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September 13, 2017

Jeff Walker  
Executive Administrator  
Texas Water Development Board  
P.O. Box 13231  
Austin, Texas 78711

**RE: Adoption of Substitution to the 2016 Region L Regional Water Plan**

Dear Mr. Walker,

At its August 3, 2017, meeting, the South Central Texas Regional Water Planning Group (SCTRWPG) adopted the Guadalupe Blanco River Authority's (GBRA) proposed substitution of an alternative water management strategy in the 2016 South Central Texas Regional Water Plan, for two recommended water management strategies in the Plan.

Previously, the 2016 Plan included the following two recommended water management strategies: 1) GBRA Mid-Basin Project (ASR), and 2) Texas Water Alliance (TWA) Carrizo Project (MAG-limited). The adopted substitution effectively replaced both of these recommended water management strategies with the Mid-Basin Water Supply Project (MBWSP) – Conjunctive Use with Aquifer Storage & Recovery (ASR), which was previously identified in the 2016 Plan as an alternative water management strategy.

The enclosed addendum (*see* GBRA MBWSP Substitution Addendum) details the modifications made to the 2016 Plan. Additionally, San Antonio River Authority (SARA) staff has electronically transmitted an Excel spreadsheet containing the data necessary for updating Database 17 (DB17) to TWDB's Region L representative, Ron Ellis (*see* Region L DB17 Amendment Updates). For your records, please also find the enclosed correspondence between interested parties indicating that the Region L Planning Group followed the protocol for modifying a regional water plan by way of substitution, in accordance with section 357.51(e) of the Texas Administrative Code (*see* GBRA Substitution Correspondence 2016 Region L Plan).

On behalf of the SCTRWPG, I am requesting TWDB adoption of a corresponding amendment to the 2017 State Water Plan in accordance with TWDB Rules (*see* 31 TAC § 357.51 (g)) to reflect the recently adopted modifications of the 2016 South Central Texas Regional Water Plan.

Should your office require any additional information from the Planning Group related to this request, please contact Cole Ruiz ([cruiz@sara-tx.org](mailto:cruiz@sara-tx.org)), Steve Raabe ([sraabe@sara-tx.org](mailto:sraabe@sara-tx.org)), or me ([sscott@sara-tx.org](mailto:sscott@sara-tx.org)).

Sincerely,



Suzanne Scott, Region L Chair  
San Antonio River Authority, General Manager

Enclosures (3):

GBRA MBWSP Substitution Addendum

Region L DB17 Amendment Updates (transmitted electronically)

GBRA Substitution Correspondence 2016 Region L Plan

Cc:

Kevin Patteson, Guadalupe-Blanco River Authority, General Manager

Jonathan Stinson, Guadalupe-Blanco River Authority, Deputy General Manager

Ron Ellis, Texas Water Development Board, Regional Water Planning Project Manager

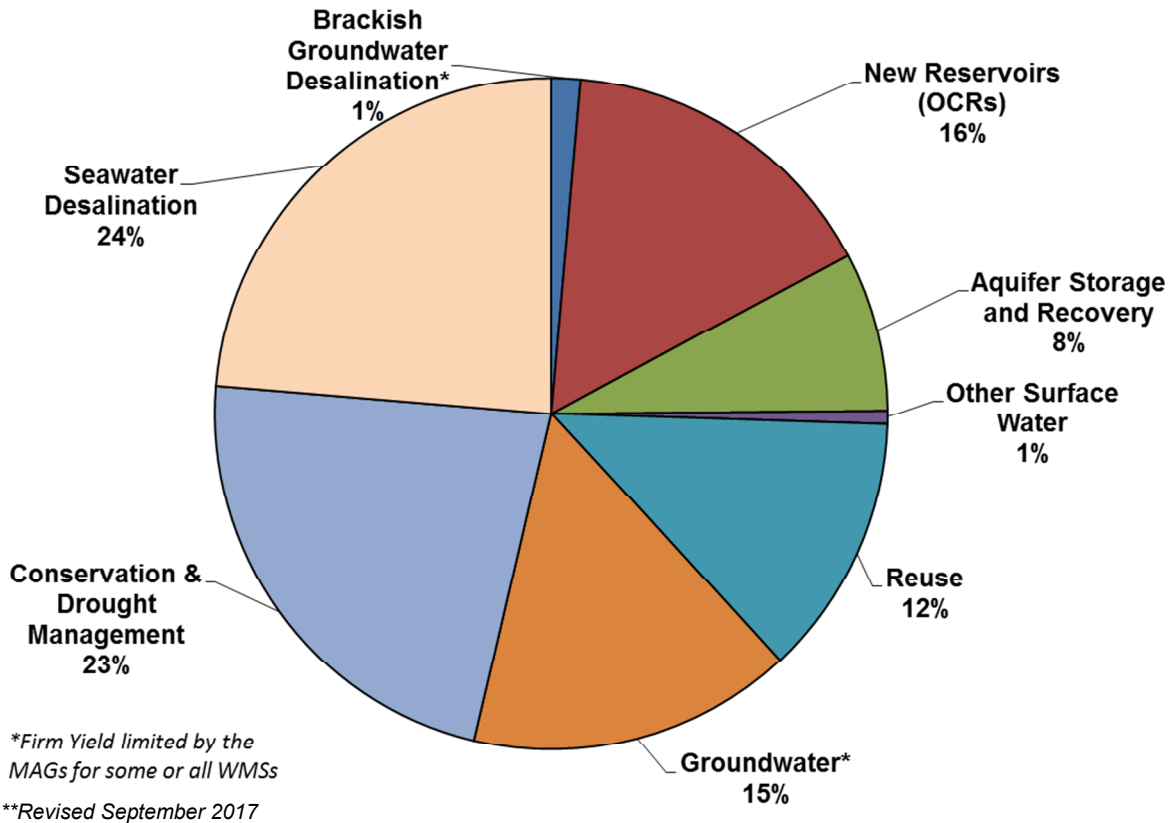
Brian Perkins, Black and Veatch, Integrated Water Supply Practice Lead

Steve Raabe, San Antonio River Authority, Director of Technical Services

Cole Ruiz, San Antonio River Authority, Intergovernmental Relations Coordinator

recovery, groundwater desalination, seawater desalination, new off-channel reservoirs, new groundwater, and new surface water supplies. **Water management strategies recommended to meet projected needs in the South Central Texas Region could produce new supplies in excess of 787,777,000 acft/yr in 2070 and may be categorized by source as shown in [Figure ES-3](#).**

**Figure ES-3 Sources of New Supply**



Water management strategies emphasizing **conservation**, including drought management, comprise about 175,707 acft/yr (22 percent) of recommended new supplies at an estimated unit cost of \$684/acft/yr<sup>2</sup>.

The 2016 SCTRWP includes the **reuse** in the form of the Direct Recycled Water Programs water management strategy at 97,763 acft/yr which could represent approximately 12 percent of the recommended new supplies.

Water management strategies that simultaneously develop **fresh groundwater** supplies and limit depletion of storage in regional aquifers comprise about 16 percent of recommended new supplies and include:

- Local Groundwater Supplies (Carrizo-Wilcox, Gulf Coast, Leona Gravels, Yegua-Jackson, and Trinity) (7,837 acft/yr @ \$130/acft/yr - \$5,316/acft/yr);

<sup>2</sup> \$684/acft/yr is an average cost of municipal water conservation. Actual unit costs vary from WUG to WUG and from decade to decade.

- Hays/Caldwell PUA Project (21,833 acft/yr @ \$1,926/acft/yr);
- ~~TWA Regional Carrizo – MAG Limited (15,000 acft/yr @ \$2,490/acft/yr);~~
- TWA Trinity Project (5,000 acft/yr @ \$613/acft/yr);
- CRWA Wells Ranch Project – Phase 2 – MAG Limited (7,829 acft/yr @ \$858/acft/yr);
- Vista Ridge Project – MAG Limited (34,894 acft/yr @ \$2,177/acft/yr);
- New Braunfels Trinity (1,090 acft/yr @ \$634/acft/yr);
- Victoria Groundwater-Surface Water Exchange (8,544 acft/yr @ \$0/acft/yr);
- Cibolo Valley LGC Carrizo Project (10,000 acft/yr @ \$1,834/acft/yr);
- Regional Carrizo for SSLGC Project Expansion (6,500 acft/yr @ \$1,070/acft/yr);  
and
- Expanded Local Carrizo for SAWS - MAG Limited (5,419 acft/yr @ \$700/acft/yr)

Water management strategies that simultaneously develop **brackish groundwater** supplies and limit depletion of storage in regional aquifers comprise about 1 percent of recommended new supplies and include:

- Brackish Wilcox Groundwater for CRWA - MAG Limited (3,839 acft/yr @ \$2,619/acft/yr);
- Brackish Wilcox Groundwater for SAWS - MAG Limited (5,622 acft/yr @ \$1,289/acft/yr);
- Expanded Brackish Project for SAWS - MAG Limited (0 acft/yr);
- Brackish Wilcox (Gonzales Co.) - MAG Limited (1,392 acft/yr @ \$5,032/acft/yr);  
and
- Brackish Wilcox Groundwater for SSWSC - MAG Limited (0 acft/yr).

