

5B.17 Johnson County Water Supply Plan

Table 5B.17-1 lists each water user group in Johnson County and their corresponding surplus or shortage in years 2030 and 2050. For each water user group with a projected shortage, a water supply plan has been developed and is presented in the following subsections. Water supply plans are also presented for some entities that need pumping/conveyance facilities to utilize their existing water resources, or to become a regional provider.

**Table 5B.17-1.
Johnson County Surplus/(Shortage)**

Water User Group	Surplus/(Shortage)¹		Comment
	2030 (acft/yr)	2050 (acft/yr)	
City of Alvarado	(72)	(220)	Projected shortage – see plan below
City of Briar Oaks	(36)	(38)	Projected shortage – see plan below
City of Burleson	(783)	(1,544)	Projected shortage – see plan below
City of Cleburne	1,716	(2,822)	Projected shortage – see plan below
City of Godley	(60)	(60)	Projected shortage – see plan below
City of Grandview	(160)	(190)	Projected shortage – see plan below
City of Joshua	(29)	(209)	Projected shortage – see plan below
City of Keene	(1,149)	(1,495)	Projected shortage – see plan below
City of Mansfield	172	262	Projected surplus
City of Rio Vista	(34)	(36)	Projected shortage – see plan below
City of Venus	(323)	(418)	Projected shortage – see plan below
County-Other	(7,054)	(9,046)	Projected shortage – see plan below
Manufacturing	(1,309)	(1,839)	Projected shortage – see plan below
Steam-Electric	0	0	Supply equals demand
Mining	(33)	(21)	Projected shortage – see plan below
Irrigation	247	247	Projected surplus
Livestock	2,582	2,582	Projected surplus
¹ From Tables 4-33 and 4-34, Section 4 – Comparison of Water Demands with Water Supplies to Determine Needs.			

5B.17.1 City of Alvarado**5B.17.1.1 Description of Supply**

The City of Alvarado obtains its water supply from groundwater from the Trinity Aquifer and from surface water from Lake Alvarado. The City owns and operates six wells that serve as the city's current primary supply. Lake Alvarado is owned by the City of Alvarado, however, the city has not implemented a water treatment plant to utilize this source. The City also has contracted for a small amount (11 acft/yr) of water from Johnson County Rural WSC, however, this contract expires in the year 2001. Based on the city's existing water supply, a shortage is projected in the amount of 72 acft/yr in the year 2030 and 220 acft/yr in the year 2050.

5B.17.1.2 Options Considered

Table 5B.17-2 lists the water management strategies, references to the report section discussing the strategy, total project cost, and unit costs that were considered for meeting the City of Alvarado's shortage.

**Table 5B.17-2.
Water Management Strategies Considered for the City of Alvarado**

<i>Option</i>	<i>Yield (acft/yr)</i>	<i>Approximate Cost¹</i>	
		<i>Total</i>	<i>Unit (\$/acft)</i>
Additional Water Conservation (Section 5A.2)	35	\$20,000/yr	\$574 ²
Voluntary Redistribution (Section 5A.6)	220	\$5,000/yr	\$23 ³
Lake Granbury SWATS Expansion (2030) (Section 5A.16)	72	\$690,000	\$1,180 ⁴
Lake Granbury SWATS Expansion (2050) (Section 5A.16)	148	\$1,418,000	\$1,180 ⁴
No Action	-	\$3,340,000 ⁵	\$46,394 ⁵

¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft per year) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity.
² Source of Cost Estimate: Section 5A.2.
³ Source of Cost Estimate: Section 5A.6.
⁴ Source of Cost Estimate: Section 5A.16 (prorated for City of Alvarado), Includes cost of raw water supply.
⁵ Economic impact of not meeting shortage (i.e., "no action" alternative) in 2030 as estimated by TWDB.

5B.17.1.3 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended to meet the projected 2030 shortage of the City of Alvarado:

- Lake Granbury SWATS expansion by 2030 to supply an additional 72 acft/yr
- Voluntary Redistribution from BRA System

For the long-term period beyond 2030, the following additional water management strategies are recommended:

- Lake Granbury SWATS Expansion

5B.17.1.4 Costs

Costs of the recommended plan for the City of Alvarado to meet 2030 shortages are:

- a. Lake Granbury SWATS Expansion:
 - Cost Source: Section 5A.16
 - Date to be Implemented: before 2010
 - Total Project Cost: \$690,000
 - Annual Cost: \$85,000

**Table 5B.17-3.
Recommended Plan Costs by Decade for the City of Alvarado**

<i>Plan Element</i>	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Lake Granbury SWATS Expansion						
Projected Surplus/(Shortage) (acft/yr)	205	105	(7)	(72)	(142)	(220)
Supply from Plan Element (acft/yr)	-	72	72	72	220	220
Annual Cost (\$/yr)	-	\$85,000	\$85,000	\$85,000	\$190,000	\$190,000
Unit Cost (\$/acft)	-	\$1,180	\$1,180	\$1,180	\$863	\$863

5B.17.2 City of Briar Oaks

5B.17.2.1 Description of Supply

The City of Briar Oaks obtains its water supply from groundwater from the Trinity Aquifer. Based on the supply available from the Trinity Aquifer, the City of Briar Oaks is projected to have a shortage in the amount of 36 acft/yr in the year 2030 and 38 acft/yr in the year 2050.

