2026 South Central Texas (Region L) Regional Water Plan

Initially Prepared Plan

Prepared by the South Central Texas Regional Water Planning Group

With Administration by the San Antonio River Authority

MARCH 3, 2025

BLACK & VEATCH

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Prepared by:

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With funding assistance from the Texas Water Development Board

With administration by the San Antonio River Authority

With assistance from:

Black & Veatch
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Date: March 1, 2025

B&V PROJECT NO. 411170
MARCH 2025

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EXECUTIVE SUMMARY

South Central Texas Regional Water Plan

B&V PROJECT NO. 411170

PREPARED FOR

South Central Texas Regional Water Planning Group

3 MARCH 2025

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%	Percent
acft/yr	Acre-Foot per Year
ARWA	Alliance Regional Water Authority
ASR	Aquifer Storage and Recovery
BFZ	Balcones Fault Zone
CRWA	Canyon Regional Water Authority
CVLGC	Cibolo Valley Local Government Corporation
DB27	2027 Regional and State Water Planning Database
DCP	Drought Contingency Plan
DFC	Desired Future Condition
DPR	Direct Potable Reuse
GBRA	Guadalupe-Blanco River Authority
GPCD	Gallons per Capita per Day
IBT	Interbasin Transfer
IH	Interstate Highway
IPP	Initially Prepared Plan
MAG	Modeled Available Groundwater
MWP	Major Water Provider
NBU	New Braunfels Utilities
Region J	Plateau Region
Region K	Lower Colorado Region
Region L	South Central Texas Region
Region M	Rio Grande Region
Region N	Coastal Bend Region
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SAWS	San Antonio Water System
SB	Senate Bill
SCTRWP	South Central Texas Regional Water Plan
SCTRWPA	South Central Texas Regional Water Planning Area
SCTRWPG	South Central Texas Regional Water Planning Group
SSLGC	Schertz-Seguin Local Government Corporation
SUD	Special Utility District
SWP	State Water Plan

TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
USFWS	U.S. Fish & Wildlife Service
WAM	Water Availability Model
WCID	Water Control and Improvement District
WMS	Water Management Strategy
WSC	Water Supply Corporation
WUG	Water User Group
WWP	Wholesale Water Provider
WWTP	Wastewater Treatment Plant

Executive Summary

The 2026 Regional Water Planning process continues the planning process set forth by the 2001 Regional Water Plans (RWPs) for the State of Texas. Beginning in 2021, the sixth cycle of Regional Water Planning gathered a wide range of expertise and interests to update the long-range water supply plans for the 16 unique planning regions within the state. This Initially Prepared Plan (IPP) was submitted to the Texas Water Development Board (TWDB) on March 3, 2025. Following a comment period from state agencies and the general public, all IPPs will be finalized and adopted by October 20, 2025, to be combined into the 2027 State Water Plan (SWP). In order to provide consistency and facilitate the compilation of the different regional plans, the TWDB requires the incorporation of the data from the completed regional plans into a standardized on-line database, referred to as the 2027 Regional and State Water Planning Database (DB27).

The database reports from DB27 are available at https://www3.twdb.texas.gov/apps/SARA/reports/list.

Additional instructions include the following:

1. Navigate to the TWDB Database Reports application at https://www3.twdb.texas.gov/apps/SARA/reports/list.
2. Enter “2026 Regional Water Plan” into the “Report Name” field to filter to all DB27 reports associated with the 2026 Regional Water Plans.
3. Click on the report name hyperlink to load the desired report.
4. Enter planning region letter parameter, click view report.

Reports available include the following:

1. Water User Group (WUG) Population
2. WUG Demand
3. Source Availability
4. WUG Existing Water Supply
5. WUG Identified Water Needs/Surplus
6. WUG Second-Tier Identified Water Need
7. WUG Data Comparison to 2026 RWP
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17. Sponsored Recommended WMS Supplies Unallocated to WUGs
18. Major Water Provider (MWP) Existing Sales and Transfers
19. MWP WMS Summary

The chapters and appendices of the 2026 South Central Texas (Region L) Regional Water Plan (SCTRWP) are as follows:

2026 SCTRWP Chapters

Chapter 1:	Description of the Regional Water Planning Area
Chapter 2:	Population and Water Demand Projections
Chapter 3:	Water Availability and Existing Water Supplies
Chapter 4:	Identification of Water Needs
Chapter 5:	Evaluation and Recommendation of Water Management Strategies
Chapter 6:	Impacts of the Regional Water Plan and Consistency with Protection of Resources
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Chapter 9:	Implementation and Comparison to the Previous Regional Water Plan
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Appendix 9A:	Implementation Survey Results

ES.1 Background

Since 1957, the TWDB has been charged with preparing a comprehensive and flexible long-term plan for the development, conservation, and management of the state's water resources. The current SWP, *2022 State Water Plan – Water for Texas*, was produced by the TWDB and based on approved RWPs pursuant to requirements of Senate Bill (SB) 1, enacted in 1997 by the 75th Texas Legislature. As stated in SB1 Section 16.053.a, the purpose of the regional water planning effort is to:

> *"…provide for the orderly development, management, and conservation of water resources and preparation for and response to drought conditions in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of that particular region."*

SB1 also provides that future regulatory and financing decisions of the Texas Commission on Environmental Quality (TCEQ) and the TWDB, respectively, be consistent with approved regional plans.

The TWDB divided the state into 16 regional water planning areas (RWPAs) and appointed inaugural members to the Regional Water Planning Groups (RWPGs). As shown on Figure ES-1, the South Central Texas Regional Water Planning Area (SCTRWPA) includes all or portions of 21 counties.