Water management strategies that develop new **surface water** supplies comprise 1 percent of recommended new supplies and include:

- CRWA Siesta Project (5,042 acft/yr @ \$1,886/acft/yr).

Water management strategies that involve **new reservoirs** (off-channel storage) comprise approximately 16 percent of recommended new supplies and include:

- GBRA Lower Basin Storage (51,800 acft/yr @ \$140 acft/yr);
- GBRA New Appropriation (Lower Basin) (42,000 acft/yr @ \$591/acft/yr); and
- Victoria County Steam-Electric (29,100 acft/yr @ \$1,225/acft/yr).

Water management strategies that involve **aquifer storage and recovery (ASR)** comprise approximately 9 percent of recommended new supplies and include:

- GBRA Mid-Basin Project – Conjunctive Use with ASR (~~4250~~,000 acft/yr @ \$1,~~637~~836/acft/yr);
- Victoria ASR (7,900 acft/yr @ \$192/acft/yr);

Implementation of the 2016 South Central Texas Regional Water Plan will result in the development of new water supplies that will be reliable in the event of a repeat of the most severe drought on record. Implementation of all recommended water management strategies is not likely to be necessary in order to meet projected needs within the planning period. The SCTRWPG explicitly recognizes the difference between additional supplies and projected needs as System Management Supplies and has recommended water management strategies over and above those apparently needed to meet projected demands in the Regional Water Plan for the following reasons:

- To recognize both the long lead times and the uncertainty associated with risk factors that may prevent implementation of water management strategies and necessitate replacement strategies;
- To preserve flexibility for water user groups or wholesale water suppliers to select the most feasible projects among several consistent with the Regional Plan and, therefore, ensure that such projects are potentially eligible for permitting and funding;
- To serve as additional supplies in the event that rules, regulations, or other restrictions limit use of any planned strategies; and/or
- To ensure adequate supplies in the event of a drought more severe than that which occurred historically.

Costs associated with the implementation and long-term operations and maintenance of water management strategies have been estimated in accordance with TWDB rules and general guidelines and reflect regional water treatment capacity and balancing storage facilities sufficient to meet peak daily and seasonal water demands in the larger urban areas. **Annual unit costs for recommended water management strategies for municipal supply in the 2011 South Central Texas Regional Water Plan (in September 2013 dollars) are estimated to range from a low of about \$140/acft/yr for GBRA Lower Basin Storage (500 acre site) to a high of about \$5,032/acft/yr for the MAG Limited Brackish Wilcox (Gonz Co) for SSLGC strategy and average about \$1,294,285/acft/yr.**

## ES.8 Water Plan Summary

Recommended water management strategies to meet the projected needs of each city, utility, water user group, and wholesale water provider in the South Central Texas Region are presented in Chapter 5 and summarized in tables generated by the TWDB Regional Water Planning Database (DB17) in Appendix A. Likewise, alternative water management strategies are listed in Chapter 5.1 and summarized in tables generated by DB17 in Appendix A.

### 5.1.23 SAWS Vista Ridge

SAWS has contracted with Vista Ridge Consortium for up to 50,000 acft/yr of groundwater supply from Burleson County, Texas. Vista Ridge holds permits from the Post Oak Savannah Groundwater Conservation District for withdrawal of up to 70,000 acft/yr from the Carrizo–Wilcox Aquifer in Burleson County. The project includes a well field, collection system, treatment, and 143 miles of 54-inch and 60-inch transmission pipelines, and will deliver water to northern Bexar County for integration into the SAWS distribution system. Due to MAG limitations, the recommended firm supply for this project is 34,894 acft/yr by 2070 at a unit cost of \$2,177/acft/yr. Volume II, Chapter 5.2.23 includes a detailed discussion of this recommended water management strategy.

### 5.1.24 Hays/Caldwell PUA Project

The Hays/Caldwell PUA Project envisions the development of about 35,690 acft/yr of dependable supply from the Carrizo Aquifer in Caldwell and Gonzales Counties. The HCPUA currently holds 10,300 acft/yr of groundwater permits from the Gonzales County Underground Water Conservation District (GCUWCD) in Caldwell County. Due to MAG limitations, the recommended firm supply for the project is 21,833 acft/yr at an estimated unit cost of \$1,926/acft/yr. Volume II, Chapter 5.2.25 includes a detailed discussion of this recommended water management strategy.

### ~~5.1.25 TWA Carrizo Project~~

~~The Texas Water Alliance (TWA) is currently has groundwater leases in Gonzales County and permits from the GCUWCD for up to 15,000 acft/yr of Carrizo Aquifer groundwater for delivery to entities in Guadalupe, Hays, and Comal Counties. Due to MAG limitations, the recommended firm supply of the project is 14,680 acft/yr at an estimated unit cost of \$2,490/acft/yr. Volume II, Chapter 5.2.26 includes a more detailed discussion of this recommended water management strategy.~~

### ~~5.1.265.1.25~~ TWA Trinity Project

TWA is considering a Trinity Aquifer well field in western Comal County for up to 5,000 acft/yr of new supply for delivery to entities in Comal and Hays Counties. Currently, there is not a groundwater conservation district in Comal County to regulate the Trinity Aquifer. The estimated unit cost of the project is \$613/acft/yr. Volume II, Chapter 5.2.27 includes a more detailed discussion of this recommended water management strategy.

### ~~5.1.275.1.26~~ GBRA Mid-Basin Water Supply Project – Conjunctive Use with ASR

The Guadalupe-Blanco River Authority (GBRA) is in the planning and permitting stages of a phased Mid-Basin Water Supply Project (MBWSP) to provide supplemental water supplies directly to participants in Comal, Caldwell, Hays, and/or Guadalupe Counties. GBRA is currently considering four general formulations of the MBWSP using available surface water and/or groundwater supply sources to ensure unrestricted delivery of a firm yield of up to 50,000 acft/yr. The recommended water management strategy focuses on a Conjunctive Use of surface water, groundwater, and a Aquifer Storage



storage and Recover-recover (ASR) formulation which includes run-of-river diversions from the Guadalupe River near Gonzales, treatment, and transmission to participants or ASR wells in Gonzales County for storage and subsequent recovery during periods when run-of-river diversions are limited, along with groundwater production from the Carrizo Aquifer. The project has a firm yield of 5042,000 acft/yr at an estimated unit cost of \$1,637,836/acft/yr. GBRA's Application No. 12378 for the surface water rights associated with this water management strategy has been declared administratively complete by the Texas Commission on Environmental Quality (TCEQ). GBRA has purchased groundwater permits up to 15,000 acft/yr from TWA for the groundwater component of the project. Volume II, Chapter 5.2.33–32 includes a detailed discussion of this recommended water management strategy.

#### 5.1.285.1.27 GBRA New Appropriation (Lower Basin)

The GBRA New Appropriation (Lower Basin) water management strategy involves diversion of up to 189,484 acft/yr under a new appropriation from the Guadalupe River in Calhoun County using existing gravity-flow diversion facilities located immediately upstream of GBRA's Saltwater Barrier and Diversion Dam at a rate of diversion not to exceed 500 cfs (within the existing 622 cfs maximum authorized diversion rate) and authorization to impound up to 200,000 acft in Calhoun County. The diversions and storage will serve municipal and industrial water users in GBRA's ten-county statutory district and are the subject of Application No. 12482 for surface water rights pending before the TCEQ. The firm supply from this strategy, with a 150,000 acft off-channel reservoir, is 42,000 acft/yr available at a unit cost of \$591/acft/yr for raw water at the reservoir. Volume II, Chapter 5.2.34 includes a detailed discussion of this recommended water management strategy.

#### 5.1.295.1.28 GBRA Lower Basin Storage

The GBRA and Dow Chemical Company (Dow), individually and collectively, own surface water rights in the lower Guadalupe – San Antonio River Basin authorizing diversions totaling 175,501 acre-feet per year (acft/yr). In order to firm up the GBRA/Dow water rights, a 12,500 acft off-channel reservoir supplied from the GBRA Main Canal by a new intake, pump station, and appurtenant transmission facilities is recommended for implementation. The estimated project firm yield is 51,800 acft/yr available at a unit cost of \$140/acft/yr for raw water at the reservoir or Main Canal. Volume II, Chapter 5.2.35 includes a detailed discussion of this recommended water management strategy.

#### 5.1.305.1.29 Victoria County Steam-Electric Project

The Victoria County Steam-Electric Project involves the development of a reliable supply of cooling water to serve a future power plant in Victoria County. Water available under GBRA/Dow existing surface water rights would be diverted from the GBRA Main Canal and delivered to an off-channel cooling reservoir in Victoria County. Using a junior portion of the GBRA/Dow existing water rights, the firm supply of the project is 29,100 acft/yr at an estimated unit cost of \$1,225/acft/yr for raw water. Volume II, Chapter 5.2.37 includes a detailed discussion of this recommended water management strategy.

2016 SCTRWP, if necessary authorizations are obtained pursuant to TCEQ or groundwater conservation district rules and applicable law. Volume II, Chapter 5.2.43 includes a more detailed discussion of this recommended water management strategy.