5B.17.2.2 Options Considered

Table 5B.17-4 lists the water management strategies, references to the report section discussing the strategy, total project cost, and unit costs that were considered for meeting the City of Briar Oaks’ projected shortage.

**Table 5B.17-4.
Water Management Strategies Considered for the City of Briar Oaks**

Option	Yield (acft/yr)	Approximate Cost ¹	
		Total	Unit (\$/acft)
Additional Water Conservation (Section 5A.2)	3	\$1,700/yr	\$574 ²
Voluntary Redistribution (Section 5A.6)	41	\$940/yr	\$23 ³
Lake Granbury SWATS Expansion (2030) (Section 5A.16)	41	\$393,000	\$1,180 ⁴
No Action	-	\$1,528,000 ⁵	\$42,443 ⁵
¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft per year) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity. ² Source of Cost Estimate: Section 5A.2. ³ Source of Cost Estimate: Section 5A.6. ⁴ Source of Cost Estimate: Section 5A.16 (prorated for City of Briar Oaks). Includes cost of raw water supply. ⁵ Economic impact of not meeting shortage (i.e., “no action” alternative) in 2030 as estimated by TWDB			

5B.17.2.3 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended to meet the projected 2030 and 2050 shortage of the City of Briar Oaks:

- Lake Granbury SWATS expansion by 2030 to supply an additional 36 acft/yr
- Voluntary Redistribution from BRA System

5B.17.2.4 Costs

Costs of the recommended plan for the City of Briar Oaks to meet 2030 shortages are:

- a. Lake Granbury SWATS Expansion:
 - Cost Source: Section 5A.16
 - Date to be Implemented: before 2010
 - Total Project Cost: \$393,000
 - Annual Cost: \$48,000

**Table 5B.17-5.
Recommended Plan Costs by Decade for the City of Briar Oaks**

<i>Plan Element</i>	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Lake Granbury SWATS Expansion						
Projected Surplus/(Shortage) (acft/yr)	(45)	(41)	(38)	(36)	(37)	(38)
Supply from Plan Elements (acft/yr)	-	41	41	41	41	41
Annual Cost (\$/yr)	-	\$48,000	\$48,000	\$48,000	\$9,000	\$9,000
Unit Cost (\$/acft)	-	\$1,180	\$1,180	\$1,180	\$212	\$212

5B.17.3 City of Burleson

5B.17.3.1 Description of Supply

The City of Burleson obtains its water supply from Tarrant Regional Municipal Water District (TRMWD). The city purchases water through the City of Fort Worth supply system. Based on the amount of supply currently available from TRMWD, the City of Burleson is projected to have a shortage of 783 acft/yr in the year 2030 and 1,544 acft/yr in the year 2050.

5B.17.3.2 Options Considered

Table 5B.17-6 lists the water management strategies, references to the report section discussing the strategy, total project cost, and unit costs that were considered for meeting the City of Burleson's shortage.

**Table 5B.17-6.
Water Management Strategies Considered for the City of Burleson**

<i>Option</i>	<i>Yield (acft/yr)</i>	<i>Approximate Cost¹</i>	
		<i>Total</i>	<i>Unit (\$/acft)</i>
Additional Water Conservation (Section 5A.2)	156	\$90,000/yr	\$574 ²
Water Supply from Tarrant Regional MWD	783	0	766 ³
No Action	-	\$34,180,000 ⁴	\$43,652 ⁴

¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft per year) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity.
² Source of Cost Estimate: Section 5A.2.
³ Source of Cost Estimate: Based on estimated cost for treated water from TRMWD System.
⁴ Economic impact of not meeting shortage (i.e., "no action" alternative) in 2030 as estimated by TWDB.

