

## **4C.5 Canyon Reservoir**

### **4C.5.1 Description of Water Management Strategy**

The Canyon Reservoir water management strategy involves the purchase of Canyon Reservoir stored water from the Guadalupe-Blanco River Authority (GBRA), transmission and treatment facilities, and integration of additional supply. Canyon Reservoir is located on the Guadalupe River in Comal County and is about 14 miles west of San Marcos and 12 miles northwest of New Braunfels. The U.S. Army Corps of Engineers (USCE) initiated construction of the water supply and flood control project in 1958, with deliberate impoundment of water beginning in 1964. The reservoir has 386,200 acft of authorized conservation storage; impounds runoff from 1,432 square miles of drainage area; and inundates 8,231 acres at the full conservation storage level of 909 ft-msl. The conservation storage pool of Canyon Reservoir is owned and operated by the GBRA. Planned implementation of this strategy includes diversions directly from Canyon Reservoir and diversions from the Guadalupe River at various locations downstream of Canyon Dam. Presently uncontracted supplies of firm stored water from Canyon Reservoir are between 20,000 acft/yr and 25,000 acft/yr. This water management strategy is more generally identified as “Purchase from Wholesale Water Provider (GBRA)” and is recommended for entities with projected water needs in Caldwell, Comal, Guadalupe, Hays, Kendall, and Victoria Counties.

The Western Canyon Water Supply Project and Hays/IH35 Water Supply Project (presently under construction) facilitate greater use of available supplies from Canyon Reservoir to meet needs in the GBRA district. Water User Groups (WUGs) expected to receive water from these two strategies to meet projected needs include:

- Western Canyon Water Supply Project (WCWSP)<sup>1</sup>
  - City of Bulverde
  - Comal County Other
  - Kendall County Other

---

<sup>1</sup> Additional WUGs or Wholesale Water Providers (WWPs) expected to receive water through the WCWSP include, but are not limited to, the Cities of Boerne and Fair Oaks Ranch, San Antonio Water System, and San Antonio River Authority.

- Hays/IH35 Water Supply Project (Hays/IH35 WSP)<sup>2</sup>
  - Goforth WSC
  - City of Kyle
  - City of Niederwald
  - Hays County Other

Cost estimates for treated water supplies delivered to these seven WUGs are provided in Section 4C.5.3. Volume II, Section 4C.4 contains more information regarding the WCWSP and Hays/IH35 WSP.

Canyon Lake WSC purchases and diverts water directly from Canyon Reservoir, then treats and distributes that water to customers around Canyon Reservoir in Comal County. Year 2060 needs for Canyon Lake WSC total 9,331 acft/yr. A cost estimate for additional supplies for Canyon Lake WSC is provided in Section 4C.5.4.

New Braunfels Utilities (NBU) currently diverts water from the Guadalupe River downstream of Canyon Reservoir. This strategy includes the purchase of Canyon Reservoir water to meet the growing needs of the City of New Braunfels. Year 2060 needs for NBU, all of which are expected to be met by Canyon Reservoir, are about 15,000 acft/yr. A cost estimate for additional NBU supplies is provided in Section 4C.5.4.

Goliad County Steam Electric (Coletto Creek Power) and Victoria County Industrial, have projected needs of about 4,500 acft/yr and 6,600 acft/yr, respectively, in 2060. Most of these needs will be met from GBRA's existing lower basin water rights. In order to ensure that a firm supply is available to meet these projected needs, it is assumed that a commitment of stored water from Canyon Reservoir equal to approximately one-third of the projected needs may be necessary. Cost estimates for additional supplies for these two WUGs are provided in Section 4C.5.4.

#### **4C.5.2 Available Yield**

In 2001, GBRA was granted an amendment to Certificate of Adjudication No. 18-2074 increasing the authorized diversions from Canyon Reservoir for municipal, industrial, and other purposes from an average of 50,000 acft/yr to an average of 90,000 acft/yr. The firm yield of Canyon Reservoir is dependent upon a number of factors including points of diversion for

---

<sup>2</sup> Additional WUGs or Wholesale Water Providers (WWPs) expected to receive water through the Hays/IH35 WSP include, but are not limited to, the Cities of Buda and Mustang Ridge, Plum Creek WC, and County Line WSC.

contracted supplies, Edwards Aquifer springflow, term recreational flow agreements, and discharge of treated effluent throughout the Guadalupe – San Antonio River Basin. Subject to hydrologic assumptions and operational procedures listed in Section 3.2.3.1, estimates of Canyon Reservoir firm yield (calculated using the GSA WAM) range from 88,232 acft/yr to 87,484 acft/yr in years 2000 and 2060, respectively.