#### ~~5.1.355~~.1.34 Victoria ASR

The City of Victoria is considering an ASR project to aid in firming up their existing run-of-river water supplies. The strategy involves retrofitting six existing wells and construction of 10 new ASR wells. Because the Victoria WTP has excess capacity and all the wells are within the city limits, no costs are necessary for treatment or transmission. The strategy will yield approximately 7,900 acft/yr at an estimated unit cost of \$192/acft/yr. Volume II, Chapter 5.2.45 includes a more detailed discussion of this recommended water management strategy.

#### ~~5.1.365~~.1.35 Victoria Groundwater-Surface Water Exchange

The City of Victoria plans to expand their groundwater-surface water exchange, a program in which surface water diversions during times they would otherwise be restricted may continue as a result of fresh groundwater discharge into a tributary of the Guadalupe River. Hence, the recommended water management strategy is adding special conditions authorizing groundwater offset to more of Victoria's current water rights thereby increasing firm supply from surface water by 8,544 acft/yr at little, if any, additional cost. Volume II, Chapter 5.2.46 includes a more detailed discussion of this recommended water management strategy.

#### ~~5.1.375~~.1.36 List of Alternative Water Management Strategies

The following is the list of alternative water management strategies in the 2016 SCTRWP:

1. Local Groundwater Supplies (Various Aquifers) (See Chapter 5.2.7)
2. Brackish Wilcox for SSLGC - Envisioned (See Chapter 5.2.12)
3. Brackish Wilcox for SS WSC - Envisioned (See Chapter 5.2.13)
4. Cibolo Valley LGC Carrizo Project - Envisioned (See Chapter 5.2.14)
5. Uvalde ASR - Envisioned (See Chapter 5.2.15)
6. CRWA Wells Ranch - Phase 2 - Envisioned (See Chapter 5.2.16)
7. Brackish Wilcox Groundwater for CRWA - Envisioned (See Chapter 5.2.18)
8. Brackish Wilcox Groundwater for SAWS - Envisioned (See Chapter 5.2.19)
9. SAWS Expanded Brackish Project - Envisioned (See Chapter 5.2.20)
10. SAWS Expanded Local Carrizo - Envisioned (See Chapter 5.2.21)
11. Vista Ridge Project - Envisioned (See Chapter 5.2.23)
12. Hays/Caldwell PUA Project - Phase I & II - Envisioned (See Chapter 5.2.25)
- [13. TWA Carrizo Project – MAG Limited \(See Chapter 5.2.26\)](#)
- ~~13-14.~~ TWA Carrizo Project - Envisioned (See Chapter 5.2.26)



~~14-15.~~ HCPUA/TWA Joint Project (See Chapter 5.2.28)

~~15-16.~~ HCPUA/TWA/GBRA MBWSP Shared Facilities Project (See Chapter 5.2.29)

~~16-17.~~ GBRA Mid-Basin Water Supply Project – Carrizo Only (See Chapter 5.2.30)

~~17-18.~~ GBRA Mid-Basin Water Supply Project – Surface Water (See Chapter 5.2.31)

~~18-19.~~ GBRA Mid-Basin Water Supply Project —~~Conjunctive Use with~~ ASR (See Chapter 5.2.~~3233~~)

~~19-20.~~ Luling ASR (See Chapter 5.2.36)

~~20-21.~~ Lavaca Off-Channel Reservoir (See Chapter 5.2.40)

### ~~5.1.38~~ 5.1.37 List of Water Management Strategies Needing Further Study and/or Funding

The following is the list of water management strategies that need further study and/or funding in the 2016 SCTRWP:

1. Storage above Canyon Reservoir – ASR (See Chapter 5.2.39)
2. Brush Management in Gonzales County (See Chapter 5.2.44)

- Purchase from WWP (GBRA) to be implemented prior to 2020. This strategy can provide an additional 1,120 acft/yr in 2020 increasing to 2,402 acft/yr by 2070.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 113 acft/yr by 2020.

**Table 5.3.3-4. Recommended Water Supply Plan for the City of Lockhart**

	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)	2070 (acft/yr)
Projected Need (Shortage)	188	613	1,042	1,484	1,947	2,402
<b>Recommended Plan</b>						
Municipal Water Conservation	—	—	—	—	—	72
Purchase from WWP (GBRA)	1,120	1,120	1,120	1,484	1,947	2,402
Drought Management	113	—	—	—	—	—
<b>Total New Supply</b>	<b>1,233</b>	<b>1,120</b>	<b>1,120</b>	<b>1,484</b>	<b>1,947</b>	<b>2,474</b>

Estimated costs of the recommended plan to meet the City of Lockhart's projected needs are shown in Table 5.3.3-5.

**Table 5.3.3-5. Recommended Plan Costs by Decade for the City of Lockhart**

Plan Element	2020	2030	2040	2050	2060	2070
<b>Municipal Water Conservation</b>						
Annual Cost (\$/yr)	—	—	—	—	—	\$49,011
Unit Cost (\$/acft)	—	—	—	—	—	\$681
<b>Purchase from WWP (GBRA)</b>						
Annual Cost (\$/yr)	<u>\$1,874,906</u>	<u>\$1,874,906</u>	<u>\$923,324</u>	<u>\$1,233,793</u>	<u>\$1,374,927</u>	<u>\$1,478,417</u>
Unit Cost (\$/acft)	<u>\$1,674</u>	<u>\$1,674</u>	<u>\$824</u>	<u>\$831</u>	<u>\$706</u>	<u>\$615</u>
<b>Drought Management</b>						
Annual Cost (\$/yr)	\$29,702	—	—	—	—	—
Unit Cost (\$/acft)	\$264	—	—	—	—	—

#### 5.3.3.4 City of Luling

Current water supply for the City of Luling is obtained from the Carrizo Aquifer and Guadalupe-Blanco River Authority run-of-river rights. Luling is projected to need additional water supplies prior to 2030. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Luling implement the following water supply plan to meet the projected needs for the city (Table 5.3.3-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 3 acft/yr by 2070.
- Purchase from WWP (GBRA) to be implemented prior to 2020. This strategy can provide an additional 1,680 acft/yr from 2020 increasing to 1,875 by 2070.

**Table 5.3.3-6. Recommended Water Supply Plan for the City of Luling**

	<b>2020 (acft/yr)</b>	<b>2030 (acft/yr)</b>	<b>2040 (acft/yr)</b>	<b>2050 (acft/yr)</b>	<b>2060 (acft/yr)</b>	<b>2070 (acft/yr)</b>
Projected Need (Shortage)	0	41	218	402	596	787
<b>Recommended Plan</b>						
Municipal Water Conservation	—	—	—	—	—	3
Purchase from WWP (GBRA)	1,680	1,680	1,680	1,680	1,684	1,875
<b>Total New Supply</b>	<b>1,680</b>	<b>1,680</b>	<b>1,680</b>	<b>1,680</b>	<b>1,684</b>	<b>1,878</b>

Estimated costs of the recommended plan to meet the City of Luling’s projected needs are shown in Table 5.3.3-7.

**Table 5.3.3-7. Recommended Plan Costs by Decade for the City of Luling**

<b>Plan Element</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
<b>Municipal Water Conservation</b>						
Annual Cost (\$/yr)	—	—	—	—	—	\$2,573
Unit Cost (\$/acft)	—	—	—	—	—	\$770
<b>Purchase from WWP (GBRA)</b>						
Annual Cost (\$/yr)	<u>\$2,812,358</u>	<u>\$2,812,358</u>	<u>\$1,384,986</u>	<u>\$1,396,747</u>	<u>\$1,189,203</u>	<u>\$1,154,052</u>
Unit Cost (\$/acft)	<u>\$1,674</u>	<u>\$1,674</u>	<u>\$824</u>	<u>\$831</u>	<u>\$706</u>	<u>\$615</u>

5.3.3.5 City of Martindale

The City of Martindale is obtained from run-of-river rights. The City of Martindale is projected to need additional water supplies prior to 2030. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that The City of Martindale implement the following water supply plan to meet the projected needs for the City (Table 5.3.3-8).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 1 acft/yr by 2070.
- Purchase from Wholesale Water Provider (CRWA) to be implemented prior to 2030. This strategy can provide an additional supply of 31 acft/yr by 2030, increasing to 177 acft/yr of additional supply by 2070.

#### 5.3.4.6 Rural Area Residential and Commercial

Rural Areas are projected to have adequate water supplies available from the Gulf Coast Aquifer and run-of-river rights of the Guadalupe-Blanco River Authority (GBRA) to meet their projected demands during the planning period.

#### 5.3.4.7 Industrial/Manufacturing

Calhoun County Industrial obtains water supplies available from the Gulf Coast Aquifer, Lake Texana, and run-of-river rights of the Guadalupe-Blanco River Authority (GBRA) to meet the water user group's current demands. The following water supply plan is recommended for Calhoun County Industrial (Table 5.3.4-4).

- Purchase from WWP (GBRA) to be implemented by 2050. This strategy can provide an additional 2,161 acft by 2050 increasing to 11,174 acft/yr by 2070.

An alternative water management strategy to meet the 10,000 acft/yr of needs for Formosa Plastics could be obtained from Purchase from WWP (LNRA) to be implemented by 2020. This strategy can provide an additional 10,000 acft/yr by 2050, continuing through 2070.