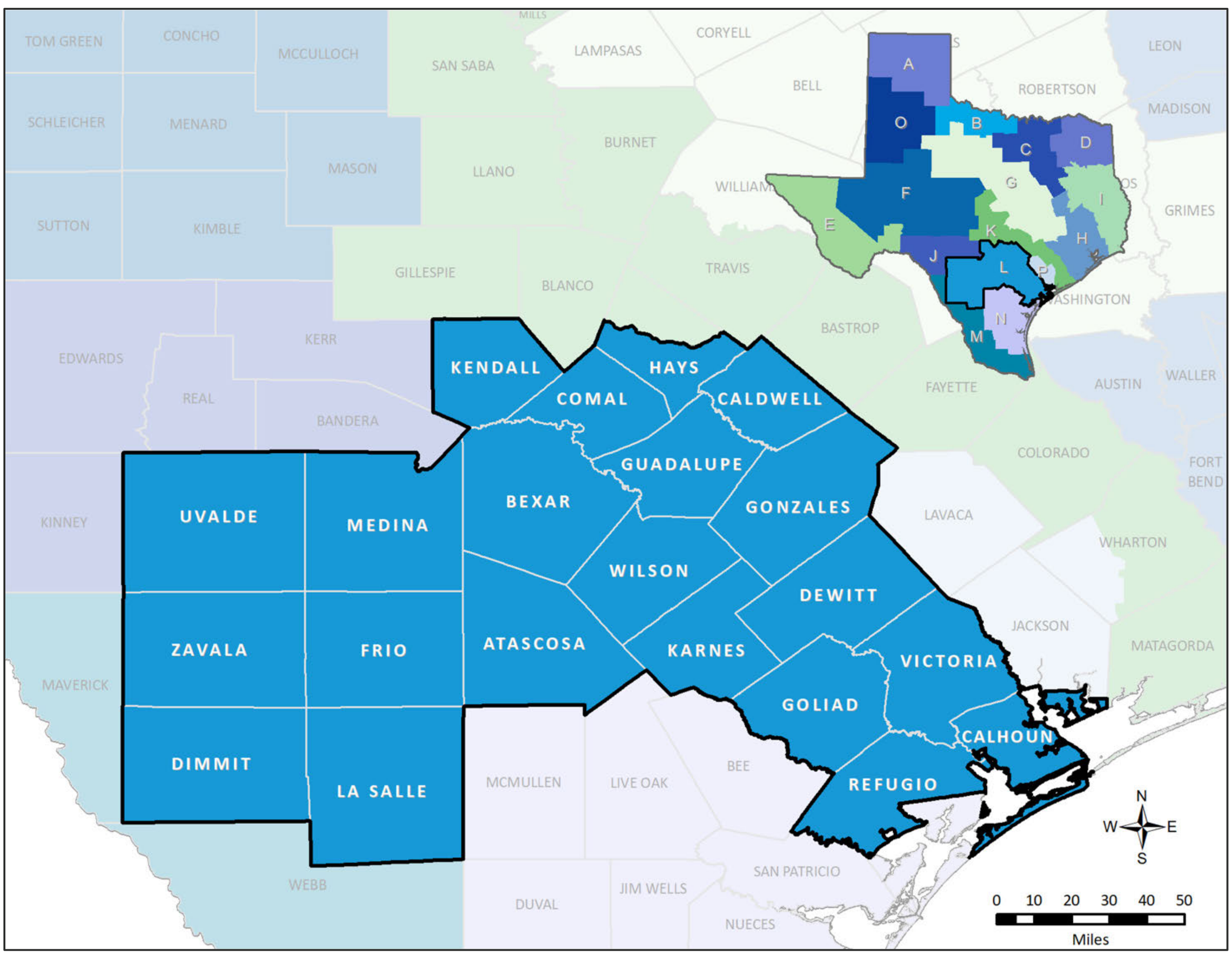

Figure ES-1 South Central Texas (Region L) Regional Water Planning Area

The South Central Texas Regional Water Planning Group (SCTRWPG) has a total of 32 voting members, representing 12 stakeholder groups (public, counties, municipalities, industry, agriculture, environmental, small business, electric generating utilities, river authorities, water districts, water utilities, and groundwater management areas). The RWPG members are volunteers who are responsible for the development of the SCTRWP.

The SCTRWPG adopted bylaws and Guiding Principles to govern its operations and as a reference when making decisions. As described in the bylaws, the San Antonio River Authority serves as the administrative officer for the Regional Water Planning Process. The Guiding Principles (refer to Appendix 5A) serve as a touchstone for which to reference when the SCTRWPG makes decisions. The Guiding Principles also seek to reconcile competing interests at the onset of the planning process, develop a shared understanding of the approach to regional water planning, and encourage consensus based decision making throughout the planning cycle. The Guiding Principles are further described in Chapter 10 (Refer to Section 10.1).

Pursuant to regional and state water planning guidelines (Title 31 of the Texas Administrative Code [TAC] §§357 and 358), the SCTRWPG developed the 2001, 2006, 2011, 2016 and 2021 SCTRWPs, which the TWDB then integrated into the 2002, 2007, 2012, 2017 and 2022 SWPs, respectively. The 2026 SCTRWP, of which this executive summary is part, represents the sixth, 5-year Regional Water Planning cycle. Once the final plan is adopted in October 2025, the TWDB will integrate it with the other 15 RWPs into the 2027 SWP.

The Regional Water Planning Process is depicted graphically in Figure ES-2, which also shows the chapters for which each major task is associated. The process begins and ends with public participation, as it is a foundational element to the Regional Water Planning Process.

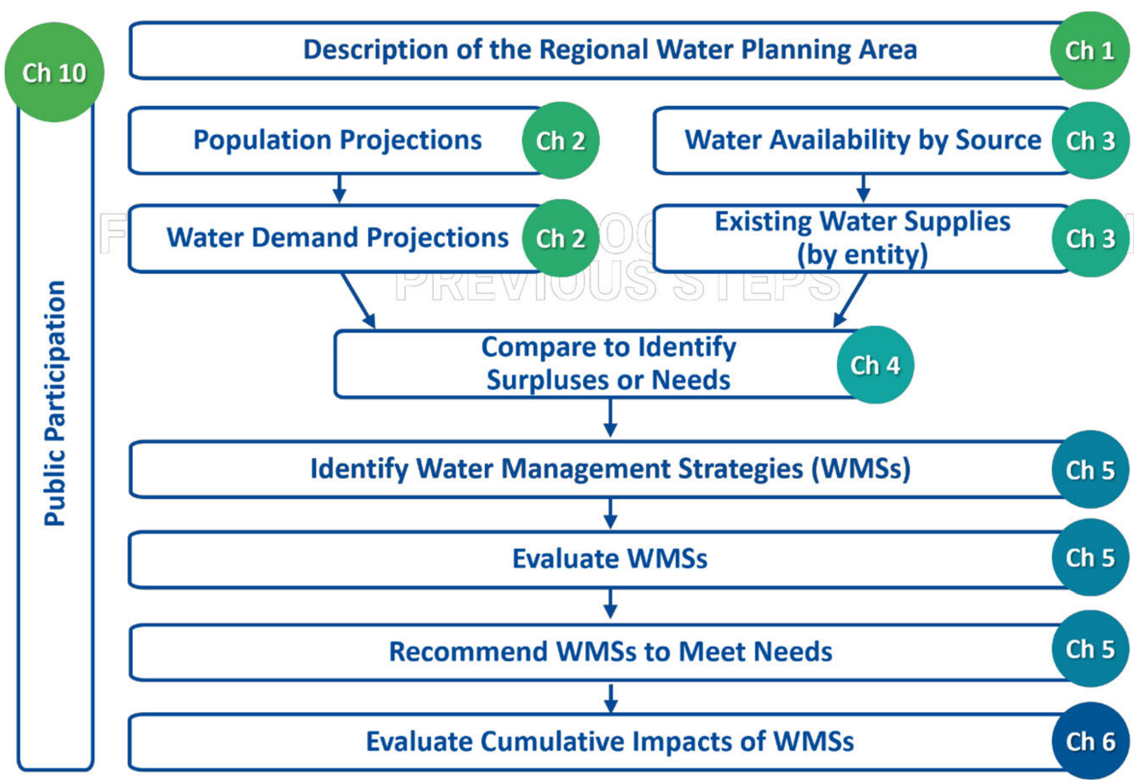

Figure ES-2 Regional Water Planning Process

ES.2 Description of the South Central Texas Region

The SCTRWPA includes parts of six major river basins and three coastal basins: Rio Grande, Nueces, San Antonio, Guadalupe, Lavaca, and Lower Colorado River Basins; and Colorado-Lavaca, Lavaca-Guadalupe, and San Antonio-Nueces Coastal Basins. In the SCTRWPA, there are four major water demand centers. These centers are the Interstate Highway (IH)-35 corridor from San Antonio to San Marcos, the Edwards Aquifer region west of the City of San Antonio, the Winter Garden area south of the Edwards Aquifer area, and the coastal area. The IH-35 corridor includes many of the major urban population centers in the SCTRWPA, including San Antonio, New Braunfels, and San Marcos, which represent some of the fastest growing cities in Texas.

The regional economy is centered on agricultural production, livestock production, mining, manufacturing, and trades and services. Physical terrain of the region ranges from the Hill Country of the Edwards Plateau to the coastal plains. Vegetational areas include the Edwards Plateau, Southern Texas Plains, Texas Blackland Prairies, East Central Texas Plains, and the Western Gulf Coastal Plain. Many species occur within the region that are listed by the U.S. Fish & Wildlife Service (USFWS) or Texas Parks & Wildlife Department (TPWD) as threatened or endangered, or considered species of greatest conservation need. Mean annual precipitation ranges from a high of 41 inches per year in the Colorado-Lavaca River Basin in the southeastern part of the region, to a low of 23 inches per year in the Nueces River Basin in the west.

ES.3 Population and Water Demands

To develop water plans to meet future water needs, it is necessary to first develop projections of future water demands for the region. Chapter 2 of the 2026 SCTRWP summarizes the guidelines, methodology, and results of the evaluation of population and water demand projections from 2030 to 2080 for the SCTRWPA.

