## *4B.5 Groundwater/Surface Water Conjunctive Use (Lake Granger Augmentation)*

### *4B.5.1 Description of Option*

Rapid population growth and development in Williamson County cause continuing need for additional water supplies throughout the planning period. Total need for new supply in Williamson County is 24,470 acft/yr in the year 2030, increasing to 97,204 acft/yr by year 2060. Much of the increased demand is in the southwestern portion of the county in and adjoining the Cities of Cedar Park and Round Rock and extending along major highway corridors served by other potable water suppliers. This alternative will add 54,390 acft/yr by augmenting the long-term firm yield of Lake Granger with groundwater pumped from the Simsboro member of the Carrizo-Wilcox Aquifer in areas east of Williamson County, in Milam and Lee Counties. Groundwater would be pumped into Lake Granger, then diverted into a water treatment plant at the lake, with potable water supply delivered to terminal ground storage at a point between the Cities of Round Rock and Georgetown. Facilities are depicted in Figure 4B.5-1.

### *4B.5.2 Available Yield*

Reservoir sedimentation in Lake Granger is depleting conservation storage from its original permitted volume of 65,500 acft to a projected volume at year 2060 of 22,597 acft. This sedimentation is projected to cause the yield of Lake Granger to decline to 10,564 acft/yr in the year 2060, which is slightly more than half its year 2000 yield of 19,840 acft/yr. This option envisions overdrafting Lake Granger, utilizing interruptible surface water from BRA System Operations, supplementing the surface water supply from well fields in the Simsboro Aquifer, and treating the commingled supplies to deliver potable water to Williamson County.

The Brazos G WAM was utilized to simulate operations of Lake Granger supplemented with the groundwater pumpage. Pumpage from the Simsboro Aquifer (Figure 4B.5-2) would average 28,263 acft/yr with a peak monthly pumping rate of 6,250 acft/month. Figure 4B.5-3 illustrates the proportion of total water impounded each year in Lake Granger from groundwater pumpage and runoff from the Lake Granger watershed. The conjunctive use project would develop a firm supply of 67,930 acft/yr. The availability of this supply is reduced by quantities BRA currently has obligated to the Cities of Taylor and Georgetown, and Alcoa's Rockdale Operations, leaving a supply of 54,390 acft/yr to meet Williamson County needs. The Lake Granger simulations included specific operational constraints regarding groundwater pumpage to

minimize chances of spilling groundwater supply stored in the reservoir, and a requirement that 30 percent of storage remain in the reservoir in the critical drought to protect local supplies. Figure 4B.5-4 illustrates simulated Lake Granger storage throughout the simulation.

### *4B.5.3 Environmental*

Environmental impacts could include:

- Possible reduction in flood releases to the San Gabriel River downstream of Lake Granger;
- Possible moderate impacts on riparian corridors depending on specific locations of pipelines; and
- Possible low impacts on instream flows due to slight decrease in groundwater discharges from the Carrizo-Wilcox Aquifer.

A summary of environmental issues is presented in Table 4B.5-1.

### *4B5.4 Engineering and Costing*

Facilities required to meet this option include a well field consisting of 109 wells along a 30-mile corridor as shown in Figure 4B.5-2. Pumpage will be gathered by a well field collection system and delivered to a ground storage tank and booster pump station for transmission in a 60-inch diameter, 22.5 mile pipeline to Lake Granger, which would discharge into a stilling basin in the lake. The treatment plant will take water from the lake, treat up to 97.13 MGD, and pump potable water in a 72-inch diameter, 18.4 mile pipeline to terminal ground storage sited between the Cities of Georgetown and Round Rock.

The total capital costs including wells, well field collection system, storage and booster pump station, groundwater transmission pipeline, treatment plant, potable water pipeline, and terminal ground storage is $192,826,000, as summarized in Table 4B.5-2. Additional costs for professional services, land acquisition, well mitigation, and interest during construction add $110,462,000 for a total project cost of $303,288,000. Annual debt service on this principal amount, calculated on the basis of 6 percent interest for 30-year debt is $22,034,000. Operation and maintenance costs for pumping, transmission, and treatment to deliver the new annual supply of 54,390 acft, as well as groundwater leasing, regulatory groundwater withdrawal fees, and surface water purchase contracts must be accounted for to arrive at a unit cost of produced