**Table 5.3.4-4. Recommended Water Supply Plan for Industrial**

	<b>2020 (acft/yr)</b>	<b>2030 (acft/yr)</b>	<b>2040 (acft/yr)</b>	<b>2050 (acft/yr)</b>	<b>2060 (acft/yr)</b>	<b>2070 (acft/yr)</b>
Projected Need (Shortage)	0	0	0	2,161	6,993	11,174
<b>Recommended Plan</b>						
Purchase from WWP (GBRA)	—	—	—	2,161	6,993	11,174
<b>Total New Supply</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>2,161</b>	<b>6,393</b>	<b>11,174</b>

Estimated costs of the recommended plan for Industrial are shown in Table 5.3.4-5.

**Table 5.3.4-5. Recommended Plan Costs by Decade for Industrial**

<b>Plan Element</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
<b>Purchase from WWP (GBRA)</b>						
Annual Cost (\$/yr)	—	—	—	<b>\$1,796,648</b>	<b>\$4,938,299</b>	<b>\$6,877,532</b>
Unit Cost (\$/acft)	—	—	—	<b>\$831</b>	<b>\$706</b>	<b>\$615</b>

#### 5.3.4.8 Steam-Electric Power

Steam-electric power is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the water user group's projected demands during the planning period.

- Purchase from WWP (~~TWAGBRA~~) to be implemented prior to 2030. This strategy can provide an additional 671 acft/yr by 2030, increasing to 7,468 acft/yr in 2070.

**Table 5.3.5-4. Recommended Water Supply Plan for Canyon Lake WSC**

	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)	2070 (acft/yr)
Projected Need (Shortage)	0	671	2,373	4,095	5,814	7,468
<b>Recommended Plan</b>						
Municipal Water Conservation	—	—	—	75	321	638
Purchase from WWP ( <del>TWAGBRA</del> )	—	671	2,373	4,095	5,814	7,468
<b>Total New Supply</b>	<b>—</b>	<b>671</b>	<b>2,373</b>	<b>4,170</b>	<b>6,135</b>	<b>8,106</b>

Estimated costs of the recommended plan to meet Canyon Lake WSC's projected needs are shown in Table 5.3.5-5.

**Table 5.3.5-5. Recommended Plan Costs by Decade for Canyon Lake WSC**

Plan Element	2020	2030	2040	2050	2060	2070
<b>Municipal Water Conservation</b>						
Annual Cost (\$/yr)	—	—	—	\$57,425	\$246,793	\$491,637
Unit Cost (\$/acft)	—	—	—	\$770	\$770	\$770
<b>Purchase from WWP (<del>TWAGBRA</del>)</b>						
Annual Cost (\$/yr)		<u>\$1,123,269</u>	<u>\$1,956,292</u>	<u>\$3,404,570</u>	<u>\$4,105,716</u>	<u>\$4,596,510</u>
Unit Cost (\$/acft)		<u>\$1,674</u>	<u>\$824</u>	<u>\$831</u>	<u>\$706</u>	<u>\$615</u>

### 5.3.5.3 City of Garden Ridge

Current water supply for the City of Garden Ridge is obtained from the Edwards Aquifer. Garden Ridge is projected to need additional water supplies prior to 2020. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Garden Ridge implement the following water supply plan to meet the projected needs for the city (Table 5.3.5-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 101 acft/yr by 2020, increasing to 1,941 acft/yr of supply in 2070.
- A Local Trinity Groundwater water management strategy to be implemented prior to 2020 can provide an additional 2,000 acft/yr by 2020 through 2070.
- Purchase from WWP (SSLGC) to be implemented prior to 2020. This strategy can provide an additional 150 acft/yr by 2020 through 2070.

**Table 5.3.5-10. Recommended Water Supply Plan for Industrial**

	<b>2020 (acft/yr)</b>	<b>2030 (acft/yr)</b>	<b>2040 (acft/yr)</b>	<b>2050 (acft/yr)</b>	<b>2060 (acft/yr)</b>	<b>2070 (acft/yr)</b>
Projected Need (Shortage)	4,130	4,881	5,612	6,239	7,120	8,074
<b>Recommended Plan</b>						
Purchase from WWP (GBRA)	4,130	4,881	5,612	6,239	7,120	8,074
<b>Total New Supply</b>	<b>4,130</b>	<b>4,881</b>	<b>5,612</b>	<b>6,239</b>	<b>7,120</b>	<b>8,074</b>

Estimated costs of the recommended plan to meet the industrial projected needs are shown in Table 5.3.5-11.

**Table 5.3.5-11. Recommended Plan Costs by Decade for Industrial**

<b>Plan Element</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
<b>Purchase from WWP (GBRA)</b>						
Annual Cost (\$/yr)	<u>\$6,913,714</u>	<u>\$8,170,905</u>	<u>\$4,626,512</u>	<u>\$5,187,084</u>	<u>\$5,027,983</u>	<u>\$4,969,500</u>
Unit Cost (\$/acft)	<u>\$1,674</u>	<u>\$1,674</u>	<u>\$824</u>	<u>\$831</u>	<u>\$706</u>	<u>\$615</u>

#### 5.3.5.7 Steam-Electric Power

There is no projected steam-electric power water demand in Comal County, therefore no water management strategies are recommended for this water user group.

#### 5.3.5.8 Mining

Current water supply for mining is obtained from the Trinity Aquifer. Mining is not projected to need additional water supplies over the planning period.

#### 5.3.5.9 Irrigation

Irrigation is projected to have adequate water supplies available from the Edwards Aquifer, Canyon Reservoir, and run-of-river rights to meet the water user group's projected demand during the planning period.

#### 5.3.5.10 Livestock

Current water supply for livestock is obtained from the Trinity Aquifer and local sources. Livestock is projected to have adequate water supplies through 2070.



**Table 5.3.11-12. Recommended Water Supply Plan for the City of Schertz**

	<b>2020 (acft/yr)</b>	<b>2030 (acft/yr)</b>	<b>2040 (acft/yr)</b>	<b>2050 (acft/yr)</b>	<b>2060 (acft/yr)</b>	<b>2070 (acft/yr)</b>
Projected Need (Shortage)	0	0	1,035	3,410	5,943	8,438
<b>Recommended Plan</b>						
Municipal Water Conservation	240	370	614	957	1,406	1,935
Purchase from WWP (SSLGC)	501	896	1,035	3,410	3,708	3,634
Purchase from WWP (CVLGC)	—	—	—	—	2,235	4,804
<b>Total New Supply</b>	<b>741</b>	<b>1,266</b>	<b>1,649</b>	<b>4,367</b>	<b>7,349</b>	<b>10,373</b>

Estimated costs of the recommended plan to meet the City of Schertz’s projected needs are shown in Table 5.3.11-13.

**Table 5.3.11-13. Recommended Plan Costs by Decade for the City of Schertz**

<b>Plan Element</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
<b>Municipal Water Conservation</b>						
Annual Cost (\$/yr)	\$163,434	\$252,087	\$418,337	\$651,584	\$957,561	\$1,317,526
Unit Cost (\$/acft)	\$681	\$681	\$681	\$681	\$681	\$681
<b>Purchase from WWP (SSLGC)</b>						
Annual Cost (\$/yr)	\$552,000	\$959,000	\$578,000	\$1,932,000	\$2,101,000	\$2,059,000
Unit Cost (\$/acft)	\$1,101	\$1,070	\$559	\$567	\$566	\$566
<b>Purchase from WWP (CVLGC)</b>						
Annual Cost (\$/yr)	—	—	—	—	\$2,720,000	\$5,846,000
Unit Cost (\$/acft)	—	—	—	—	\$1,217	\$1,217

### 5.3.11.8 City of Seguin

The City of Seguin is projected to have adequate water supplies available from the Carrizo Aquifer, Canyon Reservoir, and run-of-river rights to meet the city’s projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Seguin implement the following water supply plan (Table 5.3.11-14).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 65 acft/yr by 2050, increasing to 491 acft/yr of supply in 2070.

Alternative water management strategies identified by City of Seguin include Purchase from WWP (SSLGC), and/or Purchase from WWP (GBRA), ~~and/or Purchase from WWP (TWA)~~.



Estimated costs of the recommended plan to meet the industrial projected needs are shown in Table 5.3.11-19.

**Table 5.3.11-19. Recommended Plan Costs by Decade for Industrial**

<i>Plan Element</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>	<i>2070</i>
<i>Purchase from WWP (GBRA)</i>						
Annual Cost (\$/yr)	—	—	—	<u>\$135,518</u>	<u>\$348,852</u>	<u>\$525,632</u>
Unit Cost (\$/acft)	—	—	—	<u>\$831</u>	<u>\$706</u>	<u>\$615</u>

5.3.11.12 Steam-Electric Power

Current water supply for steam-electric power is obtained from Canyon Reservoir and direct reuse. Steam-electric power is projected to have adequate water supplies through 2070.

5.3.11.13 Mining

Mining is projected to have adequate water supplies available from the Carrizo Aquifer to meet the water user group’s projected demand during the planning period.

5.3.11.14 Irrigation

Irrigation is projected to have adequate water supplies available from the Carrizo Aquifer, Canyon Reservoir, and run-of-river rights to meet the water user group’s projected demand during the planning period.