The population projections in this plan were developed over the 50-year planning horizon (2030 to 2080), utilizing the 2020 US Census data and growth projections established by the Texas State Office of the State Demographer. These data were further refined on a county, subcounty, and water user group (WUG) basis by the TWDB in consultation with TCEQ, Texas Department of Agriculture, and the Texas Parks and Wildlife Department (TPWD). RWPGs were provided an opportunity to review and suggest adjustments to population projections, as necessary, for municipal WUGs delineated by utility service area boundaries.

Population in the SCTRWPA is projected to increase by 93 percent (%) over the planning horizon (2030 to 2080), with the majority of growth anticipated to occur along the IH-35 corridor. Counties with the largest anticipated population growth over the planning horizon include Bexar, Comal, Guadalupe, and Hays Counties. Table ES-1 summarizes the population projections for the SCTRWPA.

Table ES-1 Population Projections for the South Central Texas Region (No. of People)

Regional Projections	2030	2040	2050	2060	2070	2080
Total	3,987,279	4,793,957	5,469,629	6,176,459	6,897,460	7,689,377

Total water demands (measured in acre-feet per year [acft/yr] [1]) in the SCTRWPA are expected to increase by 37% over the planning horizon. Water demand projections for the SCTRWPA are categorized by use type, including irrigation, livestock, manufacturing, mining, municipal, and steam-electric power. Table ES-2 summarizes water demand projections for each use type. The municipal and manufacturing sectors are expected to increase over the planning horizon; whereas the irrigation, livestock, and steam-electric power sectors are expected to remain unchanged from 2030 to 2080. The mining sector is expected to experience a gradual increase between 2030 and 2070, then decrease significantly between 2070 and 2080.

Table ES-2 Water Demand Projections for the South Central Texas Region (acft/yr)

Use Type	2030	2040	2050	2060	2070	2080
Irrigation	314,645	314,645	314,645	314,645	314,645	314,645
Livestock	24,641	24,641	24,641	24,641	24,641	24,641
Manufacturing	110,929	115,034	119,292	123,706	128,283	133,030
Mining	74,126	77,971	81,760	85,423	88,890	48,880
Municipal	530,751	616,476	691,969	773,195	856,949	956,362
Steam-Electric Power	79,879	79,879	79,879	79,879	79,879	79,879
Total	**1,134,971**	**1,228,646**	**1,312,186**	**1,401,489**	**1,493,287**	**1,557,437**

ES.4 Water Availability and Supplies

The SCTRWPG performed an evaluation to estimate the quantity of water that could meet water demands within the SCTRWPA. The evaluation estimated availabilities and supplies for water sources within the SCTRWPA, including surface water, groundwater, and reuse. Chapter 3 reports results of the evaluation of the SCTRWPA's source water availability and existing supplies.

There are two terms used that are similar but distinct: water availability and existing water supply. Water availability refers to the maximum amount of raw water that could be produced by or at a water source during a repeat of the drought of record. Existing water supply is the maximum amount of water that is physically and legally accessible from existing sources for immediate use by a WUG or wholesale water provider (WWP) under drought of record conditions.

Surface water sources in the SCTRWPA include run-of-river, major reservoirs, and local surface water sources. As shown on Figure ES-3, the SCTRWPA includes parts of nine river and coastal basins, including the Rio Grande, Nueces, San Antonio, Guadalupe, Colorado, and Lavaca River Basins, and parts of the Colorado-Lavaca, Lavaca-Guadalupe, and San Antonio-Nueces Coastal Basins. Major reservoirs in the SCTRWPA include Canyon Lake, the Medina Lake System, and three cooling lakes for power generation facilities, including Calaveras Lake, Coleto Creek Reservoir, and Victor Braunig Lake. All major reservoirs within Region L are located in the Guadalupe-San Antonio River Basin.

There are five major aquifers located within the SCTRWPA (Figure ES-4), including the Edwards-Balcones Fault Zone (BFZ), Carrizo-Wilcox, Trinity, Gulf Coast, and Edwards-Trinity (Plateau) Aquifers. Other

[1] One acft is approximately 325,851 gallons.

aquifers include the Sparta, Queen City, Ellenburger-San Saba, Hickory, and Yegua-Jackson Aquifers, Austin Chalk, Buda Limestone, San Marcos River Alluvium, and Leona Gravel Aquifers.

Treated effluent from wastewater treatment plants (WWTPs), called reclaimed water or reuse, is also considered as a water supply source. Table ES-3 summarizes water availabilities within the SCTRWPA by water source.