5B.17.3.3 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended to meet the projected 2030 shortage of the City of Burleson:

- Water Supply from Tarrant Regional MWD

For the long-term period beyond 2030, the following additional water management strategies are recommended:

- Water Supply from Tarrant Regional MWD

5B.17.3.4 Costs

Costs of the recommended plan for the City of Burleson to meet 2030 shortages are:

- Water Supply from Tarrant Regional MWD:
 - Cost Source: Based on estimated cost for treated water from TRMWD.
 - Date to be Implemented: before 2010
 - Total Project Cost: \$0
 - Annual Cost: \$600,000

**Table 5B.17-7.
Recommended Plan Costs by Decade for the City of Burleson**

<i>Plan Element</i>	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Water Supply from Tarrant MWD						
Projected Shortage (acft/yr)	43	(309)	(341)	(783)	(1,143)	(1,544)
Supply from Plan Element (acft/yr)	0	309	341	783	1,143	1,544
Annual Cost (\$/yr)	\$0	\$237,000	\$261,00	\$600,000	\$875,000	\$1,183,000
Unit Cost (\$/acft)	\$	\$766	\$766	\$766	\$766	\$766

5B.17.4 City of Cleburne

The City of Cleburne obtains its water supply from Lake Pat Cleburne, Lake Aquilla, and groundwater from the Trinity Aquifer. The city owns and operates Lake Pat Cleburne that impounds runoff from Nolan Creek for storage and use. The city has contracted with the Brazos River Authority for water supply from Lake Aquilla (5,300 acft/yr) and from the BRA System (4,700 acft/yr). Currently, the City of Cleburne has not implemented facilities to utilize the

4,700 acft/yr of water supply from the BRA system. The city owns and operates six wells that produce water from the Trinity Aquifer. Based on the existing water supply available to the City of Cleburne, no shortages are projected through the year 2030 and no changes in water supply are recommended.

5B.17.5 City of Godley

5B.17.5.1 Description of Supply

The City of Godley obtains its water supply from groundwater from the Trinity Aquifer. The city owns and operates six wells that serve as its primary supply. The City also has interconnected their system with the Johnson County Rural WSC system for emergency use. Based on the available groundwater supply, the City of Godley is projected to have a shortage of 60 acft/yr in the year 2030.

5B.17.5.2 Options Considered

Table 5B.17-8 lists the water management strategies, references to the report section discussing the strategy, total project cost, and unit costs that were considered for meeting the City of Godley’s projected shortage.

**Table 5B.17-8.
Water Management Strategies Considered for the City of Godley**

Option	Yield (acft/yr)	Approximate Cost ¹	
		Total	Unit (\$/acft)
Additional Water Conservation (Section 5A.2)	4	\$2,300/yr	\$574 ²
Voluntary Redistribution (Section 5A.6)	63	\$1,450/yr	\$23 ³
Lake Granbury SWATS Expansion (2030) (Section 5A.16)	63	\$604,000	\$1,180 ⁴
No Action	-	\$2,547,000 ⁵	\$42,443 ⁵

¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft per year) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity.
² Source of Cost Estimate: Section 5A.2.
³ Source of Cost Estimate: Section 5A.6.
⁴ Source of Cost Estimate: Section 5A.16 (prorated for City of Godley). Includes cost of raw water supply.
⁵ Economic impact of not meeting shortage (i.e., “no action” alternative) in 2030 as estimated by TWDB.

5B.17.5.3 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended to meet the projected 2030 and 2050 shortage of the City of Godley:

- Lake Granbury SWATS expansion
- Voluntary Redistribution from BRA System

5B.17.5.4 Costs

Costs of the recommended plan for the City of Godley to meet 2030 shortages are:

- a. Lake Granbury SWATS Expansion:
 - Cost Source: Section 5A.16
 - Date to be Implemented: before 2010
 - Total Project Cost: \$604,000
 - Annual Cost: \$74,000

**Table 5B.17-9.
Recommended Plan Costs by Decade for the City of Godley**

<i>Plan Element</i>	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Lake Granbury SWATS Expansion						
Projected Surplus/(Shortage) (acft/yr)	(67)	(63)	(61)	(60)	(59)	(60)
Quantity Available (acft/yr)	-	63	63	63	63	63
Annual Cost (\$/yr)	-	\$74,000	\$74,000	\$74,000	\$13,000	\$13,000
Unit Cost (\$/acft)	-	\$1,180	\$1,180	\$1,180	\$212	\$212

5B.17.6 City of Grand View

5B.17.6.1 Description of Supply

The City of Grand View obtains its water supply from groundwater from the Trinity Aquifer. The city owns and operates four wells that serve as the sole source supply for the city. Based on the available groundwater supply, the City of Grand View is projected to have a shortage of 160 acft/yr in the year 2030.

5B.17.6.2 Options Considered

Table 5B.17-10 lists the water management strategies, references to the report section discussing the strategy, total project cost, and unit costs that were considered for meeting the City of Grand View's shortage.