5.3.11.15 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group’s projected demand during the planning period.

**Table 5.3.12-6. Recommended Water Supply Plan for Goforth WSC**

	<b>2020 (acft/yr)</b>	<b>2030 (acft/yr)</b>	<b>2040 (acft/yr)</b>	<b>2050 (acft/yr)</b>	<b>2060 (acft/yr)</b>	<b>2070 (acft/yr)</b>
Projected Need (Shortage)	0	0	0	0	0	525
<b>Recommended Plan</b>						
Municipal Water Conservation	—	—	—	—	—	2
Purchase from WWP (GBRA)	—	—	—	—	—	525
<b>Total New Supply</b>	—	—	—	—	—	<b>527</b>

Estimated costs of the recommended plan to meet Goforth WSC’s projected needs are shown in Table 5.3.12-7.

**Table 5.3.12-7. Recommended Plan Costs by Decade for Goforth WSC**

<b>Recommended Plan Element</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
<b>Municipal Water Conservation</b>						
Annual Cost (\$/yr)	—	—	—	—	—	\$1,368
Unit Cost (\$/acft)	—	—	—	—	—	\$770
<b>Purchase from WWP (GBRA)</b>						
Annual Cost (\$/yr)	—	—	—	—	—	<u>\$323,134</u>
Unit Cost (\$/acft)	—	—	—	—	—	<u>\$615</u>

- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 4 acft/yr by 2020.

**Table 5.3.12-12. Recommended Water Supply Plan for the City of Niederwald**

	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)	2070 (acft/yr)
Projected Need (Shortage)	62	81	105	134	166	203
<b>Recommended Plan</b>						
Purchase from WWP (GBRA)	62	81	105	134	166	203
Drought Management	4	—	—	—	—	—
<b>Total New Supply</b>	<b>66</b>	<b>81</b>	<b>105</b>	<b>134</b>	<b>166</b>	<b>203</b>

Estimated costs of the recommended plan to meet the City of Niederwald’s projected needs are shown in Table 5.3.12-13.

**Table 5.3.12-13. Recommended Plan Costs by Decade for the City of Niederwald**

<i>Plan Element</i>	2020	2030	2040	2050	2060	2070
<b>Purchase from WWP (GBRA)</b>						
Annual Cost (\$/yr)	<u>\$103,789</u>	<u>\$135,596</u>	<u>\$86,562</u>	<u>\$111,407</u>	<u>\$117,225</u>	<u>\$124,945</u>
Unit Cost (\$/acft)	<u>\$1,674</u>	<u>\$1,674</u>	<u>\$824</u>	<u>\$831</u>	<u>\$706</u>	<u>\$615</u>
<b>Drought Management</b>						
Annual Cost (\$/yr)	\$5,441	—	—	—	—	—
Unit Cost (\$/acft)	\$1,451	—	—	—	—	—

### 5.3.12.7 Plum Creek Water Company

Plum Creek Water Company obtains water supplies from the Edwards (Barton Springs) Aquifer. Plum Creek Water Company is projected to need additional water supplies prior to 2030. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Niederwald implement the following water supply plan to meet the projected needs for the city (Table 5.3.12-14).

- Local Trinity Groundwater to be implemented by 2030 can provide an additional 185 acft/yr by 2030, continuing through 2070.



Estimated costs of the recommended plan to meet the City of San Marcos' projected needs are shown in Table 5.3.12-17.

**Table 5.3.12-17. Recommended Plan Costs by Decade for the City of San Marcos**

<i>Plan Element</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>	<i>2070</i>
<b><i>Municipal Water Conservation (City of San Marcos)</i></b>						
Annual Cost (\$/yr)	\$121,953	\$529,930	\$764,316	\$1,146,686	\$1,706,984	\$2,443,551
Unit Cost (\$/acft)	\$681	\$681	\$681	\$681	\$681	\$681
<b><i>Purchase from HCPUA (City of San Marcos)</i></b>						
Annual Cost (\$/yr)	—	—	—	\$1,452,000	\$3,382,000	\$5,831,000
Unit Cost (\$/acft)	—	—	—	\$739	\$739	\$739
<b><i>Direct Recycle Programs (City of San Marcos)</i></b>						
Annual Cost (\$/yr)	\$1,678,908	\$2,291,553	\$3,223,990	\$4,307,633	\$5,566,814	\$7,031,079
Unit Cost (\$/acft)	\$869	\$869	\$869	\$869	\$869	\$869
<b><i>Direct Recycle Programs (Texas State University)</i></b>						
Annual Cost (\$/yr)	\$217,250	\$217,250	\$217,250	\$217,250	\$217,250	\$217,250
Unit Cost (\$/acft)	\$869	\$869	\$869	\$869	\$869	\$869
<b><i>Purchase from GBRA (Texas State University)</i></b>						
Annual Cost (\$/yr)	—	—	<u>\$1,962,063</u>	<u>\$2,885,778</u>	<u>\$3,234,999</u>	<u>\$3,518,780</u>
Unit Cost (\$/acft)	—	—	<u>\$824</u>	<u>\$831</u>	<u>\$706</u>	<u>\$615</u>

5.3.12.9 City of Umland

The City of Umland is projected to have adequate water supplies available from County Line SUD to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Umland implement the following water supply plan (Table 5.3.12-18).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 5 acft/yr by 2020, increasing to 19 acft/yr of supply in 2070.

**Table 5.3.12-18. Recommended Water Supply Plan for the City of Umland**

	<b>2020 (acft/yr)</b>	<b>2030 (acft/yr)</b>	<b>2040 (acft/yr)</b>	<b>2050 (acft/yr)</b>	<b>2060 (acft/yr)</b>	<b>2070 (acft/yr)</b>
Projected Need (Shortage)	0	0	0	0	0	0
<b>Recommended Plan</b>						
Municipal Water Conservation	—	—	—	—	5	19
<b>Total New Supply</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>5</b>	<b>19</b>

Estimated costs of the recommended plan for the City of Umland are shown in Table 5.3.12-19.

**Table 5.3.12-19. Recommended Plan Costs by Decade for the City of Umland**

<b>Plan Element</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
<b>Municipal Water Conservation</b>						
Annual Cost (\$/yr)	—	—	—	—	\$4,160	\$14,501
Unit Cost (\$/acft)	—	—	—	—	\$770	\$770

#### 5.3.12.10 City of Wimberley

Current water supply for the City of Wimberley is obtained from the Trinity Aquifer. Wimberley WSC is projected to need additional water supplies prior to 2040. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Wimberley implement the following water supply plan to meet the projected needs for the WSC (Table 5.3.12-20).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 10 acft/yr by 2020, increasing to 272 acft/yr of supply in 2070.
- Purchase from WWP (GBRA) to be implemented prior to 2070. This strategy can provide an additional ~~933~~1,033 acft/yr of supply in 2070.
- Purchase from WWP (TWA) to be implemented prior to 2070. This strategy can provide ~~243~~113 acft/yr of supply in 2070.





**Table 5.3.12-20. Recommended Water Supply Plan for the City of Wimberley**

	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)	2070 (acft/yr)
Projected Need (Shortage)	0	0	174	456	778	1,146
<b>Recommended Plan</b>						
Municipal Water Conservation	10	55	78	123	187	272
Purchase from WWP (GBRA)	—	—	174	456	778	1,033
Purchase from WWP (TWA)	—	—	=	=	=	113
<b>Total New Supply</b>	<b>10</b>	<b>55</b>	<b>252</b>	<b>579</b>	<b>965</b>	<b>1,418</b>

Estimated costs of the recommended plan to meet The City of Wimberley’s projected needs are shown in Table 5.3.12-21.

**Table 5.3.12-21. Recommended Plan Costs by Decade for the City of Wimberley**

Plan Element	2020	2030	2040	2050	2060	2070
<b>Municipal Water Conservation</b>						
Annual Cost (\$/yr)	\$7,628	\$41,983	\$59,715	\$94,409	\$143,966	\$209,536
Unit Cost (\$/acft)	\$770	\$770	\$770	\$770	\$770	\$770
<b>Purchase from WWP (GBRA)</b>						
Annual Cost (\$/yr)	—	—	\$143,445	\$379,117	\$549,406	\$635,805
Unit Cost (\$/acft)	—	—	\$824	\$831	\$706	\$615
<b>Purchase from WWP (TWA)</b>						
Annual Cost (\$/yr)	—	—	=	=	=	\$69,269
Unit Cost (\$/acft)	—	—	=	=	=	\$613

5.3.12.11 Wimberley WSC

Current water supply for Wimberley WSC is obtained from the Trinity Aquifer. Wimberley WSC is projected to need additional water supplies prior to 2040. Working within the planning criteria established by the SCTRWP and the TWDB, it is recommended that Wimberley implement the following water supply plan to meet the projected needs for the WSC (Table 5.3.12-22).

- Purchase from WWP (GBRA) to be implemented prior to 2070. This strategy can provide an additional 1,123,223 acft/yr of supply in 2070.
- Purchase from WWP (TWA) to be implemented prior to 2070. This strategy can provide 233,133 acft/yr of supply in 2070.