#### **4C.5.3 Environmental Issues**

The Canyon Reservoir water management strategy involves diversion and use of water that is currently authorized for use under Certificate of Adjudication No. 18-2074E, hence environmental issues have been sufficiently addressed through the inclusion of special conditions in the certificate. This management strategy would increase flows in the Guadalupe River between Canyon Dam and New Braunfels during drought. Water levels in Canyon Reservoir may be expected to fluctuate to a greater degree as more of the firm yield is delivered to customers. Even with full delivery of the firm yield, however, simulations indicate that Canyon Reservoir is expected to be full (at or above 909 ft-msl) more than 40 percent of the time.

#### **4C.5.4 Engineering and Costing**

Unit costs for this water supply are dependent upon location and appurtenant transmission and treatment facilities unique for each customer. With the exceptions of Canyon Lake WSC and delivery via the WCWSP, water would be released at Canyon Dam and allowed to flow downstream to various WUGs and/or projects serving WUGs along the Guadalupe River.

The water committed to WUGs utilizing the Hays/IH35 WSP would be delivered to Lake Dunlap where it would be diverted and transmitted to the San Marcos WTP via GBRA's San Marcos pipeline, treated, and then delivered via the Hays/IH35 WSP. GBRA's water purchase cost for the Hays/IH35 WSP is \$3.00/kgal, or about \$977/acft (Table 4C.5-1).

Water committed to customers of the WCWSP would be diverted directly from the reservoir and delivered via the WCWSP transmission system. GBRA's water purchase cost for the WCWSP is approximately \$2.80/kgal, or \$912/acft (Table 4C.5-1).

Canyon Lake WSC's commitment will also be diverted directly from the reservoir. A rough cost estimate to determine the associated cost of expanding diversions, treatment, and integration provided a unit cost of approximately \$438/acft, including debt service, O&M, and power costs (Table 4C.5-1).

Water committed to NBU would be delivered via the Guadalupe River to an intake on the Guadalupe River in New Braunfels, where diversions in the amount of 15,000 acft/yr would be made in a seasonal pattern. The major facilities required to implement this portion of the strategy are:

- Intake and Pump Station Expansion
- Raw Water Pipeline to Treatment Plant
- Water Treatment Plant Expansion

The intake and pump station is sized to deliver ~1,500 acft/month (16 MGD) through a 33-inch diameter pipeline. The operating cost was determined for the delivery of 15,000 acft/year through expansion of the existing water treatment plant. Financing the project over 30 years at 6.0 percent annual interest rate results in annual debt service of \$1,694,000 (Table 4C.5-2). The annual cost to purchase water from GBRA is \$84 per acft, resulting in a payment of \$1,260,000 per year for water. Operation and maintenance costs, including power and purchase of stored water, total \$2,715,000 per year. The total annual costs, including debt repayment, interest, and operation and maintenance, total \$4,409,000. For an annual firm supply of 15,000 acft, the resulting annual cost of water is \$294 per acft (Table 4C.5-2).

Estimated costs to provide firm water supply to meet projected needs for Coletto Creek Power and Victoria County industry are based on the GBRA Lower Basin rate of \$0.08/kgal for 100 percent of the annual need plus firm-up supply from Canyon Reservoir at a rate of \$84/acft for one-third of the annual need. The resulting unit cost of water for these two WUGs is \$54/acft (Table 4C.5-1).

**Table 4C.5-1**  
**Cost Estimate Summary for**  
**WUGs Utilizing Canyon Reservoir Water**  
**Second Quarter 2002 Prices**