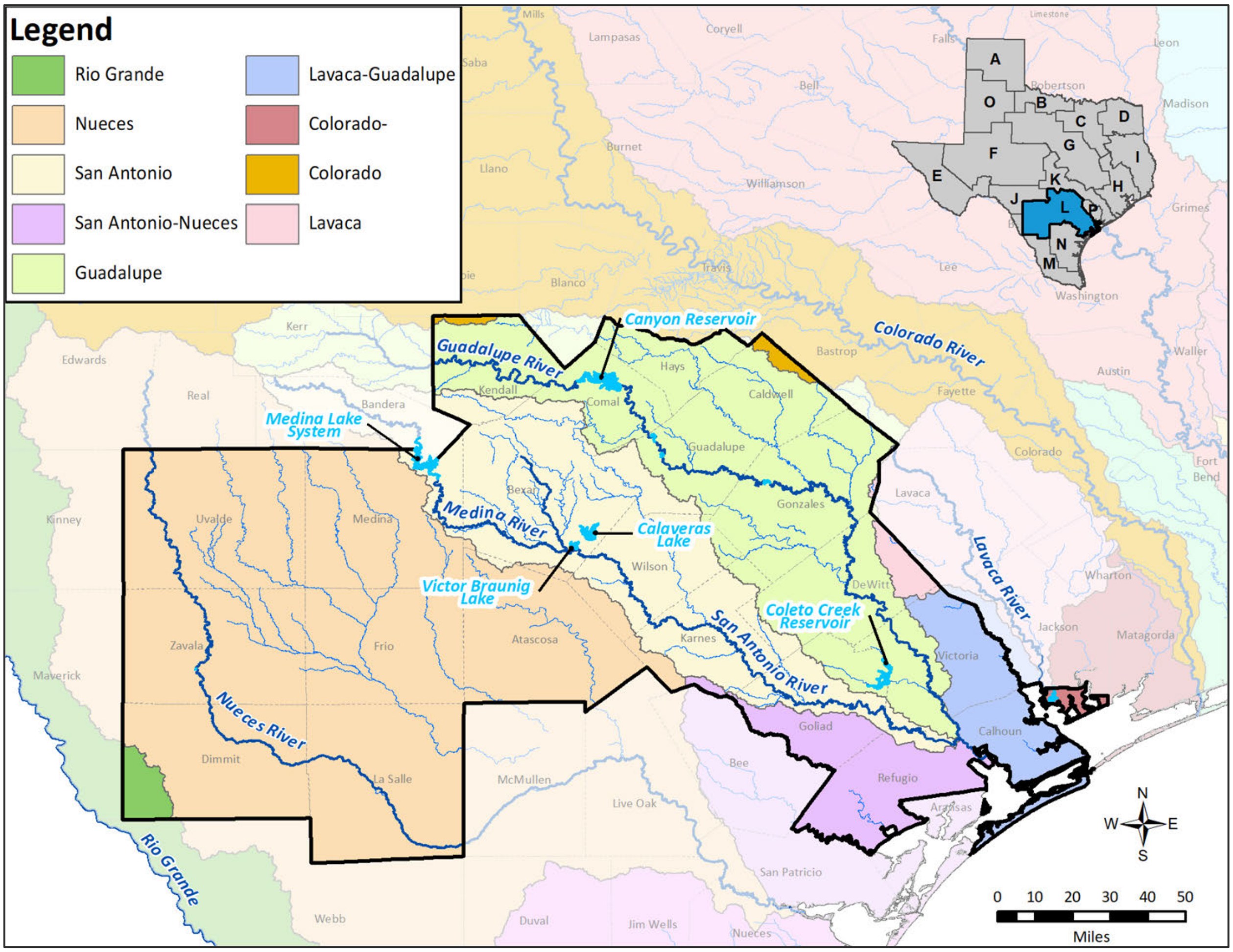

Figure ES-3 River Basins, Major Reservoirs, and Rivers in the SCTRWPA

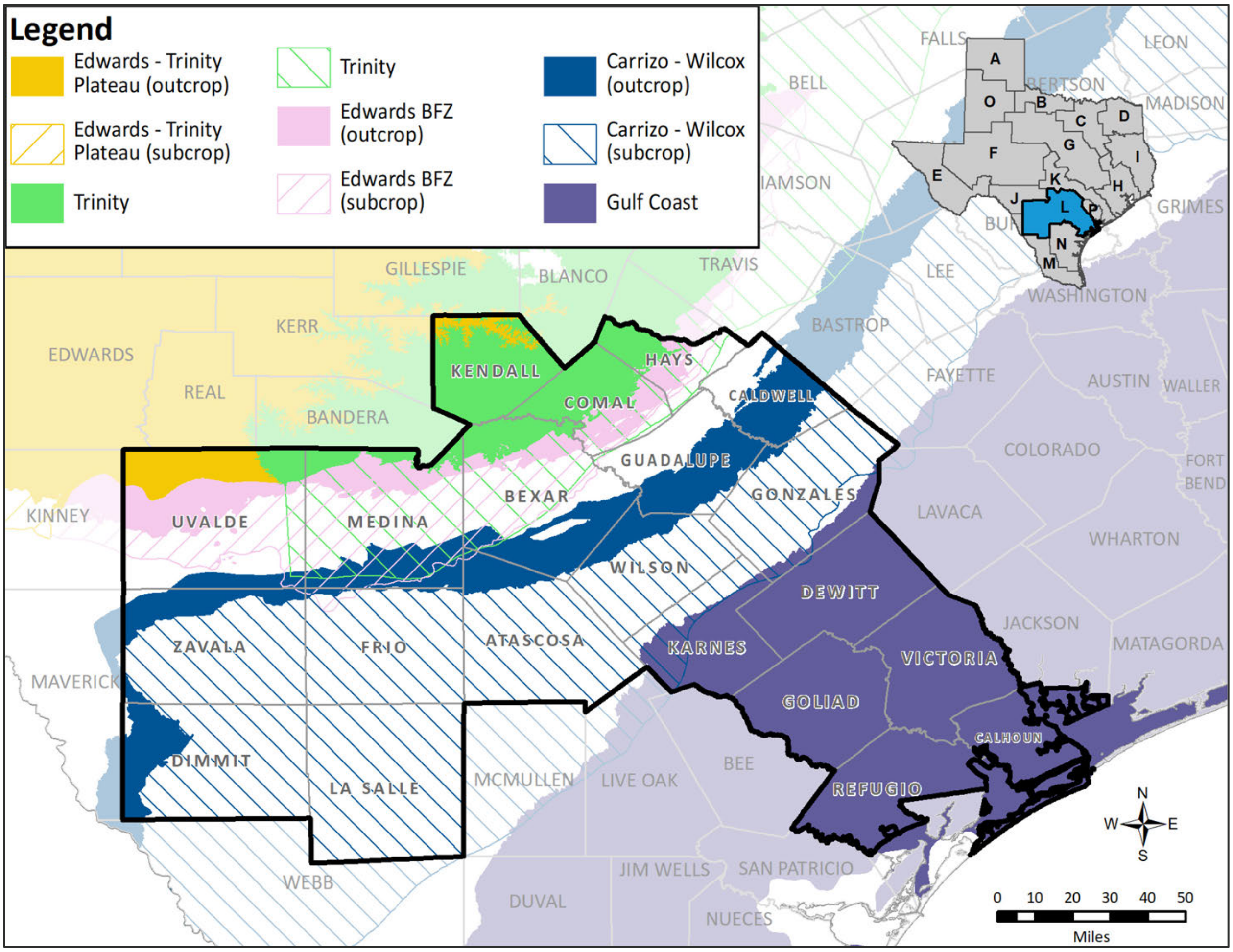

Figure ES-4 Major Aquifers in the SCTRWPA

Table ES-3 Water Availabilities by Water Source Type (acft/yr)

	2030	2040	2050	2060	2070	2080
Run-of-River	86,465	86,465	86,465	86,465	86,465	86,465
Reservoirs	164,064	163,918	163,774	163,630	163,251	162,846
Local Surface Water	11,118	11,118	11,118	11,118	11,118	11,118
Groundwater	1,224,662	1,245,107	1,291,601	1,329,171	1,352,029	1,343,597
Reuse	142,359	166,581	166,581	166,581	166,581	166,581
Total	**1,628,668**	**1,673,189**	**1,719,539**	**1,756,965**	**1,779,444**	**1,770,607**

The SCTRWPG used the TCEQ water availability model (WAM) Run 3 and an alternative surface water model, the "Region L WAM" to assess surface water availabilities. The Region L WAM was used to estimate surface water availabilities for certain reservoirs, including Canyon Reservoir, Victor Braunig Lake, Calaveras Lake, and Coleto-Creek Reservoir. The unmodified WAM Run 3 was used to evaluate firm yields for all other reservoirs in the SCTRWPA. Local surface water availabilities, or livestock local supplies, were estimated as 50% of livestock water demands, as is generally assumed to be supplied 50% of livestock demand is met by local surface water sources such as stock tanks, streams, and windmills.

Groundwater availabilities were determined using modeled available groundwater (MAG) estimates provided by the TWDB, desired future condition (DFC) compatible estimates provided by the TWBD, or RWPG estimates developed by the SCTRWPG.

The SCTRWPG determined reuse/recycled water availability based on the estimated amount of water returned to a utility's WWTP for each decade, less the amount of reuse water already being utilized as existing supply. Please note that the reuse availabilities are for existing water sources; they do not reflect availabilities for future sources of supply, such as availabilities that would enable a WUG to implement a reuse water management strategy (WMS).

For additional information regarding the determination of available water supplies, refer to Chapter 3. Existing water supplies for WUGs are provided in DB27 reports included in Appendix 3A.

ES.5 Water Needs

Chapter 4 describes the evaluation and results of the water needs (shortages) analysis and secondary needs analysis for WUGs. Table ES-4 includes a summary of water shortages/needs for the SCTRWPA.

Table ES-4 Identified Water Needs by Individual Use Types for the South Central Texas Region (acft/yr)

Need Type	2030	2040	2050	2060	2070	2080
Irrigation	71,258	71,187	71,793	71,862	71,927	71,979
Livestock	12	12	12	12	12	12
Manufacturing	39,765	41,606	45,440	49,562	53,838	58,272
Mining	34,771	37,867	40,936	43,930	46,782	20,956
Municipal	38,660	69,291	110,927	184,017	264,133	361,693
Steam-Electric Power	666	666	666	666	666	666
Identified Needs Total	**185,132**	**220,629**	**269,774**	**350,049**	**437,358**	**513,578**

In all decades, municipal and irrigation needs comprise the majority of identified water needs in the SCTRWPA. In 2030 and 2040, irrigation has the highest needs of the use types; however, by 2050, municipal needs are expected to overtake irrigation and increase through the end of the planning horizon. The manufacturing needs are expected to increase gradually over the planning horizon. The livestock sector is anticipated to have minimal needs of 12 acft/yr, localized to Hays County. The mining sector is expected to experience a gradual increase in needs between 2030 and 2070 before declining sharply in 2080. Steam-electric power needs are expected to remain constant over the planning horizon.

The SCTRWPA has a projected total annual water need of 185,132 acft/yr in 2030, increasing to 513,578 acft/yr in 2080. All counties within the SCTRWPA, except DeWitt and Refugio Counties, have identified needs in at least one decade during the 50-year planning horizon.

The SCTRWPG evaluates various WMSs to meet identified water needs. These strategies are discussed in Chapter 5. After applying all recommended conservation and direct reuse WMSs, the secondary water needs are 175,863 acft/yr in 2030 and 318,286 acft/yr in 2080. For additional information regarding the determination of water needs, refer to Chapter 4.