**Table 5.3.12-22. Recommended Water Supply Plan for Wimberley WSC**

	<b>2020 (acft/yr)</b>	<b>2030 (acft/yr)</b>	<b>2040 (acft/yr)</b>	<b>2050 (acft/yr)</b>	<b>2060 (acft/yr)</b>	<b>2070 (acft/yr)</b>
Projected Need (Shortage)	0	0	236	564	934	1,356
<b>Recommended Plan</b>						
Purchase from WWP (GBRA)	—	—	<u>236</u>	<u>564</u>	<u>934</u>	<u>1,223</u>
Purchase from WWP (TWA)	—	—	<u>=</u>	<u>=</u>	<u>=</u>	<u>133</u>
<b>Total New Supply</b>	<b>0</b>	<b>0</b>	<b>236</b>	<b>564</b>	<b>934</b>	<b>1,356</b>

Estimated costs of the recommended plan to meet Wimberley WSC’s projected needs are shown in Table 5.3.12-23.

**Table 5.3.12-23. Recommended Plan Costs by Decade for Wimberley WSC**

<b>Plan Element</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
<b>Purchase from WWP (GBRA)</b>						
Annual Cost (\$/yr)	—	—	<u>\$194,558</u>	<u>\$468,908</u>	<u>\$659,570</u>	<u>\$752,145</u>
Unit Cost (\$/acft)	—	—	<u>\$824</u>	<u>\$831</u>	<u>\$706</u>	<u>\$615</u>
<b>Purchase from WWP (TWA)</b>						
Annual Cost (\$/yr)	—	—	<u>=</u>	<u>=</u>	<u>=</u>	<u>\$81,529</u>
Unit Cost (\$/acft)	—	—	<u>=</u>	<u>=</u>	<u>=</u>	<u>\$613</u>

5.3.12.12 City of Woodcreek

The City of Woodcreek is projected to have adequate supplies from the Trinity Aquifer to meet needs through the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Woodcreek implement the following water supply plan (Table 5.3.12-24).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 10 acft/yr by 2020, increasing to 76 acft/yr of supply in 2070.



**Table 5.3.12-24. Recommended Water Supply Plan for the City of Woodcreek**

	<b>2020 (acft/yr)</b>	<b>2030 (acft/yr)</b>	<b>2040 (acft/yr)</b>	<b>2050 (acft/yr)</b>	<b>2060 (acft/yr)</b>	<b>2070 (acft/yr)</b>
Projected Need (Shortage)	0	0	0	0	0	0
<b>Recommended Plan</b>						
Municipal Water Conservation	10	25	31	41	57	76
<b>Total New Supply</b>	<b>10</b>	<b>25</b>	<b>31</b>	<b>41</b>	<b>57</b>	<b>76</b>

Estimated costs of the recommended plan to meet the City of Woodcreek’s projected needs are shown in Table 5.3.12-25.

**Table 5.3.12-25. Recommended Plan Costs by Decade for the City of Woodcreek**

<b>Plan Element</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
<b>Municipal Water Conservation</b>						
Annual Cost (\$/yr)	\$6,791	\$16,810	\$21,032	\$28,109	\$38,780	\$51,651
Unit Cost (\$/acft)	\$681	\$681	\$681	\$681	\$681	\$681

5.3.12.13 Rural Area Residential and Commercial

Current water supply for Rural Areas is obtained from the Edwards Aquifer and Trinity Aquifer. Rural Areas are projected to need additional water supplies by 2050. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts, authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan (Table 5.3.12-26).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 354 acft/yr by 2070.
- Purchase from WWP (GBRA) to be implemented prior to ~~2060~~2050. This strategy can provide an additional ~~2,029~~1,169 acft/yr of supply in ~~2060-2050~~ and ~~7,220~~11,608 acft/yr of additional supply in 2070.
- ~~Purchase from WWP (TWA) to be implemented prior to 2050. This strategy can provide 1,169 acft/yr of supply in 2050, increasing to 4,388 acft/yr in 2070.~~
- Purchase from WWP (SAWS) to be implemented prior to 2020. This strategy can provide 3,781 acft/yr of supply in 2020 and 5,000 acft/yr in all decades thereafter. This supply would be part of the Vista Ridge project and additional transmission pipelines are recommended for Hays County-Other to convey this water to users within the County.

Alternative water management strategies identified by Rural Hays County include Hays/Caldwell PUA Project, and/or Rainwater Harvesting.

**Table 5.3.12-26. Recommended Water Supply Plan for Rural Areas**

	<b>2020 (acft/yr)</b>	<b>2030 (acft/yr)</b>	<b>2040 (acft/yr)</b>	<b>2050 (acft/yr)</b>	<b>2060 (acft/yr)</b>	<b>2070 (acft/yr)</b>
Projected Need (Shortage)	0	0	0	1,109	6,654	12,812
<b>Recommended Plan</b>						
Municipal Water Conservation	—	—	—	—	—	354
Purchase from WWP (GBRA)	—	—	—	1,169	6,714	11,608
<del>Purchase from WWP (TWA)</del>	<del>—</del>	<del>—</del>	<del>—</del>	<del>1,169</del>	<del>4,685</del>	<del>4,388</del>
Purchase from WWP (SAWS)	3,781	5,000	5,000	5,000	5,000	5,000
<b>Total New Supply</b>	<b>3,781</b>	<b>5,000</b>	<b>5,000</b>	<b>6,169</b>	<b>11,715</b>	<b>16,962</b>

Estimated costs of the recommended plan for rural areas are shown in Table 5.3.12-27.

**Table 5.3.12-27. Recommended Plan Costs by Decade for Rural Areas**

<b>Plan Element</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
<b>Municipal Water Conservation</b>						
Annual Cost (\$/yr)	—	—	—	—	—	\$272,643
Unit Cost (\$/acft)	—	—	—	—	—	\$770
<b>Purchase from WWP (GBRA)</b>						
Annual Cost (\$/yr)	—	—	—	\$971,903	\$4,741,275	\$7,144,656
Unit Cost (\$/acft)	—	—	—	\$831	\$706	\$615
<b>Purchase from WWP (TWA)</b>						
<del>Annual Cost (\$/yr)</del>	<del>—</del>	<del>—</del>	<del>—</del>	<del>\$1,019,368</del>	<del>\$3,340,405</del>	<del>\$3,089,152</del>
<del>Unit Cost (\$/acft)</del>	<del>—</del>	<del>—</del>	<del>—</del>	<del>\$872</del>	<del>\$713</del>	<del>\$704</del>
<b>Purchase from WWP (SAWS)</b>						
Annual Cost (\$/yr)	\$2,571,080	\$3,800,000	\$1,560,000	\$6,800,000	\$6,475,000	\$6,055,000
Unit Cost (\$/acft)	\$680	\$760	\$312	\$1,360	\$1,295	\$611



and the TWDB, it is recommended that individual industrial operations implement the following water supply plan to meet the projected needs for Industrial (Table 5.3.19-4).

- Purchase from WWP (GBRA) to be implemented in 2020. This strategy can provide an additional 2,178 acft/yr of supply in 2020 increasing to 16,252 acft/yr in 2070.

**Table 5.3.19-4. Recommended Water Supply Plan for Industrial**

	<b>2020 (acft/yr)</b>	<b>2030 (acft/yr)</b>	<b>2040 (acft/yr)</b>	<b>2050 (acft/yr)</b>	<b>2060 (acft/yr)</b>	<b>2070 (acft/yr)</b>
Projected Need (Shortage)	2,178	5,016	7,841	10,366	13,206	16,252
<b>Recommended Plan</b>						
Purchase from WWP (GBRA)	2,178	5,016	7,841	10,366	13,206	16,252
<b>Total New Supply</b>	<b>2,178</b>	<b>5,016</b>	<b>7,841</b>	<b>10,366</b>	<b>13,206</b>	<b>16,252</b>

Estimated costs of the recommended plan to meet the industrial projected needs are shown in Table 5.3.19-5.

**Table 5.3.19-5. Recommended Plan Costs by Decade for Industrial**

<b>Plan Element</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
<b>Purchase from WWP (GBRA)</b>						
Annual Cost (\$/yr)	<u>\$3,646,022</u>	<u>\$8,396,898</u>	<u>\$6,464,091</u>	<u>\$8,618,259</u>	<u>\$9,325,779</u>	<u>\$10,003,011</u>
Unit Cost (\$/acft)	<u>\$1,674</u>	<u>\$1,674</u>	<u>\$824</u>	<u>\$831</u>	<u>\$706</u>	<u>\$615</u>

5.3.19.4 Steam-Electric Power

Steam-electric power obtains water supply from the Gulf Coast Aquifer and run-of-river rights to meet the water user group’s needs. The entity is expected to have a shortage prior to 2020. The following water supply plan is recommended for Steam-Electric Power for Victoria County (Table 5.3.19-6).

- Purchase from WWP (GBRA) to be implemented in 2020. This strategy can provide an additional 4,506 acft/yr starting in 2012, increasing to 70,696 acft/yr by 2070.