WUG	Item	Data	Cost Estimate Notes
<b>Bulverde</b>	<b>Need @ 2060 (acft/yr)</b>	4,595	Based on Western Canyon Water Supply Project rate of \$2.80/kgal. (Estimated cost of Increased LGWSP Capacity for GBRA Needs is \$2.83/kgal.)
	<b>Annual Cost (\$)</b>	\$4,191,815	
	<b>Unit Cost (\$/acft)</b>	\$912	
<b>Canyon Lake WSC</b>	<b>Need @ 2060 (acft/yr)</b>	9,331	Based on purchase of raw water from GBRA as well as construction and operation of intake, transmission, and treatment facilities. The larger numbers include debt service and O&M and the smaller numbers are O&M only.
	<b>Annual Cost (\$)</b>	\$4,086,978 \$1,968,841	
	<b>Unit Cost (\$/acft)</b>	\$438 \$211	
<b>New Braunfels</b>	<b>Need @ 2060 (acft/yr)</b>	14,475	Based on purchase of raw water from GBRA as well as construction and operation of intake, transmission, and treatment facilities. The larger numbers include debt service and O&M and the smaller numbers are O&M only.
	<b>Annual Cost (\$)</b>	\$4,255,650 \$2,619,975	
	<b>Unit Cost (\$/acft)</b>	\$294 \$181	
<b>Comal County Other</b>	<b>Need @ 2060 (acft/yr)</b>	2,071	Based on Western Canyon Water Supply Project rate of \$2.80/kgal. (Estimated cost of Increased LGWSP Capacity for GBRA Needs is \$2.83/kgal.)
	<b>Annual Cost (\$)</b>	\$1,889,281	
	<b>Unit Cost (\$/acft)</b>	\$912	
<b>Goliad County Steam Electric</b>	<b>Need @ 2060 (acft/yr)</b>	4,482	Based on GBRA Lower Basin rate of \$0.08/kgal for 100% of the annual need plus firm-up supply from Canyon Reservoir at a rate of \$84/acft for one-third of the annual need. No additional facility costs included.
	<b>Annual Cost (\$)</b>	\$242,028	
	<b>Unit Cost (\$/acft)</b>	\$54	
<b>Goforth WSC</b>	<b>Need @ 2060 (acft/yr)</b>	3,000	Based on Hays/IH35 Water Supply Project rate of \$3.00/kgal. (Estimated cost of Increased LGWSP Capacity for GBRA Needs is \$2.83/kgal.)
	<b>Annual Cost (\$)</b>	\$2,932,250	
	<b>Unit Cost (\$/acft)</b>	\$977	
<b>Kyle</b>	<b>Need @ 2060 (acft/yr)</b>	3,522	Based on Hays/IH35 Water Supply Project rate of \$3.00/kgal. (Estimated cost of Increased LGWSP Capacity for GBRA Needs is \$2.83/kgal.)
	<b>Annual Cost (\$)</b>	\$3,442,462	
	<b>Unit Cost (\$/acft)</b>	\$977	
<b>Niederwald</b>	<b>Need @ 2060 (acft/yr)</b>	354	Based on Hays/IH35 Water Supply Project rate of \$3.00/kgal. (Estimated cost of Increased LGWSP Capacity for GBRA Needs is \$2.83/kgal.)
	<b>Annual Cost (\$)</b>	\$346,006	
	<b>Unit Cost (\$/acft)</b>	\$977	
<b>Hays County Other</b>	<b>Need @ 2060 (acft/yr)</b>	4,480	Based on Hays/IH35 Water Supply Project rate of \$3.00/kgal. (Estimated cost of Increased LGWSP Capacity for GBRA Needs is \$2.83/kgal.)
	<b>Annual Cost (\$)</b>	\$4,378,827	
	<b>Unit Cost (\$/acft)</b>	\$977	

**Table 4C.5-1 Continued**

<b>Kendall County Other</b>	<b>Need @ 2060 (acft/yr)</b>	4,163	Based on Western Canyon Water Supply Project rate of \$2.80/kgal. (Estimated cost of Increased LGWSP Capacity for GBRA Needs is \$2.83/kgal.)
	<b>Annual Cost (\$)</b>	\$3,797,720	
	<b>Unit Cost (\$/acft)</b>	\$912	
<b>Victoria County Industrial</b>	<b>Need @ 2060 (acft/yr)</b>	6,566	Based on GBRA Lower Basin rate of \$0.08/kgal for 100% of the annual need plus firm-up supply from Canyon Reservoir at a rate of \$84/acft for one-third of the annual need. No additional facility costs included.
	<b>Annual Cost (\$)</b>	\$354,564	
	<b>Unit Cost (\$/acft)</b>	\$54	

**Table 4C.5-2  
Cost Estimate Summary for  
Canyon Reservoir Water Released to New Braunfels Utilities  
Second Quarter 2002 Prices**

<i>Item</i>	<i>Estimated Costs for Facilities</i>
<b>Capital Costs</b>	
Intake and Pump Station (16 MGD)	\$1,241,000
Transmission Pipeline (33 in dia., 0 miles)	\$301,000
Water Treatment Plant Expansion (from 8 MGD to 24 MGD)	<u>\$13,324,000</u>
<b>Total Capital Cost</b>	<b>\$14,866,000</b>
Engineering, Legal Costs and Contingencies	\$5,188,000
Environmental & Archaeology Studies and Mitigation	\$23,000
Land Acquisition and Surveying (10 acres)	\$28,000
Interest During Construction (4 years)	<u>\$3,217,000</u>
<b>Total Project Cost</b>	<b>\$23,322,000</b>
<b>Annual Costs</b>	
Debt Service (6 percent, 30 years)	\$1,694,000
Operation and Maintenance	
Intake, Pipeline, Pump Station	\$34,000
Water Treatment Plant	\$1,309,000
Pumping Energy Costs (1,863,806 kW-hr @ 0.06 \$/kW-hr)	\$112,000
Purchase of Water (15,000 acft/yr @ 84 \$/acft)	<u>\$1,260,000</u>
<b>Total Annual Cost</b>	<b>\$4,409,000</b>
<b>Available Project Yield (acft/yr)</b>	15,000
<b>Annual Cost of Water (\$ per acft)</b>	\$294
<b>Annual Cost of Water (\$ per 1,000 gallons)</b>	\$0.90