**Table 5B.17-10.
Water Management Strategies Considered for the City of Grand View**

Option	Yield (acft/yr)	Approximate Cost ¹	
		Total	Unit (\$/acft)
Additional Water Conservation (Section 5A.2)	11	\$6,300/yr	\$574 ²
Voluntary Redistribution (Section 5A.6)	190	\$4,400/yr	\$23 ³
Lake Granbury SWATS Expansion (2030) (Section 5A.16)	160	\$1,533,000	\$1,180 ⁴
Lake Granbury SWATS Expansion (2050) (Section 5A.16)	30	\$288,000	\$1,180 ⁴
No Action	-	\$6,791,000 ⁵	\$42,443 ⁵

¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft per year) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity.
² Source of Cost Estimate: Section 5A.2.
³ Source of Cost Estimate: Section 5A.6.
⁴ Source of Cost Estimate: Section 5A.16 (prorated for City of Grand View). Cost of raw water supply included.
⁵ Economic impact of not meeting shortage (i.e., "no action" alternative) in 2030 as estimated by TWDB.

5B.17.6.3 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended to meet the projected 2030 shortage of the City of Grand View:

- Lake Granbury SWATS Expansion
- Voluntary Redistribution from BRA System

For the long-term period beyond 2030, the following additional water management strategies are recommended:

- Lake Granbury SWATS Expansion

5B.17.6.4 Costs

Costs of the recommended plan for the City of Grand View to meet 2030 shortages are:

- a. Lake Granbury SWATS Expansion:
- Cost Source: Section 5A.16
 - Date to be Implemented: before 2010
 - Total Project Cost: \$1,533,000
 - Annual Cost: \$189,000

**Table 5B.17-11.
Recommended Plan Costs by Decade for the City of Grand View**

<i>Plan Element</i>	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Lake Granbury SWATS Expansion						
Projected Surplus/(Shortage) (acft/yr)	(138)	(143)	(148)	(160)	(172)	(190)
Supply from Plan Elements (acft/yr)	-	160	160	160	190	190
Annual Cost (\$/yr)	-	\$189,000	\$189,000	\$189,000	\$69,000	\$69,000
Unit Cost (\$/acft)	-	\$1,180	\$1,180	\$1,180	\$363	\$363

5B.17.7 City of Joshua**5B.17.7.1 Description of Supply**

The City of Joshua obtains its water supply from Johnson County Fresh Water Supply District No. 1 (Johnson Co. FWSD No. 1). Johnson Co. FWSD No. 1 utilizes groundwater from the Trinity Aquifer and surface water from Lake Granbury through the existing SWATS. The district has contracted with the Brazos River Authority for 2,665 acft/yr of supply from the BRA System. The district has contracted with the BRA for 605 acft/yr (0.54 mgd) of conveyance and treatment capacity from SWATS. Based on the existing supply available from groundwater and SWATS, a shortage of 29 acft/yr is projected in the year 2030 and 209 acft/yr in the year 2050.

5B.17.7.2 Options Considered

Table 5B.17-12 lists the water management strategies, references to the report section discussing the strategy, total project cost, and unit costs that were considered for meeting the City of Joshua's shortage.

**Table 5B.17-12.
Water Management Strategies Considered for the City of Joshua**

<i>Option</i>	<i>Yield (acft/yr)</i>	<i>Approximate Cost¹</i>	
		<i>Total</i>	<i>Unit (\$/acft)</i>
Additional Water Conservation (Section 5A.2)	34	\$20,000/yr	\$574 ²
Lake Granbury SWATS Expansion (2030) (Section 5A.16)	29	\$278,000	\$1,180 ³
Lake Granbury SWATS Expansion (2050) (Section 5A.16)	180	\$1,725,00	\$1,180 ³
No Action	-	\$1,345,000 ⁴	\$46,394 ⁴
¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft per year) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity. ² Source of Cost Estimate: Section 5A.2. ³ Source of Cost Estimate: Section 5A.16 (prorated for City of Joshua). ⁴ Economic impact of not meeting shortage (i.e., "no action" alternative) in 2030 as estimated by TWDB.			

5B.17.7.3 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended to meet the projected 2030 shortage of the City of Joshua:

- Lake Granbury SWATS Expansion

For the long-term period beyond 2030, the following additional water management strategies are recommended:

- Lake Granbury SWATS Expansion

5B.17.7.4 Costs

Costs of the recommended plan for the City of Joshua to meet 2030 shortages are:

- a. Lake Granbury SWATS Expansion:
 - Cost Source: Section 5A.16
 - Date to be Implemented: before 2030
 - Total Project Cost: \$278,000
 - Annual Cost: \$34,000

**Table 5B.17-13.
Recommended Plan Costs by Decade for the City of Joshua**

<i>Plan Element</i>	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Lake Granbury SWATS Expansion						
Projected Surplus/(Shortage) (acft/yr)	226	142	64	(29)	(101)	(209)
Supply from Plan Elements (acft/yr)	-	-	-	29	209	209
Annual Cost (\$/yr)	-	-	-	\$34,000	\$247,000	\$247,000
Unit Cost (\$/acft)	-	-	-	\$1,180	\$1,180	\$1,180

5B.17.8 City of Keene

5B.17.8.1 Description of Supply

The City of Keene obtains its water supply from groundwater from the Trinity Aquifer. The city owns and operates 11 wells that serve as their sole source water supply. The City of Keene has experienced water supply problems in recent years and is evaluating various options to meet existing and future needs. Based on the available groundwater supply, a shortage of 1,149 acft/yr is projected for the year 2030 and 1,495 acft/yr for the year 2050.