**Table 5.3.19-6. Recommended Water Supply Plan for Steam-Electric Power**

	<b>2020 (acft/yr)</b>	<b>2030 (acft/yr)</b>	<b>2040 (acft/yr)</b>	<b>2050 (acft/yr)</b>	<b>2060 (acft/yr)</b>	<b>2070 (acft/yr)</b>
Projected Need (Shortage)	4,506	29,778	37,178	53,599	70,696	70,696
<b>Recommended Plan</b>						
Purchase from WWP (GBRA)	4,506	29,778	37,178	53,599	70,696	70,696
<b>Total New Supply</b>	<b>4,506</b>	<b>29,778</b>	<b>37,178</b>	<b>53,599</b>	<b>70,696</b>	<b>70,696</b>

Estimated costs of the recommended plan to meet the Steam-Electric Power projected needs are shown in Table 5.3.19-7.

**Table 5.3.19-7. Recommended Plan Costs by Decade for Steam-Electric Power**

<b>Plan Element</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
<b>Purchase from WWP (GBRA)</b>						
Annual Cost (\$/yr)	<u>\$7,543,147</u>	<u>\$49,849,050</u>	<u>\$30,649,405</u>	<u>\$44,562,035</u>	<u>\$49,923,919</u>	<u>\$43,512,974</u>
Unit Cost (\$/acft)	<u>\$1,674</u>	<u>\$1,674</u>	<u>\$824</u>	<u>\$831</u>	<u>\$706</u>	<u>\$615</u>

#### 5.3.19.5 Mining

Mining is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the water user group’s projected demand during the planning period.

#### 5.3.19.6 Irrigation

Current water supply for irrigation is obtained from the Gulf Coast Aquifer and run-of-river rights. Irrigation is projected to need additional water supplies prior to 2020. Due to limited economically feasible supplies for irrigation, these needs remain unmet. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that individual irrigators implement the following water supply plan to meet a portion of the projected needs for irrigation (Table 5.3.20-10).

- Irrigation Water Conservation, while not a recommended strategy, is encouraged and can provide additional supply when possible. The SCTRWPG has determined that it is not economically feasible for agricultural producers to pay for additional supplies to meet projected needs.



## 5.4.2 Guadalupe-Blanco River Authority (GBRA)

Current water supply for GBRA is obtained from Canyon Reservoir and run-of-river rights. GBRA is projected to need additional water supplies by 2020 to meet the Wholesale Water Provider's projected demands. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that GBRA implement the following water supply plan to meet the projected needs for GBRA ([Table 5.4-4](#) ~~Table 5.4-4~~).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy has been assigned to each individual Water User Group (WUG) based on the Municipal Conservation water management strategy recommended by the SCTRWPG.
- GBRA Mid-Basin Water Supply Project (~~Surface Water~~ [Conjunctive Use](#) with ASR) to be implemented prior to 2020. This strategy can provide an additional ~~5042~~ 42,000 acft/yr for 2020 through 2070.
- Western Canyon WTP Expansion to be implemented by 2060. The project doesn't increase GBRA's supplies, but allows them to deliver additional existing supplies from Canyon Reservoir to customers in Comal and Kendall Counties.
- Integrated Water-Power Project (Upper & Mid Basin) to be implemented prior to 2060. This strategy can provide an additional 100,000 acft/yr for 2020 through 2070.
- GBRA Lower Basin Storage (500 acre Site)<sup>2</sup> to be implemented prior to 2020. This strategy can provide an additional 51,800 acft/yr for 2020 through 2070.
- GBRA New Appropriation (Lower Basin) to be implemented prior to 2050. This strategy can provide an additional 42,000 acft/yr for 2050 through 2070.
- Victoria County Steam-Electric to be implemented prior to 2050. This strategy can provide an additional 29,100 acft/yr for 2050 through 2070.

The following are alternative water management strategies: Luling ASR, MBWSP-Carrizo Groundwater (Option 0), MBWSP-Surface Water w/ Off-Channel Reservoir (Option 2A), MBWSP ~~Conjunctive Use w/~~ ASR (Option 3 [AC](#)), HPCUA/TWA/GBRA Shared Facilities Project, and Storage above Canyon Reservoir (ASR).

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<sup>2</sup> Firm yield estimate based on off-channel storage of 2,500 acft.

**Table 5.4-4. Recommended Water Supply Plan for GBRA**

	<b>2020 (acft/yr)</b>	<b>2030 (acft/yr)</b>	<b>2040 (acft/yr)</b>	<b>2050 (acft/yr)</b>	<b>2060 (acft/yr)</b>	<b>2070 (acft/yr)</b>
Projected Need (Shortage)	29,593	60,965	71,664	97,994	152,719	170,949
<b>Recommended Plan</b>						
Municipal Water Conservation <sup>1</sup>	—	—	—	—	—	—
MBWSP - <del>Surface Water</del> Conjunctive Use w/ ASR (Option <del>3C3A</del> )	<u>42,000</u>	<u>42,000</u>	<u>42,000</u>	<u>42,000</u>	<u>42,000</u>	<u>42,000</u>
Western Canyon WTP Expansion	—	—	—	—	—	—
Integrated Water-Power Project (Upper & Mid Basin)	100,000	100,000	100,000	100,000	100,000	100,000
GBRA Lower Basin Storage (500 acre Site)	51,800	51,800	51,800	51,800	51,800	51,800
GBRA New Appropriation (Lower Basin)	—	—	—	42,000	42,000	42,000
Victoria County Steam-Electric Project	—	—	—	29,100	29,100	29,100
<b>Total New Supply</b>	<b><u>193,800</u></b>	<b><u>193,800</u></b>	<b><u>193,800</u></b>	<b><u>264,900</u></b>	<b><u>264,900</u></b>	<b><u>264,900</u></b>
<sup>1</sup> Assigned by Water User Group based on Municipal Conservation water management strategy recommended by SCTRWPG.						

Estimated costs of the recommended plan to meet the GBRA projected needs are shown in [Table 5.4-5](#).



**Table 5.4-5. Recommended Plan Costs by Decade for GBRA**

<i>Plan Element</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>	<i>2070</i>
<b>Municipal Water Conservation<sup>1</sup></b>						
Annual Cost (\$/yr)	—	—	—	—	—	—
Unit Cost (\$/acft)	—	—	—	—	—	—
<b>MBWSP - <del>Surface Water</del>Conjunctive Use w/ ASR (Option <del>3C3A</del>)</b>						
Annual Cost (\$/yr)	<u>\$77,054,000</u>	<u>\$77,054,000</u>	<u>\$18,439,000</u>	<u>\$18,439,000</u>	<u>\$18,439,000</u>	<u>\$18,439,000</u>
Unit Cost (\$/acft)	<u>\$1,836</u>	<u>\$1,836</u>	<u>\$439</u>	<u>\$439</u>	<u>\$439</u>	<u>\$439</u>
<b>Western Canyon WTP Expansion</b>						
Annual Cost (\$/yr)	—	—	—	—	\$1,926,000	\$1,926,000
Unit Cost (\$/acft)	—	—	—	—	\$344	\$344
<b>Integrated Water-Power Project (Upper, Lower &amp; Mid Basin)</b>						
Annual Cost (\$/yr)	\$239,300,000	\$239,300,000	\$105,300,000	\$105,300,000	\$105,300,000	\$105,300,000
Unit Cost (\$/acft)	\$2,393	\$2,393	\$1,053	\$1,053	\$1,053	\$1,053
<b>GBRA Lower Basin Storage (500 acre Site)</b>						
Annual Cost (\$/yr)	\$7,252,000	\$7,252,000	\$3,626,000	\$3,626,000	\$932,400	\$932,400
Unit Cost (\$/acft)	\$140	\$140	\$70	\$70	\$18	\$18
<b>GBRA New Appropriation (Lower Basin)</b>						
Annual Cost (\$/yr)	—	—	—	\$24,822,000	\$24,822,000	\$14,196,000
Unit Cost (\$/acft)	—	—	—	\$591	\$591	\$338
<b>Victoria County Steam-Electric Project</b>						
Annual Cost (\$/yr)	—	—	—	\$35,647,000	\$35,647,000	\$22,251,000
Unit Cost (\$/acft)	—	—	—	\$1,225	\$1,225	<u>\$765</u>
<sup>1</sup> These costs have been assigned to the individual Water User Groups.						