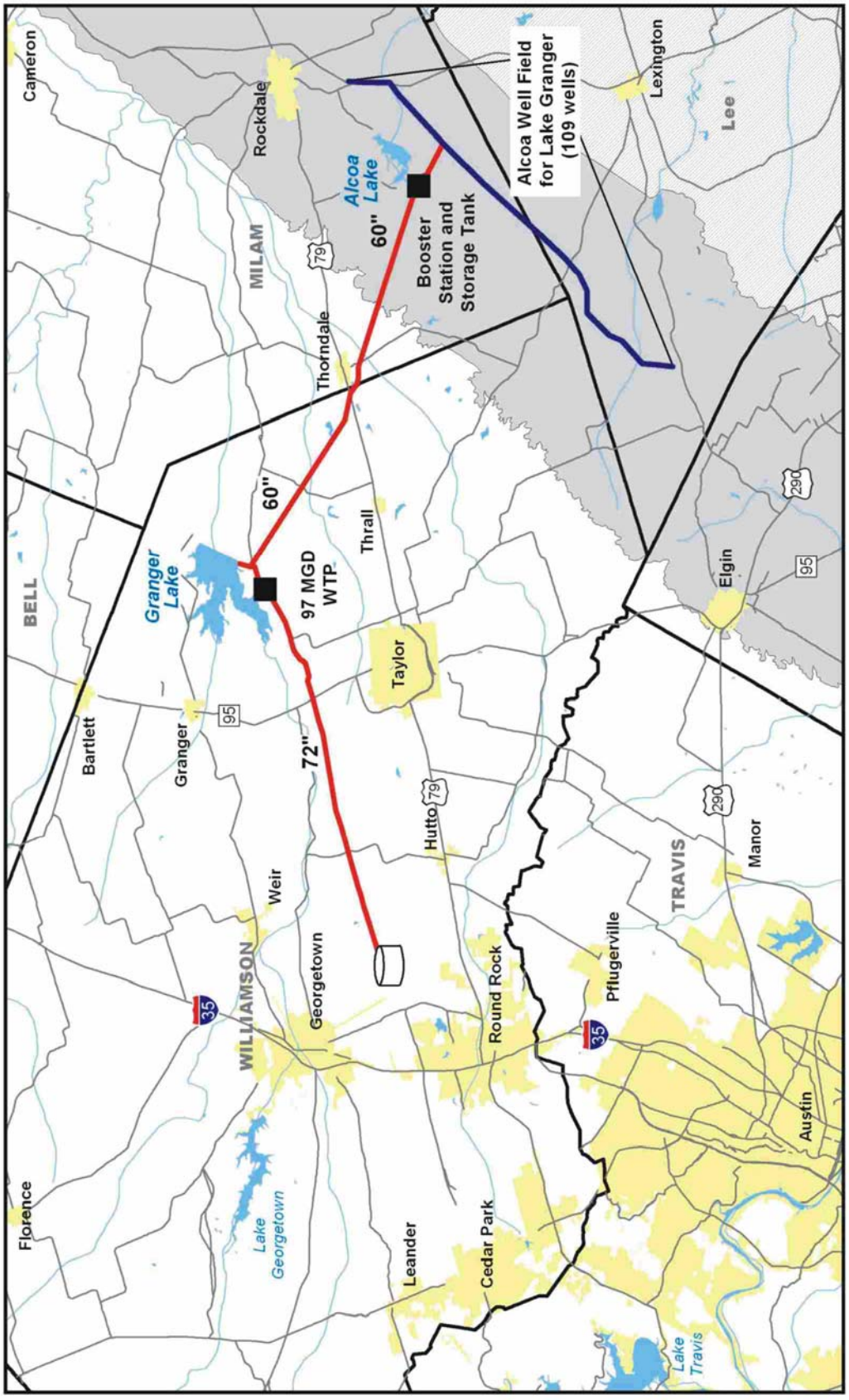


*Figure 4B.5-1. Lake Granger Conjunctive Use System*

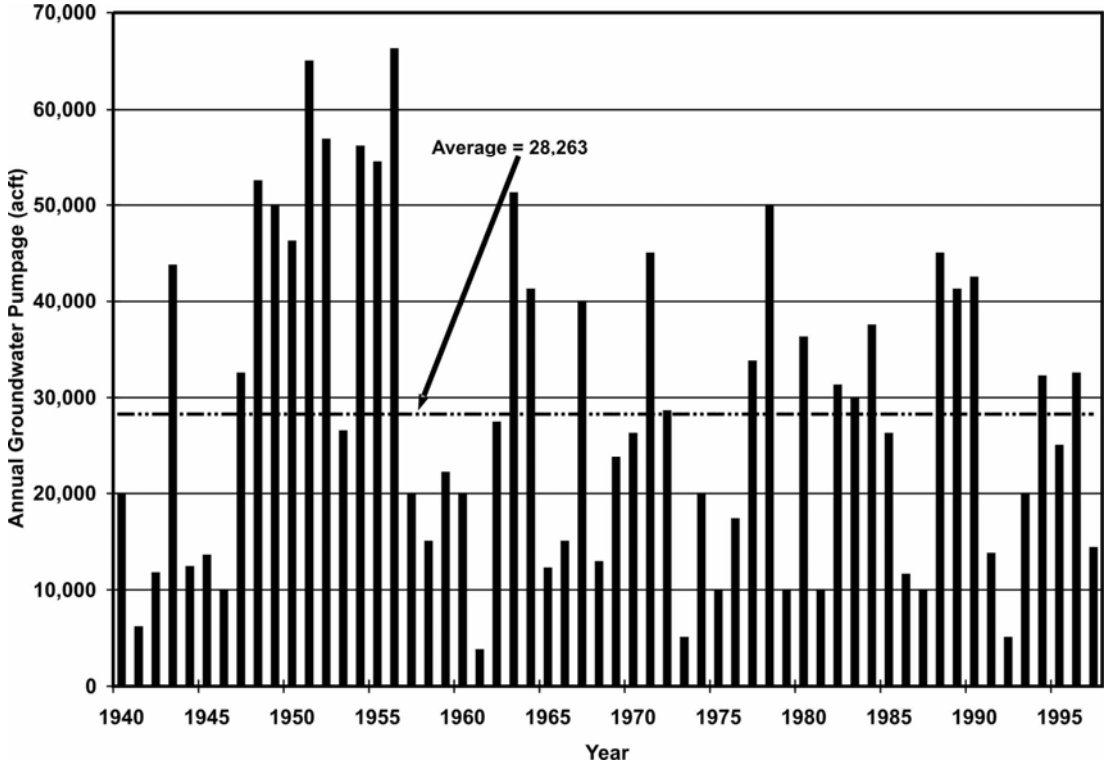


***Figure 4B.5-2. Annual Simsboro Aquifer Pumpage into Lake Granger***

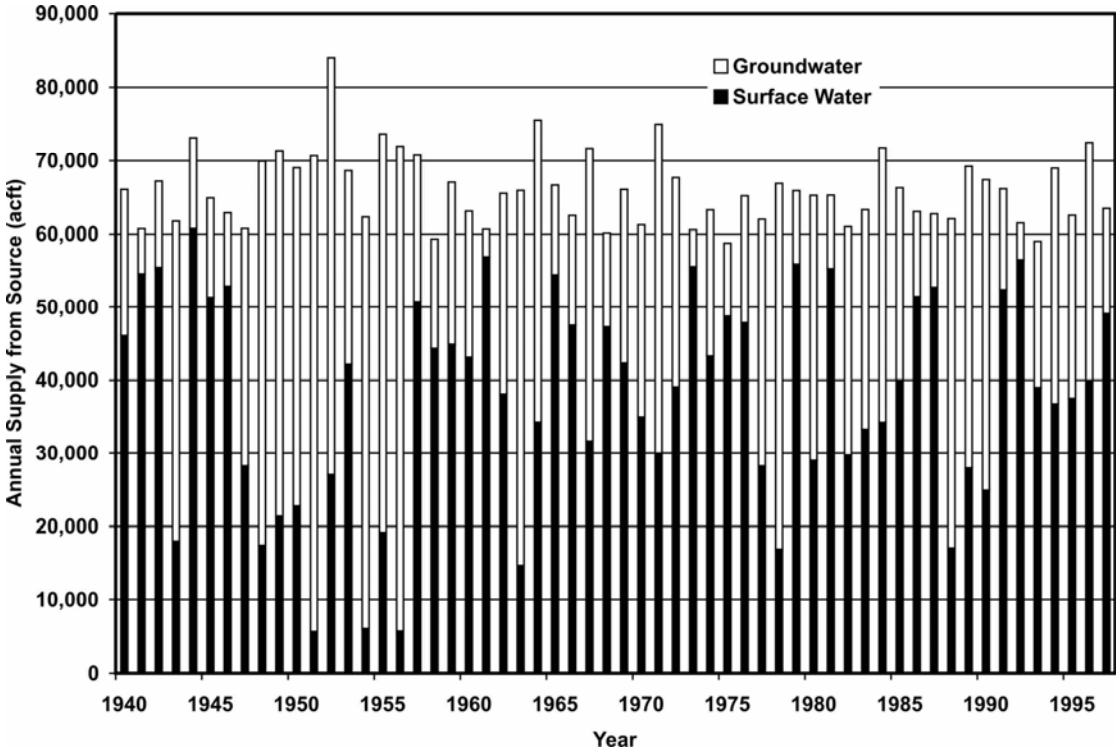


***Figure 4B.5-3. Contributions to Lake Granger Supply***

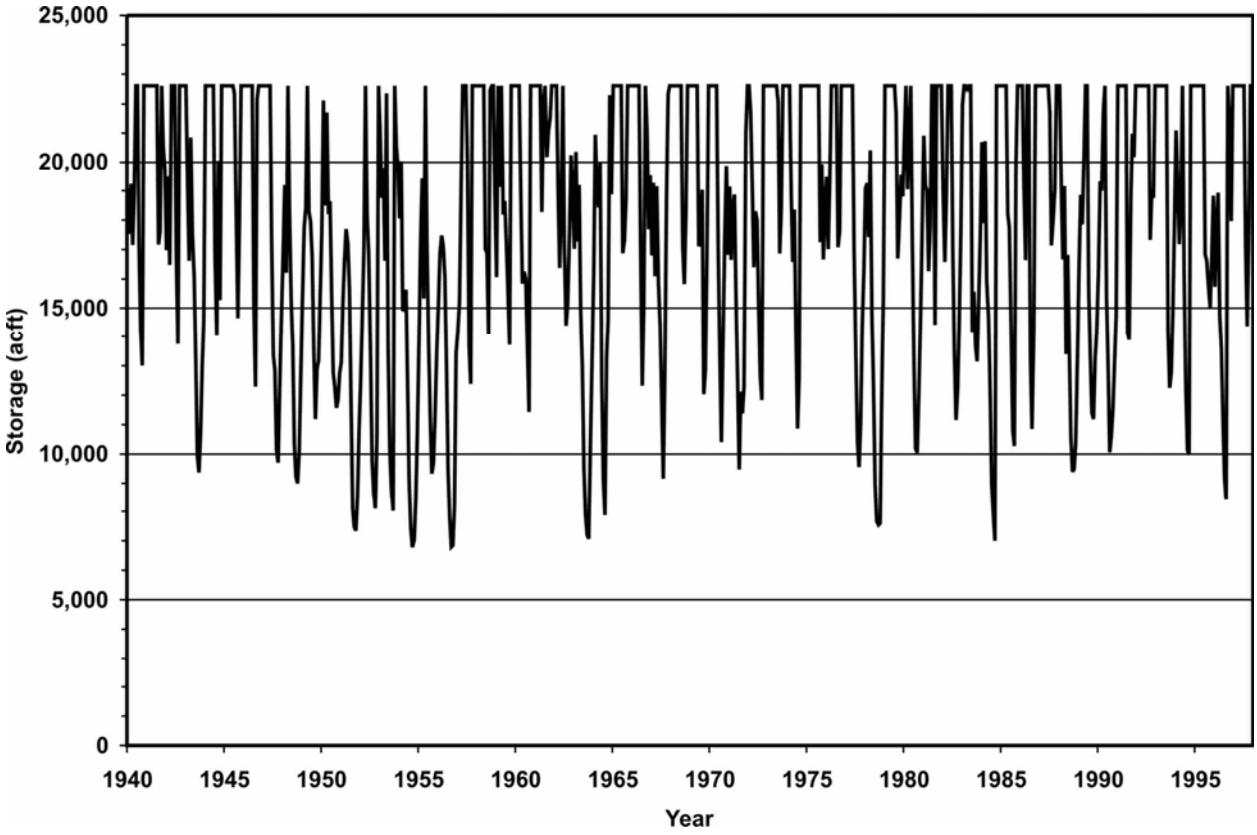


***Figure 4B.5-4. Lake Granger Storage***

***Table 4B.5-1.***
***Environmental Issues:***
***Groundwater/Surface Water Conjunctive Use (Lake Granger Augmentation)***

| Water Management Option | Groundwater/Surface Water Conjunctive Use |
|---|---|
| Implementation Measures | Construction of well fields (109 wells), collection systems (30-mile corridor), pump stations, pipelines (37 miles) and a 97 MGD treatment plant |
| Environmental Water Needs/Instream Flows | Possible impacts on instream flows |
| Bays and Estuaries | Negligible impact |
| Fish and Wildlife Habitat | Possible moderate impacts on riparian corridors and upland habitats depending on specific locations of pipelines |
| Cultural Resources | Possible low impact |
| Threatened and Endangered Species | Possible low impact |
| Comments | Assume institutional transfer agreements among water rights owners, suppliers, and users |