5B.17.8.2 Options Considered

Table 5B.17-14 lists the water management strategies, references to the report section discussing the strategy, total project cost, and unit costs that were considered for meeting the City of Keene's shortage.

**Table 5B.17-14.
Water Management Strategies Considered for the City of Keene**

<i>Option</i>	<i>Yield (acft/yr)</i>	<i>Approximate Cost¹</i>	
		<i>Total</i>	<i>Unit (\$/acft)</i>
Additional Water Conservation (Section 5A.2)	65	\$37,000/yr	\$574 ²
Voluntary Redistribution (Section 5A.6)	1,495	\$34,000/yr	23 ³
Lake Granbury SWATS Expansion (2030) (Section 5A.16)	1,149	\$11,012,000	\$1,180 ⁴
Lake Granbury SWATS Expansion (2050) (Section 5A.16)	346	\$3,316,000	\$1,180 ⁴
No Action	-	\$53,306,000 ⁵	\$46,394 ⁵

¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft per year) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity.
² Source of Cost Estimate: Section 5A.2.
³ Source of Cost Estimate: Section 5A.6.
⁴ Source of Cost Estimate: Section 5A.16 (prorated for City of Keene). Costs for raw water supply included.
⁵ Economic impact of not meeting shortage (i.e., "no action" alternative) in 2030 as estimated by TWDB.

5B.17.8.3 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended to meet the projected 2030 shortage of the City of Keene:

- Lake Granbury SWATS Expansion.
- Voluntary Redistribution from BRA System

For the long-term period beyond 2030, the following additional water management strategies are recommended:

- Lake Granbury SWATS Expansion

5B.17.8.4 Costs

Costs of the recommended plan for the City of Keene to meet 2030 shortages are:

- a. Lake Granbury SWATS Expansion:
 - Cost Source: Section 5A.16
 - Date to be Implemented: before 2010
 - Total Project Cost: \$11,012,000
 - Annual Cost: \$1,356,000

**Table 5B.17-15.
Recommended Plan Costs by Decade for the City of Keene**

<i>Plan Element</i>	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Lake Granbury SWATS Expansion						
Projected Shortage (acft/yr)	(623)	(791)	(1,004)	(1,149)	(1,312)	(1,495)
Supply from Plan Element (acft/yr)	-	1,149	1,149	1,149	1,495	1,495
Annual Cost (\$/yr)	-	\$1,356,000	\$1,356,000	\$1,356,000	\$652,000	\$652,000
Unit Cost (\$/acft)	-	\$1,180	\$1,180	\$1,180	\$436	\$436

5B.17.9 City of Mansfield

The City of Mansfield obtains its water supply from surface water from the Tarrant Regional Municipal Water District (TRMWD). The city has contracted for sufficient quantity of water supply to meet its projected needs through the year 2050. No shortage is projected for the City of Mansfield and no changes in water supply are recommended.

5B.17.10 City of Rio Vista

5B.17.10.1 Description of Supply

The City of Rio Vista obtains its water supply from groundwater from the Trinity Aquifer. The city owns and operates two wells that serve as the city's primary water supply. The city has an existing interconnection with Johnson County Rural WSC for emergency use. Based on the available groundwater supply, the City of Rio Vista is projected to have a shortage of 34 acft/yr in the year 2030 and 36 acft/yr in the year 2050.

5B.17.10.2 Options Considered

Table 5B.17-16 lists the water management strategies, references to the report section discussing the strategy, total project cost, and unit costs that were considered for meeting the City of Rio Vista's shortage.

**Table 5B.17-16.
Water Management Strategies Considered for the City of Rio Vista**

<i>Option</i>	<i>Yield (acft/yr)</i>	<i>Approximate Cost¹</i>	
		<i>Total</i>	<i>Unit (\$/acft)</i>
Additional Water Conservation (Section 5A.2)	11	\$6,300/yr	\$574 ²
Voluntary Redistribution (Section 5A.6)	41	\$940/yr	\$23 ³
Lake Granbury SWATS Expansion (2030) (Section 5A.16)	41	\$393,000	\$1,180 ⁴
No Action	-	\$1,443,000 ⁵	\$42,443 ⁵

¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft per year) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity.
² Source of Cost Estimate: Section 5A.2.
³ Source of Cost Estimate: Section 5A.6.
⁴ Source of Cost Estimate: Section 5A.16 (prorated for City of Rio Vista). Costs for raw water supply included.
⁵ Economic impact of not meeting shortage (i.e., "no action" alternative) in 2030 as estimated by TWDB.