**Appendix E**  
**2016 SCTRWP - Potentially Feasible Water Management Strategies (Revised)**

	Water Management Strategy	YR 2070 Supply (acft/yr)	Near-Term Unit Cost (\$/acft/yr)	Sponsor	Notes
<b>Recommended Water Management Strategies</b>	Water Conservation	96,288	\$684	All Municipal Users	Average Unit Cost (Varies by Land Use)
	Drought Management (2020 for all Entities other than SAWS)	2,839	\$1,554	Municipal Users	Municipal WUGs with Needs in YR 2020, average Unit Cost
	Edwards Aquifer Habitat Conservation Plan	0	\$345	All Edwards Users	Unit cost based on increase to Edwards firm existing supply (~50,600 acft/yr)
	CRWA Wells Ranch - Phase 2 - MAG-Limited	7,829	\$858	CRWA	Limited to 7,658 acft/yr in YR 2030
	Brackish Wilcox Groundwater for CRWA - MAG-Limited	3,839	\$2,619	CRWA	
	CRWA Siesta Project	5,042	\$1,186	CRWA	
	CVLGC Carrizo Project - MAG-Limited	0	N/A	CVLGC	
	CVLGC Carrizo Project w/ Conversions	10,000	\$1,834	CVLGC	
	<b>GBRA Mid-Basin Project (Conjunctive Use w/ ASR)</b>	<b>42,000</b>	<b>\$1,836</b>	<b>GBRA</b>	
	GBRA Lower Basin Storage (500 acre site)	51,800	\$140	GBRA	
	GBRA Lower Basin New Appropriation	42,000	\$591	GBRA	
	Integrated Water-Power Project	100,000	\$2,393	GBRA	
	Victoria County Steam-Electric Project	29,100	\$1,225	GBRA	
	Western Canyon WTP Expansion	N/A	\$344	GBRA	Unit cost based on capacity of expansion (5,600 acft/yr)
	Hays/Caldwell PUA Project - MAG-Limited	21,833	\$1,926	HCPUA	
	Brackish Wilcox Groundwater for SAWS - MAG-Limited	5,622	\$1,289	SAWS	
	SAWS Expanded Local Carrizo - MAG-Limited	5,419	\$700	SAWS	
	Vista Ridge Project - MAG-Limited	34,894	\$2,177	SAWS	
	SAWS Expanded Brackish Project - MAG-Limited	0	N/A	SAWS	
	SAWS Seawater Desalination	84,023	\$2,713	SAWS	75 MGD of Potable Supply
	Advanced Meter Infrastructure for SAWS	5,598	\$216	SAWS	Supply in terms of Saved Water (Leaks)
	SAWS Conservation Goals	2,792	\$600	SAWS	Varies from 2,792 acft/yr to 15,974 acft/yr
	Long-term Drought Management for SAWS	68,190	\$342	SAWS	
	SAWS Direct Reuse	40,000	\$458	SAWS	
	Water Resources Integration Pipeline	N/A	N/A	SAWS	Capacity of transmission line (84,000 acft/yr)
	Dos Rios WWTP - CPS Pipeline	N/A	\$50	SAWS	Direct Recycle Pipeline to Lake Braunig. Unit cost based on capacity of transmission line (50,000 acft/yr).
	SSLGC Expanded Carrizo Project (Guadalupe County)	6,500	\$1,070	SSLGC	
	SSLGC Brackish Wilcox (Gonz Co) - MAG-Limited	1,392	\$5,032	SSLGC	Limited to 0 acft/yr in YR 2030
	TWA Trinity Project	5,000	\$613	TWA	
	New Braunfels Utilities ASR	8,300	\$462	NBU	
	New Braunfels Utilities Trinity	1,090	\$634	NBU	
	Direct Reuse/Recycle	11,709	\$481	NBU	Zero discharge by 2070
	Hays Forestar Project - MAG-Limited	12,356	\$1,942	Hays County	
	Hays County Pipeline Project	N/A	\$427	Hays County	Unit cost based on capacity of transmission line (15,314 acft/yr)
	Uvalde ASR - MAG-Limited	1,155	\$2,803	Uvalde	
	Victoria ASR	7,900	\$192	Victoria	
	Victoria Groundwater-Surface Water Exchange	8,544	\$0	Victoria	Based on current Victoria County GCD permits
	Brackish Wilcox for SS WSC - MAG-Limited	0	N/A	SS WSC	
	Facilities Expansions	N/A	N/A	Municipal Users	Atascosa Rural WSC, Helotes, Gonzales Co WSC, Springs Hill WSC, Yancey WSC, Port O'Connor, and CCMA
	Edwards Transfers	11,772	\$1,415	Municipal Users	Sabinal, Uvalde, Castroville, East Medina SUD, Hondo, La Coste, Natalia, Yancey WSC, Medina Co Other, Alamo Heights, Atascosa Rural WSC, Converse, Kirby, Leon Valley, Shavano Park, Windcrest, CRWA, and Lytle
	Local GW (Carrizo)	9,151	\$1,298	Municipal Users	Average Cost for Benton City WSC, Asherton, Carrizo Springs, Gonzales, Gonzales WSC, Cotulla (YR 2050 Needs), La Salle Co Other (YR 2050 Needs), Floresville, Pearsall, Polonia WSC, Sunko WSC, Dimmit County-Other, La Salle County-Other, Dimmit County Mining and La Salle County Mining
	Local GW (Gulf Coast)	2,098	\$3,111	Municipal and Mining Users	Kenedy, DeWitt County Mining, and Karnes County Mining
	Local GW (Trinity)	2,060	\$1,202	Municipal Users	Boerne, Garden Ridge, and Mountain City
	Local GW (Leona Gravel)	895	\$3,608	Municipal Users	Castroville, East Medina Co WSC, La Coste, Natalia, and Yancey WSC
	Local Carrizo Conversion (Irrigation)	N/A	\$0	Municipal Users	Benton City, Polonia WSC, Pearsall, and SS WSC
	Local Carrizo Conversion (Mining)	N/A	\$0	Municipal Users	Cotulla and La Salle Co Other (YR 2050 Needs)
	Local Yegua-Jackson Conversion (Mining)	N/A	\$0	Karnes City	336 acft/yr in YR 2020
	Purchase from CRWA	N/A	Varies	Municipal Users	Moves water from CRWA to WUGs
	Purchase from CVLGC	N/A	Varies	Municipal Users	Moves water from CVLGC to WUGs
	Purchase from GBRA	N/A	Varies	Mun/Ind/SE Users	Moves water from GBRA to WUGs
	Purchase from HCPUA	N/A	Varies	Mun Users + WWP	Moves water from HCPUA to WUGs & CRWA
	Purchase from SAWS	N/A	Varies	Mun/Ind Users	Moves water from SAWS to WUGs
	Purchase from SSLGC	N/A	Varies	Municipal Users	Moves water from SSLGC to WUGs
	Purchase from TWA	N/A	Varies	Municipal Users	Moves water from TWA to WUGs
	Direct Reuse/Recycle	27,270	\$502	CCMA	Recycle 90% of WWTP Influent
	Direct Reuse/Recycle	4,368	\$710	Kyle	Zero discharge by 2070
	Direct Reuse/Recycle	8,341	\$869	San Marcos	Zero discharge by 2070
	Direct Reuse/Recycle	6,075	\$1,500	San Antonio River Authority	
	Surface WRs	N/A	N/A	Municipal Users	
	Balancing Storage	N/A	N/A	Municipal Users	
<b>Alternative Water Management Strategies</b>	CRWA Wells Ranch - Phase 2 - Envisioned	10,629	\$835	CRWA	
	Brackish Wilcox Groundwater for CRWA - Envisioned	14,700	\$2,197	CRWA	
	Edwards Transfers, Carrizo Conversions, or Trinity Aquifer	N/A	N/A	CRWA	As needed
	CVLGC Carrizo Project - Envisioned	10,000	\$1,834	CVLGC	
	Luling ASR	4,277	\$1,086	GBRA	
	MBWSP - Carrizo Groundwater (Option 0)	15,000	\$1,665	GBRA	
	MBWSP - Surface Water w/ Off-Channel Reservoir (Option 2A)	25,000	\$2,561	GBRA	
	<b>MBWSP - ASR (Option 3C)</b>	<b>50,000</b>	<b>\$1,637</b>	<b>GBRA</b>	
	Hays Forestar Project - Envisioned	45,000	\$1,331	Hays County	
	Hays/Caldwell PUA Project - Envisioned	35,690	\$1,664	HCPUA	
	Lavaca Off-Channel Reservoir	16,963	\$867	LNRA	6,963 acft/yr for Region N
	HCPUA/TWA/GBRA Shared Facilities Project	86,513	\$1,736	Multiple	
	HCPUA/TWA Joint Project	40,690	\$1,885	Multiple	
	Brackish Wilcox Groundwater for SAWS - Envisioned	33,600	\$988	SAWS	
	SAWS Expanded Local Carrizo - Envisioned	30,000	\$553	SAWS	
	Vista Ridge Project - Envisioned	50,000	\$1,976	SAWS	
	SAWS Expanded Brackish Project - Envisioned	50,000	\$2,041	SAWS	
	Brackish Wilcox for SS WSC - Envisioned	1,120	\$2,554	SS WSC	
	SSLGC Brackish Wilcox (Gonz Co) - Envisioned	5,000	\$2,124	SSLGC	
	<b>TWA Carrizo Project - MAG-Limited</b>	<b>15,000</b>	<b>\$2,490</b>	<b>TWA</b>	<b>Limited to 14,680 acft/yr in YR 2030</b>
TWA Carrizo Project - Envisioned	15,000	\$2,440	TWA		
Uvalde ASR - Envisioned	4,000	\$1,629	Uvalde		
Purchase from LNRA	10,000	\$867	Calhoun Co Ind (Formosa)	New Supply Developed by the Lavaca Off-Channel WMS	
<b>Other</b>	Storage Above Canyon (ASR)	504	\$11,875	TBD	
	Brush Management in Gonzales Co - 10% Participation	1,370	\$1,209	TBD	
	Brush Management in Gonzales Co - 30% Participation	4,631	\$937	TBD	
	Brush Management in Gonzales Co - 50% Participation	6,925	\$1,015	TBD	