ES.6 Water Management Strategies to Meet Needs

Chapter 5 of the 2026 SCTRWP provides information on the identification and evaluation of WMSs. A WMS is a plan to meet an identified need for additional water by an entity, which can mean increasing the total water supply or maximizing an existing supply, including through reducing demands.

Chapter 5 is organized into three subchapters, summarized as follows:

- **Subchapter 5.1: Potentially Feasible Water Management Strategies.** Describes the process to identify potentially feasible WMSs, which strategies were identified as potentially feasible, which strategies were Recommended, and the implementation status of certain Recommended WMSs.
- **Subchapter 5.2: Water Management Strategy Evaluations.** Summarizes methodology and results of WMS evaluations for the 2026 SCTRWP, including a quantitative reporting for each WMS of the net quantity of water, reliability, financial costs, effects on environmental factors and agricultural resources
- **Subchapter 5.3: Water Conservation Information and Recommendations.** Consolidates and presents conservation-related recommendations.

Subchapter 5.1 provides information regarding how the RWPG considered and approved a process to identify potentially feasible WMSs. The SCTRWPG approved this process at a regular meeting on November 2, 2023. Using the documented process, the SCTRWPG identified potentially feasible WMSs for inclusion in the 2026 SCTRWP.

Each of the potentially feasible WMSs were evaluated by the SCTRWPG and considered for inclusion in the SCTRWP. Table ES-5 provides a summary of the potentially feasible WMSs and identifies which strategies were identified by the SCTRWPG as Recommended, Alternative, or Considered but not Recommended. WMS evaluations are described in Subchapter 5.2. The volume of recommended and alternative strategies in the 2026 Plan for the final decade of the planning horizon (2080) is 932,788 acft/yr and 25,000 acft/yr, respectively.

Table ES-5 Strategies Identified by the SCTRWPG to be Recommended, Alternative, or Considered

Water Management Strategies	Designation by the SCTRWPG	Strategy Evaluation Reference in the 2026 SCTRWP
Municipal Water Conservation	Recommended	5.2.1
Non-municipal Water Conservation	Recommended	5.2.2
Drought Management	Recommended	5.2.3
Edwards Transfers	Recommended	5.2.4
Fresh Groundwater Development	Recommended	5.2.5
Brackish Groundwater Development	Recommended	5.2.6
Groundwater Conversions	Considered but not Recommended	5.2.7
Facilities Expansion	Recommended	5.2.8
Recycled Water	Recommended & Alternative *	5.2.9
Brush Management	Considered but not Recommended	5.2.10
Rainwater Harvesting	Recommended	5.2.11
Surface Water Rights	Considered but not Recommended	5.2.12
Balancing Storage	Considered but not Recommended	5.2.13
Alliance Regional Water Authority (ARWA) Carrizo-Wilcox Project (Phase 2)	Recommended	5.2.14
ARWA Direct Potable Reuse (DPR) Project (Phase 3)	Recommended	5.2.15
Canyon Regional Water Authority (CRWA) Expanded Brackish Carrizo-Wilcox Project	Recommended	5.2.16
CRWA Siesta Project	Recommended	5.2.17
CRWA Wells Ranch (Phase 3) Project	Recommended	5.2.18
Cibolo Valley Local Government Corporation (CVLGC) Carrizo Project	Recommended	5.2.19
Guadalupe-Blanco River Authority (GBRA) Lower Basin New Appropriation	Recommended	5.2.20
GBRA WaterSECURE	Recommended	5.2.21
Medina County Regional Aquifer Storage and Recovery (ASR) Project	Recommended	5.2.22
New Braunfels Utilities (NBU) ASR Project	Recommended	5.2.23
NBU Trinity Well Field Expansion	Recommended	5.2.24
San Antonio Water System (SAWS) Expanded Local Carrizo Project	Recommended	5.2.25

Water Management Strategies	Designation by the SCTRWPG	Strategy Evaluation Reference in the 2026 SCTRWP
SAWS Expanded Brackish Groundwater Project	Recommended	5.2.26
SAWS Regional Wilcox Project	Recommended	5.2.27
Schertz-Seguin Local Government Corporation (SSLGC) Expanded Brackish Wilcox Project	Recommended	5.2.28
SSLGC Expanded Carrizo Project	Recommended	5.2.29
Victoria ASR Project	Recommended	5.2.30
Victoria Groundwater-Surface Water Exchange	Recommended	5.2.31
Weather Modification	Recommended	5.2.32
* The SCTRWPG considered and evaluated multiple projects under the Recycled Water WMS. At the request of SAWS, the SCTRWPG designated the Recycled Water – SAWS DPR Project as an Alternative Strategy; the remaining Recycled Water projects were designated as Recommended WMSs. .		

Subchapter 5.3 is a consolidated resource that presents conservation recommendations, including per capita water use Goals, Water Conservation WMSs included in the SCTRWP, Model Water Conservation Plans, and considerations of applicable best management practices appropriate for the SCTRWPA. The SCTRWPG strongly supports water conservation and generally recommends water conservation for all WUGs in every use category. For the 2026 SCTRWP, the SCTRWPG identified the Municipal Water Conservation WMS (refer to Section 5.2.1) and Non-Municipal Water Conservation WMS (refer to Section 5.2.2) as Recommended WMSs.

A key parameter of municipal water use within a typical city or water service area is the number of gallons used per person per day (per capita water use), measured as gallons per capita per day (GPCD). Per capita water use goals are recommended and described in the Municipal Water Conservation WMS in Section 5.2.1 of the 2026 SCTRWP. Goals are recommended for each planning decade and are based on a WUG's projected 2030 per capita water use. The SCTRWPG established the following Municipal Water Conservation goals for the 2026 RWP:

- For municipal WUGs having year 2030 water use of 140 GPCD or greater, the goal is to reduce per capita water use by 10% per decade until 140 GPCD is reached; after which, the goal is to reduce per capita water use by 2.5% per decade for the remainder of the planning period;
- For municipal WUGs having year 2030 water use between 80 GPCD and 139 GPCD, the goal is to reduce per capita water use by 2.5% per year for the remainder of the planning period or until 80 GPCD is reached; and
- For municipal WUGs having year 2030 water use less than 80 GPCD, the goal is to maintain per capita water use at or below 80 GPCD throughout the planning horizon.

Section 5.2.1 of the 2026 SCTRWP includes a table of GPCD goals by WUG for each decade of the planning horizon.

ES.7 Impacts of the Regional Water Plan

Chapter 6 describes the impacts of the 2026 SCTRWP and how the 2026 SCTRWP is consistent with long-term protection of the state's water resources, agricultural resources, and natural resources. The chapter also includes a Cumulative Effects Analysis to assess the impact of the regional water plan on designated unique river or stream segments.

The cumulative effects of implementing the recommended WMSs described in the 2026 SCTRWP are quantified through long-term simulation of natural hydrologic processes including groundwater flow, precipitation, streamflow, aquifer recharge, springflow, and evaporation because they are affected by human influences such as aquifer pumpage, reservoirs, and diversions. Implementation of the 2026 SCTRWP is not expected to have an effect on the Nueces, Frio, and Sabinal River segments designated as having unique ecological value, as no WMSs are recommended within or upstream of these segments. As shown on Figure 6-2, implementation of the 2026 SCTRWP, including full implementation of the Edwards Aquifer Habitat Conservation Plan, is expected to increase long-term average spring discharges, which should serve to preserve or enhance the unique ecological value of the designated Comal River and San Marcos River segments.

Chapter 6 also presents a description of unmet needs, and the socioeconomic impacts of not meeting those needs. A TWDB report presenting the socioeconomic impacts of not meeting needs will be included as Appendix 6A. The socioeconomic impact report is anticipated to be released in August 2025 for inclusion in the final SCTRWP.