5B.17.10.3 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended to meet the projected 2030 and 2050 shortage of the City of Rio Vista:

- Lake Granbury SWATS Expansion
- Voluntary Redistribution from BRA System

5B.17.10.4 Costs

Costs of the recommended plan for the City of Rio Vista to meet 2030 shortages are:

- a. Lake Granbury SWATS Expansion:
- Cost Source: Section 5A.16
 - Date to be Implemented: before 2010
 - Total Project Cost: \$393,000
 - Annual Cost: \$48,000

**Table 5B.17-17.
Recommended Plan Costs by Decade for the City of Rio Vista**

<i>Plan Element</i>	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Lake Granbury SWATS Expansion						
Projected Shortage (acft/yr)	(44)	(41)	(37)	(34)	(34)	(36)
Supply from Plan Element (acft/yr)	-	41	41	41	41	41
Annual Cost (\$/yr)	-	\$48,000	\$48,000	\$48,000	\$8,700	\$8,700
Unit Cost (\$/acft)	-	\$1,180	\$1,180	\$1,180	\$212	\$212

5B.17.11 City of Venus

5B.17.11.1 Description of Supply

The City of Venus obtains its water supply from groundwater from the Trinity Aquifer. The city owns and operates four wells that serve as their sole source water supply. Based on the available groundwater supply, the City of Venus is projected to have a shortage of 323 acft/yr in the year 2030 and 418 acft/yr in the year 2050.

5B.17.11.2 Options Considered

Tale 5B.17-18 lists the water management strategies, references to the report section discussing the strategy, total project cost, and unit costs that were considered for meeting the City of Venus's shortage. Additional alternatives for the City of Venus may include sources in the Trinity River Basin, however, the quantity of water potentially available is not known and these alternatives are not included in this plan. It is recommended that the City of Venus consider sources in the Trinity River Basin (Region C) as well as the strategies shown in Table 5B.17-18.

Table 5B.17-18
Water Management Strategies Considered for the City of Venus

<i>Option</i>	<i>Yield (acft/yr)</i>	<i>Approximate Cost¹</i>	
		<i>Total</i>	<i>Unit (\$/acft)</i>
Additional Water Conservation (Section 5A.2)	15	\$8,600/yr	\$574 ²
Voluntary Redistribution (Section 5A.6)	418	\$9,600/yr	\$23 ³
Lake Granbury SWATS Expansion (2030) (Section 5A.16)	383	\$3,670,000	\$1,180 ⁴
No Action	-	N/A ⁵	N/A ⁵
¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft per year) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity. ² Source of Cost Estimate: Section 5A.2. ³ Source of Cost Estimate: Section 5A.6. ⁴ Source of Cost Estimate: Section 5A.16 (prorated for City of Venus). Costs for raw water supply included. ⁵ Economic impact of not meeting shortage (i.e. "no action" alternative) was not available.			

5B.17.11.3 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended to meet the projected 2030 and 2050 shortage of the City of Venus:

- Lake Granbury SWATS Expansion
- Voluntary Redistribution from BRA System

5B.17.11.4 Costs

Costs of the recommended plan for the City of Venus to meet 2030 shortages are:

- a. Lake Granbury SWATS Expansion:
- Cost Source: Sectino 5A.16
 - Date to be Implemented: before 2010
 - Total Project Cost: \$3,670,000
 - Annual Cost: \$381,000

**Table 5B.17-19
Recommended Plan Costs by Decade for the City of Venus**

<i>Plan Element</i>	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Lake Granbury SWATS Expansion						
Projected Shortage (acft/yr)	(232)	(257)	(293)	(323)	(371)	(418)
Supply from Plan Element (acft/yr)	-	323	323	323	418	418
Annual Cost (\$/yr)	-	\$381,000	\$381,000	\$381,000	\$181,000	\$181,000
Unit Cost (\$/acft)	-	\$1,180	\$1,180	\$1,180	\$433	\$433

5B.17.12 County-Other**5B.17.12.1 Description of Supply**

Johnson County-Other obtains its water supply primarily from groundwater from the Trinity Aquifer and from surface water from Lake Granbury. One of the largest water supply entities in the county is Johnson County Rural WSC (Johnson Co. Rural WSC). Johnson Co. Rural WSC owns and operates 25 wells that produce water from the Trinity Aquifer and has contracted with the Brazos River Authority for surface water from Lake Granbury. Johnson Co. Rural WSC has contracted with BRA for 6,104 acft/yr for raw water from the BRA System and 2,621 acft/yr of conveyance and treatment capacity from SWATS. Johnson Co. Rural WSC currently does not have the infrastructure to utilize the remaining 3,483 acft/yr of supply from the BRA System. Based on the available groundwater and surface water supply, Johnson County-Other (including Johnson Co. Rural WSC) is projected to have a shortage of 7,054 acft/yr in the year 2030 and 9,046 acft/yr in the year 2050.

