered a more accurate reflection of unit costs compared to estimates in the 2006 PVA. However, given the various delivery volumes explored in this assessment, the costs cannot be directly compared with those in previous years. The scenarios are intended to provide information that can be used to optimize the project in the coming years as various components are refined.

Figure 10-1 provides a summary of current estimated costs per acre-foot for the project using the annualized cost method.

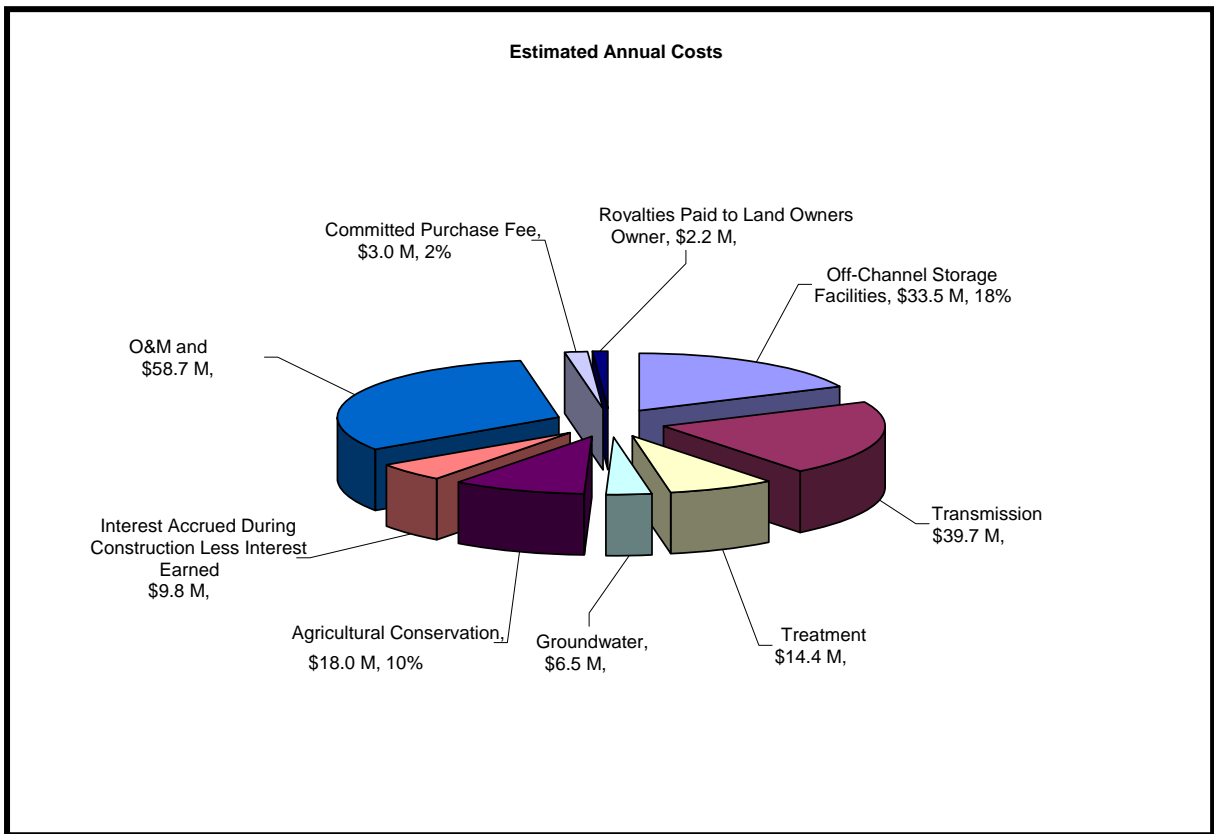
**FIGURE 10-1**  
 Cost Estimate for Delivery of Treated Water to SAWS Distribution System (per acre-foot per year), Annualized Cost Method  
*LCRA-SAWS Water Project*



Costs presented in Figure 10-1 are for representative scenarios with yields of 95,000 and 120,000 acre-feet per year delivery water to the San Antonio area from an off-channel storage site in Wharton County. Rigorous engineering optimization has not been performed in preparing these estimates. It is possible that costs could be lowered upon further study and future engineering design and optimization efforts. Similarly, costs could increase due to the risk factors discussed at the end of this section.

Figures 10-2 and 10-3 roughly illustrate the relative annualized costs of components for the 95,000 acre-feet and 120,000 acre-feet project scenarios (without system integration). Note that the agreement between LCRA and SAWS details the specific cash flow commitments between the two entities. The annualized cost method results in Figure 10-1, and the detailed presentation of cost components in Figures 10-2 and 10-3, do not accurately reflect these contractual terms. They simply represent project costs based on the assumptions in the costing approach used.