ES.8 Drought Response

Drought preparations and response are described in detail in Chapter 7. Droughts are of great importance to the planning and management of water resources in Texas. Chapter 7 presents all necessary requirements for drought management and contingency plans, as well as a summary of information provided by water systems in the SCTRWPA regarding drought, including preparations and response throughout the Region.

In terms of severity and duration, the devastating drought of the 1950s is considered the drought of record for most of the state, including portions of the SCTRWPA. By 1956, 244 of the 254 counties were considered disaster areas. This drought lasted almost a decade in many places and affected not only Texas but other states throughout the nation as well. The 1950s drought has been used by water resource engineers and managers as a benchmark drought for water supply planning since the regional water planning process was implemented. The drought of the 1950s remains the drought of record for the Guadalupe-San Antonio River Basin. For the Nueces River Basin within the SCTRWPA, the 1990s drought was severe and prolonged enough that it is now considered the drought of record.

The 2026 SCTRWP includes drought management WMSs for municipal, irrigation, and livestock uses (refer to Section 5.2.3). Drought Management yields in acft/yr are summarized in Table ES-6.

Table ES-6 Yields of Drought Management Strategies in the 2026 SCTRWP (acft/yr)

No	Water User Group	Drought Management Strategy Type	2030	2040	2050	2060	2070	2080
1	Air Force Village II Inc	Municipal	8	8	8	8	8	8
2	Alamo Heights	Municipal	88	88	88	88	88	88
3	Aqua Water Supply Corporation (WSC) [1]	Municipal	10	11	13	14	16	18
4	Atascosa Rural WSC	Municipal	100	117	132	145	159	176
5	Benton City WSC	Municipal	158	176	192	202	213	225
6	Bexar County Water Control and Improvement District (WCID) 10	Municipal	71	80	88	95	103	113
7	Boerne	Municipal	213	293	396	516	653	810
8	C Willow Water	Municipal	7	8	8	9	10	11
9	Canyon Lake Water Service (Texas Water Company) [1]	Municipal	827	1,131	1,323	1,448	1,916	2,432
10	Carrizo Hill WSC	Municipal	3	4	4	5	6	9
11	Castroville	Municipal	59	64	71	82	92	99
12	Cibolo	Municipal	207	252	301	353	413	482
13	Clear Water Estates Water System	Municipal	8	11	15	21	27	34
14	Converse	Municipal	284	285	285	285	285	285
15	County Line Special Utility District (SUD)	Municipal	314	628	1,004	1,297	1,464	1,556
16	Creedmoor-Maha WSC [1]	Municipal	112	202	292	381	472	563
17	Crystal Clear SUD	Municipal	531	893	1,008	1,136	1,285	1,456
18	Cuero	Municipal	76	76	76	75	75	75
19	East Central SUD	Municipal	472	535	592	644	702	767
20	East Medina County SUD	Municipal	84	90	94	97	100	103
21	El Oso WSC [1]	Municipal	61	64	66	68	71	75
22	Elmendorf	Municipal	28	38	51	68	85	117
23	Fair Oaks Ranch	Municipal	74	88	95	98	99	99
24	Fayette WSC [1]	Municipal	0	0	1	1	1	1
25	Fort Sam Houston	Municipal	47	47	47	47	47	47
26	Garden Ridge	Municipal	211	261	311	368	436	517
27	Goforth SUD [1]	Municipal	359	569	845	1,218	1,646	2,135

No	Water User Group	Drought Management Strategy Type	2030	2040	2050	2060	2070	2080
28	Gonzales	Municipal	48	48	47	47	46	45
29	Green Valley SUD	Municipal	380	508	652	805	980	1,179
30	Guadalupe-Blanco River Authority	Municipal	91	127	123	119	115	110
31	Hondo	Municipal	59	57	55	56	56	56
32	Karnes City	Municipal	17	18	19	20	21	22
33	Kendall West Utility	Municipal	18	23	29	36	45	54
34	Kirby	Municipal	63	71	72	72	72	72
35	KT Water Development	Municipal	19	29	43	60	80	102
36	Kyle	Municipal	542	809	1,102	1,235	1,279	1,312
37	La Coste	Municipal	11	11	11	11	11	12
38	Leon Valley	Municipal	142	172	172	172	172	172
39	Live Oak	Municipal	85	85	85	85	85	85
40	Lockhart	Municipal	141	153	166	179	192	205
41	Luling	Municipal	38	38	39	41	42	44
42	Lytle	Municipal	25	26	28	29	31	33
43	Martindale WSC	Municipal	33	44	49	54	60	66
44	Maxwell SUD	Municipal	197	265	356	479	644	711
45	McCoy WSC [1]	Municipal	73	77	81	85	90	96
46	Natalia	Municipal	11	11	11	12	12	11
47	New Braunfels	Municipal	1,529	2,177	3,004	4,010	5,161	12,958
48	Oak Hills WSC	Municipal	78	91	105	121	140	162
49	Pearsall	Municipal	74	85	92	93	95	96
50	Picosa WSC	Municipal	23	27	30	34	37	41
51	Pleasanton	Municipal	111	121	132	144	157	171
52	Port Lavaca	Municipal	79	76	72	68	64	60
53	Runge	Municipal	11	11	12	13	14	14
54	S S WSC	Municipal	165	191	216	238	264	294
55	San Antonio Water System	Municipal	26,865	29,834	31,670	33,099	34,211	35,879
56	San Marcos	Municipal	1,168	1,646	2,028	2,309	2,491	2,608
57	Schertz	Municipal	574	699	830	960	1,111	1,283
58	Seguin	Municipal	537	633	679	706	734	763

No	Water User Group	Drought Management Strategy Type	2030	2040	2050	2060	2070	2080
59	Selma	Municipal	108	131	153	173	197	224
60	Shavano Park	Municipal	73	83	91	99	108	118
61	South Buda WCID 1	Municipal	47	77	116	168	229	298
62	Springs Hill WSC	Municipal	443	525	617	713	822	1,418
63	Texas State University	Municipal	42	42	42	42	42	42
64	The Oaks WSC	Municipal	15	17	19	20	22	24
65	Universal City	Municipal	184	194	197	198	199	199
66	Uvalde	Municipal	135	133	129	125	121	116
67	Victoria	Municipal	670	680	683	680	676	672
68	Victoria County WCID 1	Municipal	11	11	12	12	12	12
69	Ville Dalsace Water Supply	Municipal	3	4	4	4	4	4
70	Water Services	Municipal	80	86	91	96	101	108
71	Wimberley WSC	Municipal	44	64	91	126	167	214
72	Wingert Water Systems	Municipal	14	16	18	19	19	19
73	Yancey WSC	Municipal	54	57	59	61	63	65
74	Irrigation, Caldwell	Irrigation	34	34	34	34	34	34
75	Irrigation, Calhoun	Irrigation	1,046	1,046	1,046	1,046	1,046	1,046
76	Irrigation, Dimmit	Irrigation	189	189	189	189	189	189
77	Irrigation, Goliad	Irrigation	313	313	313	313	313	313
78	Irrigation, Guadalupe	Irrigation	28	28	28	28	28	28
79	Irrigation, Karnes	Irrigation	82	82	82	82	82	82
80	Irrigation, La Salle	Irrigation	394	394	394	394	394	394
81	Irrigation, Victoria	Irrigation	1,109	1,109	1,109	1,109	1,109	1,109
82	Irrigation, Wilson	Irrigation	1,223	1,223	1,223	1,223	1,223	1,223
83	Irrigation, Zavala	Irrigation	4,257	4,257	4,257	4,257	4,257	4,257
84	Livestock, Hays	Livestock	12	12	12	12	12	12
All	**Total**	**All**	**39,542**	**46,302**	**51,738**	**56,697**	**61,766**	**74,550**

[1] WUGs are split between Region L and other regions. Values in the table represent Region L portion of WUG's yield.

Drought contingency plans (DCPs) are required of certain entities. These documents have become integral to providing a reliable supply of water throughout the State. Drought management measures, represented by the drought triggers and responses in DCPs, are summarized for Region L entities in Appendix 7A.