5B.17.12.2 Options Considered

Table 5B.17-20 lists the water management strategies, references to the report section discussing the strategy, total project cost, and unit costs that were considered for meeting the Johnson County-Other shortage.

Table 5B.17-20.
Water Management Strategies Considered for Johnson County-Other

Option	Yield (acft/yr)	Approximate Cost ¹	
		Total	Unit (\$/acft)
Additional Water Conservation (Section 5A.2)	593	\$340,000/yr	\$574 ²
Voluntary Redistribution (Section 5A.6)	9,046	\$208,000/yr	\$23 ³
Lake Granbury SWATS Expansion (2030) (Section 5A.16)	7,054	\$67,608,000	\$1,180 ⁴
Lake Granbury SWATS Expansion (2050) (Section 5A.16)	1,992	\$19,092,000	\$1,180 ⁴
No Action	-	\$136,652,000 ⁵	\$18,080 ⁵
¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft per year) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity. ² Source of Cost Estimate: Section 5A.2. ³ Source of Cost Estimate: Section 5A.6. ⁴ Source of Cost Estimate: Section 5A.16 (prorated for County-Other). Costs for raw water supply included. ⁵ Economic impact of not meeting shortage (i.e., "no action" alternative) in 2030 as estimated by TWDB.			

5B.17.12.3 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended to meet the projected 2030 shortage for County-Other:

- Lake Granbury SWATS Expansion
- Voluntary Redistribution from BRA System

For the long-term period beyond 2030, the following additional water management strategies are recommended:

- Lake Granbury SWATS Expansion

5B.17.12.4 Costs

Costs of the recommended plan for County-Other to meet 2030 shortages are:

- a. Lake Granbury SWATS Expansion:
- Cost Source: Section 5A.16
 - Date to be Implemented: before 2010
 - Total Project Cost: \$67,608,000
 - Annual Cost: \$8,324,000

**Table 5B.17-21.
Recommended Plan Costs by Decade for County-Other**

<i>Plan Element</i>	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Lake Granbury SWATS Expansion						
Projected Shortage (acft/yr)	(4,406)	(5,137)	(3,675)	(7,054)	(8,253)	(9,046)
Supply from Plan Element (acft/yr)	-	7,054	7,054	7,054	9,046	9,046
Annual Cost (\$/yr)	-	\$8,324,000	\$8,324,000	\$8,324,000	\$3,842,000	\$3,842,000
Unit Cost (\$/acft)	-	\$1,180	\$1,180	\$1,180	\$425	\$425

5B.17.13 Manufacturing**5B.17.13.1 Description of Supply**

Water supply for Manufacturing in Johnson County is obtained by purchase from a city or water supply corporation or from private wells operated by the Manufacturing entity. Each of the cities and the rural area outside of the cities in Johnson County could potentially supply the Manufacturing demand with implementation of a water supply project to meet its needs. Any of the cities or County-Other in Johnson County would have the available water supply to meet all of the projected Manufacturing shortage through development of additional supplies. The plan for additional water supply development in Johnson County is the expansion of the Lake Granbury SWATS facility to meet the regional needs. Therefore, for Manufacturing demands the cost of water supply is participation in the regional project.

5B.17.13.2 Options Considered

Table 5B.17-22 lists the water management strategies, references to the report section discussing the strategy, total project cost, and unit costs that were considered for meeting the Manufacturing shortage.

**Table 5B.17-22.
Water Management Strategies Considered for Johnson County Manufacturing**

Option	Yield (acft/yr)	Approximate Cost ¹	
		Total	Unit (\$/acft)
Voluntary Redistribution (Section 5A.6)	1,839	\$42,000/yr	\$23 ²
Lake Granbury SWATS Expansion (2030) (Section 5A.16)	1,309	\$12,546,000	\$1,180 ³
Lake Granbury SWATS Expansion (2050) (Section 5A.16)	530	\$5,080,000	\$1,180 ³
No Action	-	\$262,967,000 ⁴	\$200,891 ⁴

¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft per year) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity.
² Source of Cost Estimate: Section 5A.6.
³ Source of Cost Estimate: Section 5A.16 (prorated for Manufacturing). Costs for raw water supply included.
⁴ Economic impact of not meeting shortage (i.e., "no action" alternative) in 2030 as estimated by TWDB.