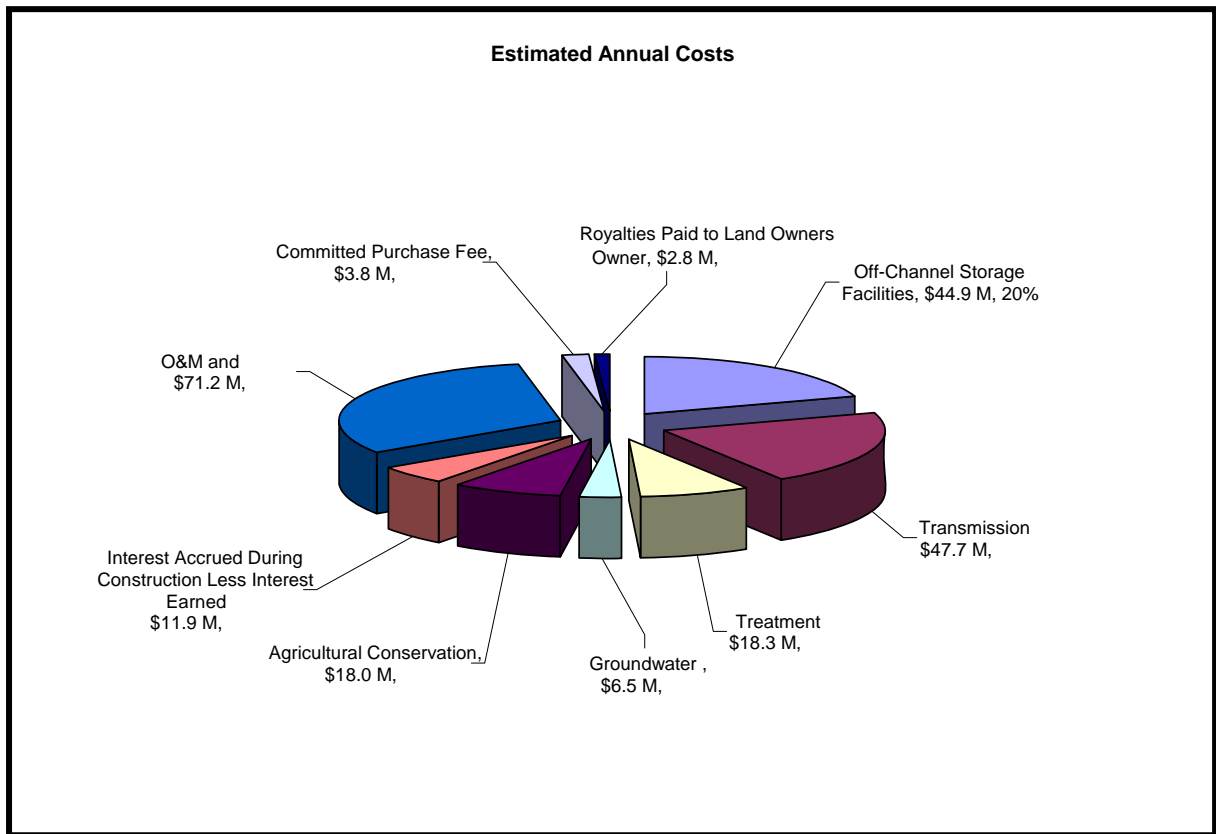
**FIGURE 10-2**  
 Estimated Annual Costs, Annualized Cost Method, Component Cost Contributions (95,000 acre-foot Project Scenario)  
 LCRA-SAWS Water Project



*Figure 10-2 Notes:*

1. The interest accrued during construction is based on the capital costs of storage (off-channel and terminal storage facilities), transmission, treatment, groundwater facilities, and agricultural conservation measures in Regions K and L.
2. These percentages do not include the cost of integration into existing SAWS infrastructure nor the study period costs.

**FIGURE 10-3**  
 Estimated Annual Costs, Annualized Cost Method, Component Cost Contributions (120,000 acre-foot Project Scenario)  
 LCRA-SAWS Water Project



*Figure 10-3 Notes:*

- 1 The interest accrued during construction is based on the capital costs of storage (off-channel and terminal storage facilities), transmission, treatment, groundwater facilities, and agricultural conservation measures in Regions K and L.
- 2 These percentages do not include the cost of integration into existing SAWS infrastructure nor the study period costs.

**Potential Risks Associated with Cost Estimates**

Annual updates and refined engineering estimates during actual design will increase the certainty related to Project cost evaluations. Some of the risks or variables related to cost include the following:

- Materials price inflation (greater than general inflation) and energy or other O&M cost increases or decreases could affect the final implementation costs, as could the actual financing costs and interest rates associated with construction of various project components.
- Environmental mitigation costs could increase above current estimates; however, site specific field investigations have not indicated impediments based on environmental, cultural, or political barriers that would render the sites impractical.
- Implementing bay enhancement or mitigation measures, if needed, or mitigation for potential effects on groundwater resources could affect the overall cost of the project.

- Land acquisition costs and schedule could impact the overall project delivery. Potential scheduling delays would likely result in increased costs due to inflation and other factors.
- More detailed design and modeling of proposed systems could increase costs or create design constraints reducing the efficiency of the project. Similarly, system optimization, leasing wells rather than constructing new ones, or other engineering factors could decrease costs.
- Increases in transmission pipeline lengths for transmission to San Antonio or within the groundwater well system could affect capital requirements and costs.
- Cost estimates (cost per acre-foot) could rise or fall substantially depending on the ultimate selected project yield to SAWS, because unit costs are highly sensitive to annual yield calculations.
- Many of the fundamental assumptions for this analysis are the same as those used in the Region L planning process. If those unit costs or estimated expenses are incorrect or inaccurate, then the evaluations in this assessment will be similarly inaccurate. For example, interest rates could rise or fall prior to construction of the project, thus affecting the annual cost.