ES.9 Policy Recommendations

Chapter 8 of the 2026 SCTRWP includes recommendations for designation of ecologically unique river and stream segments, unique sites for reservoir construction, and other policy and legislative recommendations that the SCTRWPG believes are needed and desirable to achieve the stated goals of state and regional water planning.

The 2026 SCTRWP does not include any new recommendations to designate river or stream segments as being of unique ecological value; however, it does include a funding recommendation regarding the funding for monitoring of water quality in the five stream segments already designated as having unique ecological value within the SCTRWPA. The SCTRWPG recommends the Texas Legislature adequately fund the TCEQ and other entities in monitoring the water quality of the five river and stream segments designated as being of unique ecological value. Additionally, the SCTRWPG recommends increased TWDB funding to be allocated for future planning cycles to conduct analyses necessary for designation of additional stream segments as segments of unique ecological value. The SCTRWPG makes no recommendations regarding unique sites for reservoir construction.

Other recommendations discussed in Chapter 8 include the following topics:

- Funding water projects for a growing region;
- Sponsorship and implementation of irrigation strategies;
- Groundwater;
- Surface water;
- Conservation;
- Water system capacity;
- Innovative strategies;
- Water quality and data collection; and
- Consideration of climate variability in regional water planning.

ES.10 Implementation and Comparison to the Previous Regional Water Plan

Chapter 9 documents the level of implementation of previously recommended WMSs, provides an assessment of progress toward achieving economies of scale, and summarizes the differences between 2026 SCTRWP and the 2021 SCTRWP.

To assess the level of implementation of the 2021 SCTRWP, the SCTRWPG distributed a survey to WUGs and WWPs that had WMSs and or WMSPs included in the 2021 SCTRWP. The SCTRWPG received survey responses regarding 43 of the WMSs or WMSPs. In terms of progress toward regionalization, the prevailing approach for entities within the SCTRWPA is to coordinate and collaborate. Based on the array of collaborative projects and partnerships, the SCTRWPA has been successful in encouraging cooperation among WUGs for the purpose of achieving economies of scale or otherwise incentivizing WMSs that benefit the entire SCTRWPA. The SCTRWPG is committed to encouraging continued cooperation among WUGs and is always looking for ways to achieve economies of scale for the benefit of the region and the state.

ES.11 Public Participation and Plan Adoption

Public participation was integral to all phases of development of the 2026 SCTRWP. The SCTRWPG met all requirements under the Texas Open Meetings Act and Public Information Act in accordance with 31 TAC §§357.12, 357.21, and 357.50(f).

To develop the 2026 SCTRWP, the SCTRWPG held 18 quarterly RWPG meetings beginning in February 2021 until the IPP was adopted in February 2025. The meetings convene all members of the SCTRWPG to consider and act on items to develop the SCTRWP. In addition, there were five workgroups that held meetings to develop the 2026 SCTRWP. In total, 59 meetings were held to develop the 2026 SCTRWP (Figure ES-5).

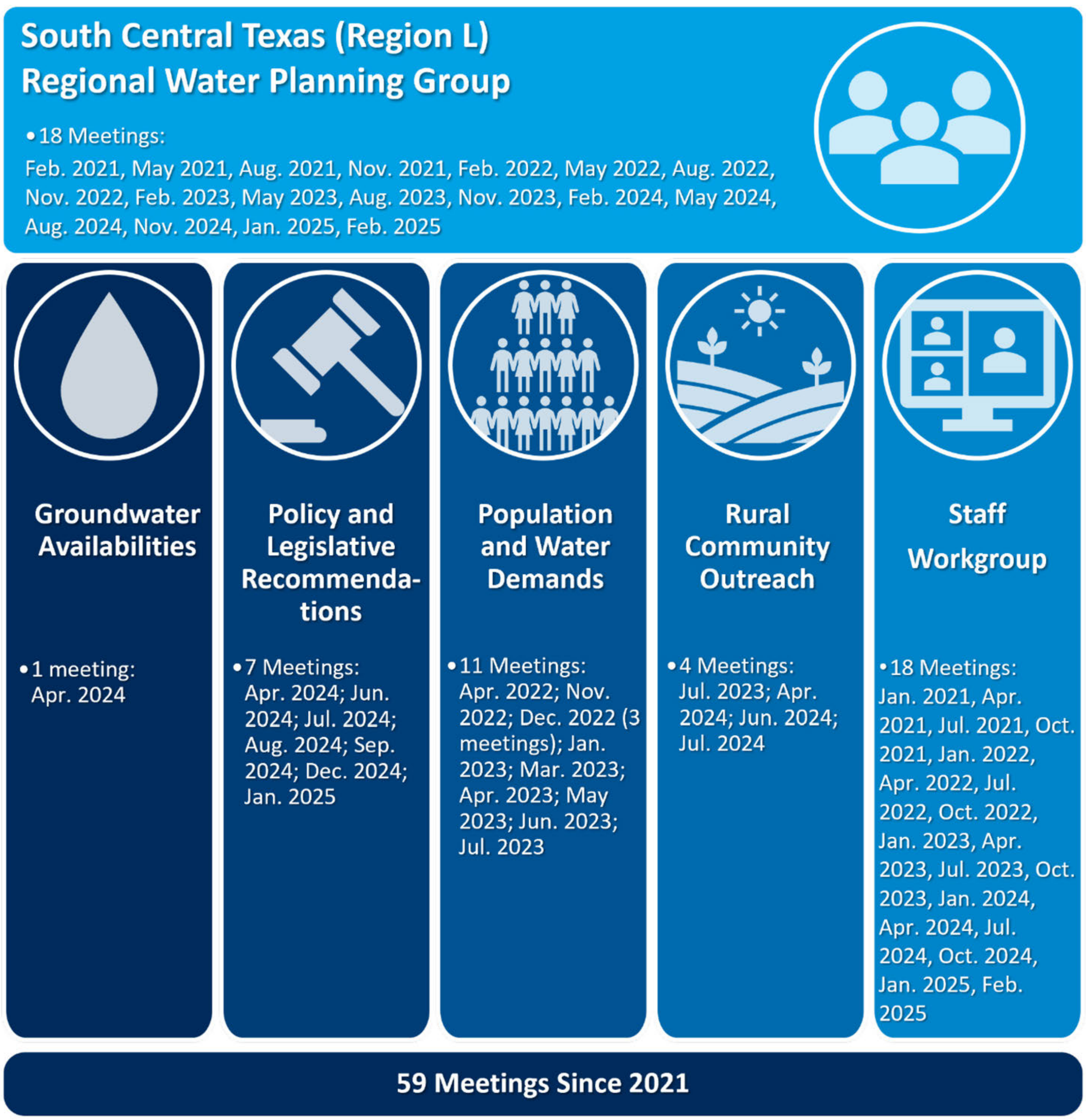

Figure ES-5 Meetings Held to Develop the 2026 SCTRWP

The Staff Workgroup comprises the SCTRWPG Executive Committee, representatives of the plan administrator, the TWDB, water suppliers, the technical and public participation consultants, and any other person or entity wishing to attend. Meetings are convened at least 1 week in advance of each SCTRWPG meeting. Similar to previous cycles, the SCTRWPG established workgroups that to focus on issues of particular importance or concern to the SCTRWPG. For the sixth cycle of planning, the SCTRWPG established the Groundwater Availabilities Workgroup, Policy and Legislative Recommendations Workgroup, Population and Water Demands Workgroup, and Rural Community Outreach Workgroup.

The SCTRWPA is bordered by five adjacent planning areas, including: Plateau (Region J), Lower Colorado (Region K), Rio Grande (Region M), Coastal Bend (Region N), and Lavaca (Region P). To the extent necessary, coordination with each of these regions was accomplished through chair correspondence, RWPG liaisons, and/or technical consultant collaboration. Subjects of coordination, correspondence, or collaboration included projected demands, confirmation of WUG allocations among regions, and specific WMSs of interest. The SCTRWPG is aware of no interregional conflicts involving recommended WMSs included in the 2026 SCTRWP.