5B.17.13.3 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended to meet the projected 2030 shortage for Manufacturing:

- Lake Granbury SWATS Expansion
- Voluntary Redistribution from BRA System

For the long-term period beyond 2030, the following additional water management strategies are recommended:

- Lake Granbury SWATS Expansion

5B.17.13.4 Costs

Costs of the recommended plan for Manufacturing to meet 2030 shortages are:

- a. Lake Granbury SWATS Expansion:
 - Cost Source: Section 5A.16
 - Date to be Implemented: before 2010
 - Total Project Cost: \$12,546,000
 - Annual Cost: \$1,545,000

**Table 5B.17-23.
Recommended Plan Costs by Decade for Johnson County Manufacturing**

<i>Plan Element</i>	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Lake Granbury SWATS Expansion						
Projected Shortage (acft/yr)	(640)	(844)	(1,069)	(1,309)	(1,570)	(1,839)
Supply from Plan Element (acft/yr)	-	1,309	1,309	1,309	1,839	1,839
Annual Cost (\$/yr)	-	\$801,000	\$801,000	\$801,000	\$258,000	\$258,000
Unit Cost (\$/acft)	-	\$1,180	\$1,180	\$1,180	\$491	\$491

5B.17.14 Steam-Electric

Steam-Electric demand in Johnson County associated with the Tenaska IV Texas Partners Cogeneration Plant in Cleburne. This power generation plant was recently put into service, however, no demand projections were included. Water supply for this facility is obtained primarily from wastewater reuse from the City of Cleburne and a small amount of potable water from the City of Cleburne. No shortages for Steam-Electric are projected and no changes in water supply are recommended.

5B.17.15 Mining

5B.17.15.1 Description of Supply

Mining demand in Johnson County is primarily met from existing groundwater resources. Based on the available groundwater supply, Mining is projected to have a shortage of 33 acft/yr in the year 2030 and 21 acft/yr in the year 2050. These small quantities of water demand will likely be met from local groundwater or municipal supplies. The expansion of the Lake Granbury SWATS facility is recommended as a regional solution for Johnson County and, therefore, for planning purposes it is included as the recommended plan for meeting future Mining shortages.

5B.17.15.2 Options Considered

Table 5B.17-24 lists the water management strategies, references to the report section discussing the strategy, total project cost, and unit costs that were considered for meeting the Mining shortage.

**Table 5B.17-24.
Water Management Strategies Considered for Johnson County Mining**

<i>Option</i>	<i>Yield (acft/yr)</i>	<i>Approximate Cost¹</i>	
		<i>Total</i>	<i>Unit (\$/acft)</i>
Voluntary Redistribution (Section 5A.6)	33	\$759	23 ²
Lake Granbury SWATS Expansion (2030) (Section 5A.16)	33	\$316,000	\$1,180 ³
No Action	-	\$193,000 ⁴	\$3,273 ⁴
¹ Unless otherwise noted, costs are Total Project Cost and Unit Cost (\$/acft per year) for treated water delivered to the water supply entity or entities. Unit cost is for full utilization of project capacity. ² Source of Cost Estimate: Section 5A.6. ³ Source of Cost Estimate: Section 5A.16 (prorated for Mining). Costs for raw water supply included. ⁴ Economic impact of not meeting shortage (i.e., "no action" alternative) in 2030 as estimated by TWDB.			

5B.17.15.3 Water Supply Plan

Working within the planning criteria established by the Brazos G RWPG and TWDB, the following water supply plan is recommended to meet the projected 2030 and 2050 shortage for Mining:

- Lake Granbury SWATS Expansion
- Voluntary Redistribution

5B.17.15.4 Costs

Costs of the recommended plan for Mining to meet 2030 shortages are:

- a. Lake Granbury SWATS Expansion:
 - Cost Source: Section 5A.16
 - Date to be Implemented: before 2030
 - Total Project Cost: \$316,000
 - Annual Cost: \$39,000

**Table 5B.17-25.
Recommended Plan Costs by Decade for Johnson County Mining**

<i>Plan Element</i>	<i>2000</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>
Lake Granbury SWATS Expansion						
Projected Shortage (acft/yr)	(238)	(111)	(57)	(33)	(17)	(21)
Supply from Plan Element (acft/yr)	-	33	33	33	33	33
Annual Cost (\$/yr)	-	\$39,000	\$39,000	\$39,000	\$7,000	\$7,000
Unit Cost (\$/acft)	-	\$1,180	\$1,180	\$1,180	\$212	\$212

5B.17.16 Irrigation

No shortage is projected for Johnson County Irrigation and no changes in water supply are recommended.

5B.17.17 Livestock

No shortage is projected for Johnson County Livestock and no changes in water supply are recommended.