***Table 4B.5-2.***
***Cost Estimate Summary for***
***Lake Granger Augmentation***
***(Second Quarter 2002 Prices)***

| *Item* | *Estimated Costs for Facilities* |
|---|---|
| **Capital Costs** | |
| Discharge Structure in Lake Granger | $313,000 |
| Transmission Pipeline (60 in dia., 37 miles) | $49,684,000 |
| Transmission Pump Station(s) | $7,003,000 |
| Well Fields | $58,934,000 |
| Water Treatment Plant (97.13 MGD) | $76,892,000 |
| **Total Capital Cost** | **$192,826,000** |
| | |
| Engineering, Legal Costs and Contingencies | $64,990,000 |
| Environmental & Archaeology Studies and Mitigation | $1,727,000 |
| Land Acquisition and Surveying (251 acres) | $1,955,000 |
| Interest During Construction (4 years) | $41,790,000 |
| **Total Project Cost** | **$303,288,000** |
| | |
| **Annual Costs** | |
| Debt Service (6 percent, 30 years) | $22,034,000 |
| Operation and Maintenance | |
| Intake, Pipeline, Pump Station | $1,243,000 |
| Water Treatment Plant | $8,158,000 |
| Pumping Energy Costs (50139720 kW-hr @ 0.06 $/kW-hr) | $3,008,000 |
| Ground Water Purchase Cost ($75/acft) | $2,120,000 |
| Management Costs ($25K/month) | $300,000 |
| Ground Water Conservation District Fee ($44/acft) | $1,244,000 |
| Mitigation Reserve for Possible Impacts to Local Wells (All Wells) | $116,000 |
| Purchase of Water (54,390 acft/yr @ 45.75 $/acft) | $2,488,000 |
| | |
| **Total Annual Cost** | **$40,711,000** |
| | |
| **Available Project Yield (acft/yr)** | 54,390 |
| **Annual Cost of Water ($ per acft)** | $749 |
| **Annual Cost of Water ($ per 1,000 gallons)** | $2.30 |

water. These additional costs of $18,677,000 added to the annual debt service gives a total annual cost for the full project of $40,711,000. At full development and use, the unit cost of treated water is $748 per acft/yr or $2.30 per 1,000 gallons at the terminal ground storage site.

### *4B.5.5 Implementation Issues*

Development of this option at the scale of this evaluation will require an institutional framework with a regional structure. Early significant activity toward implementation has been accomplished by the Brazos River Authority via its ownership of Lake Granger water supply, application for a systems operation permit, ownership of the existing water treatment plant on Lake Granger, and pursuit of nearby groundwater supplies. Developing a suitable approach to the evaluated level of groundwater pumping requires additional cooperative agreements with local groundwater districts and landowners.

This water supply option has been compared to the plan development criteria, as shown in Table 4B.5-3.

#### *4B.5.5.1 Potential Regulatory Requirements*

Requirements for permits to use surface water and groundwater, as well as for pipeline construction, will require permits as follow:

- TCEQ water rights permit (pending) for BRA System Operations
- Local groundwater district pumping permits outside areas exempted by surface mining permits.
- U.S. Army Corps of Engineers Section 404 permits for pipeline stream crossings, discharges of fill into wetlands and waters of the U.S. for construction, and other activities
- NPDES Stormwater Pollution Prevention Plans
- TP&WD Sand, Shell, Gravel, and Marl permit for construction in state-owned stream beds

***Table 4B.5-3.***
***Comparison of Lake Granger Augmentation to Plan Development Criteria***

| *Impact Category* | *Comment(s)* |
|---|---|
| A. Water Supply | |
| 1. Quantity | 1. Sufficient for local needs |
| 2. Reliability | 2. High |
| 3. Cost | 3. Reasonable |
| B. Environmental factors | |
| 1. Environmental Water Needs | 1. Low impact |
| 2. Habitat | 2. Low impact |
| 3. Cultural Resources | 3. Low impact |
| 4. Bays and Estuaries | 4. Low Impact |
| 5. Threatened and Endangered Species | 5. Low impact |
| 6. Wetlands | 6. Low impact |
| C. Impact on Other State Water Resources | • No apparent negative impacts on state water resources; no effect on navigation |
| D. Threats to Agriculture and Natural Resources | • Low to none |
| E. Equitable Comparison of Strategies Deemed Feasible | • Option is considered to meet municipal and "County-Other" shortages |
| F. Requirements for Interbasin Transfers | • Not applicable |
| G. Third Party Social and Economic Impacts from Voluntary Redistribution | • None |