The technical consultant met and/or corresponded with representatives of WWPs and WUGs throughout the development of the 2026 SCTRWP. All WWPs and WUGs were afforded opportunities to provide information and feedback regarding preferred contact information, population projections, water demand projections, existing supplies, DCPs, emergency interconnections, WMSs, and implementation status of WMSs. The majority of these touch points were facilitated through emailed surveys.

All SCTRWPG meetings were preceded by required notice and open to the public. Opportunities for public comment were available at the beginning and end of every SCTRWPG meeting, and summaries of public comments received were included in the approved minutes of each meeting. Communication of information was facilitated and supported by the Region L website (www.RegionLTexas.org) maintained by the San Antonio River Authority and by the TWDB website (www.twdb.texas.gov/waterplanning). Throughout the planning process, SCTRWPG members, San Antonio River Authority, and the technical and public participation consultants provided responses to inquiries from the public.

The IPP was adopted by the SCTRWPG during the regularly-scheduled meeting on February 20, 2025. The approved IPP was submitted to the TWDB and made available for review and comment on March 3, 2025, in accordance with 31 TAC §357.21(h)(7). The 2026 SCTRWP will be adopted by a majority vote of the SCTRWPG and submitted to the TWDB by October 20, 2025, for approval and integration into the 2027 SWP.

INITIALLY PREPARED PLAN

CHAPTER 1: DESCRIPTION OF THE REGIONAL WATER PLANNING AREA

South Central Texas Regional Water Plan

B&V PROJECT NO. 411170

PREPARED FOR

South Central Texas Regional Water Planning Group

3 MARCH 2025

BLACK & VEATCH

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%	Percent
acft	Acre-Foot
acft/yr	Acre-Foot per Year
ASR	Aquifer Storage and Recovery
AWWA	American Water Works Association
BFZ	Balcones Fault Zone
cfs	Cubic Feet per Second
CPM	Critical Period Management
DCP	Drought Contingency Plan
EAA	Edwards Aquifer Authority
EAHCP	Edwards Aquifer Habitat Conservation Plan
EARIP	Edwards Aquifer Recovery Implementation Program
EPA	US Environmental Protection Agency
FRAT	Flow Regime Application Tool
GAM	Groundwater Availability Model
GBRA	Guadalupe-Blanco River Authority
GCD	Groundwater Conservation District
GMA	Groundwater Management Area
GPCD	Gallons per Connection per Day
HB	House Bill
IH-35	Interstate Highway 35
ILI	Infrastructure Leakage Index
MAG	Modeled Available Groundwater
mg/L	Milligrams per Liter
MWP	Major Water Provider
Region L	South Central Texas Region
Region P	Lavaca Region
RWPG	Regional Water Planning Group
SAWS	San Antonio Water System
SCTRWPA	South Central Texas Regional Water Planning Area
SCTRWPG	South Central Texas Regional Water Planning Group
SUD	Special Utility District
SWIFT	State Water Implementation Fund for Texas
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality

TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TPWD	Texas Parks and Wildlife Department
TSSWCB	Texas State Soil and Water Conservation Board
TSWQS	Texas Surface Water Quality Standards
TWDB	Texas Water Development Board
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
VPC	Variable Production Cost
WAM	Water Availability Model
WCID	Water Control and Improvement District
WMS	Water Management Strategy
WPP	Watershed Protection Plan
WSC	Water Supply Corporation
WUG	Water User Group
WWP	Wholesale Water Provider

1.0 Description of the Regional Water Planning Area

1.1 Introduction and Background

Sections 16.051 and 16.055 of the Texas Water Code direct the Executive Administrator of the Texas Water Development Board (TWDB) to prepare and maintain a comprehensive State Water Plan as a flexible guide for the development, management, and conservation of all water resources in Texas in order to ensure that sufficient supplies of water will be available at a reasonable cost to ensure public health, safety and welfare; further the State's economic growth; and protect agricultural and natural resources of the entire state.

In February 1998, the TWDB adopted rules establishing 16 regional water planning areas and designated initial members of each Regional Water Planning Group (RWPG), representing 11 interest categories. In 2011, the TWDB added a 12th interest category to represent Groundwater Management Areas (GMAs). Each RWPG has the option to add interest group categories and members. With technical and financial assistance from the TWDB, and in accordance with planning guidelines it set forth, the RWPGs prepared the inaugural consensus-based Regional Water Plan in 2001. The TWDB assembled the 16 Regional Water Plan into the 2002 State Water Plan. Since the first Regional Water Plan in 2001, there have been five subsequent cycles of planning in 5-year intervals, including the 2006, 2011, 2016, and 2021 Regional Water Plans, which were compiled by TWDB into the 2007, 2012, 2017, and 2022 State Water Plans, respectively. This document is the 2026 Regional Water Plan and represents the sixth cycle of regional water planning.

For the sixth cycle, the TWDB established deadlines for the Initially Prepared Plan to be adopted by RWPGs and submitted to the TWDB by March 3, 2025, and for the Final Plan to be adopted by the RWPG and submitted to the TWDB by October 25, 2025. The TWDB will compile the 16 Regional Water Plans to develop the 2027 State Water Plan.

This chapter summarizes the results of Task 1 of the current planning cycle and describes the South Central Texas (Region L) Regional Water Planning Area (SCTRWPA).

1.2 Overview of the South Central Texas Region

The SCTRWPA consists of all or portions of 21 counties located in the South Central portion of the state (Figure 1-1), including Atascosa, Bexar, Caldwell, Calhoun, Comal, DeWitt, Dimmit, Frio, Goliad, Gonzales, Guadalupe, Hays (partial), Karnes, Kendall, La Salle, Medina, Refugio, Uvalde, Victoria, Wilson, and Zavala Counties. The physical terrain of the region ranges from the Hill Country of the Edwards Plateau to the coastal plains. The most populous cities in the SCTRWPA include San Antonio, San Marcos, New Braunfels, and Victoria.

The SCTRWPA includes parts of six major river basins and three coastal basins: Rio Grande, Nueces, San Antonio, Guadalupe, Lavaca, and Lower Colorado River Basins; and Colorado-Lavaca, Lavaca-Guadalupe, and San Antonio-Nueces Coastal Basins. Table 1-1 provides a list of the SCTRWPA counties located within each river or coastal basin.

The SCTRWPA relies primarily on groundwater, and to a lesser extent on surface water reservoirs. The SCTRWPA overlies the Edwards and Gulf Coast Aquifers, and southern parts of the Trinity, Carrizo-Wilcox, and Edwards-Trinity (Plateau) Aquifers. In addition to these water resources, the area also overlies six minor aquifers (Queen City, Sparta, Austin Chalk, Buda Limestone, Leona Gravel, and Yegua-

Jackson). The Carrizo-Wilcox Aquifer provides nearly half of the region's groundwater supplies, with the Edwards-Balcones Fault Zone (BFZ) Aquifer providing nearly 35 percent (%) of the region's groundwater supplies. The Edwards-BFZ Aquifer is regarded as one of the most prolific artesian aquifers in the world. With its karst and porous features, the Edwards-BFZ Aquifer is highly permeable and responds quickly to rainfall events. The aquifer is also characterized by its unique biodiversity and endemic species. As such, the Edwards-BFZ Aquifer is regulated by the Edwards Aquifer Authority (EAA), charged with managing, enhancing, and protecting the important natural resource.

Springs are significant water resources in the SCTRWPA. The two most noteworthy springs are the San Marcos and Comal Springs, which both emanate from the Edwards-BFZ Aquifer and contribute to flow in the Guadalupe River. Comal Springs, located in New Braunfels, are the source for the Comal River, which is a tributary of the Guadalupe River. In addition, numerous springs in northern Uvalde and Medina Counties provide surface flows that recharge the Edwards Aquifer, and a few springs, such as Leona Springs and Soldier Springs at Uvalde, flow from below the Edwards Aquifer recharge zone, providing surface flows for many miles downstream.

Details about these water resources are presented in Section 1.5 of this chapter and in Chapter 3.

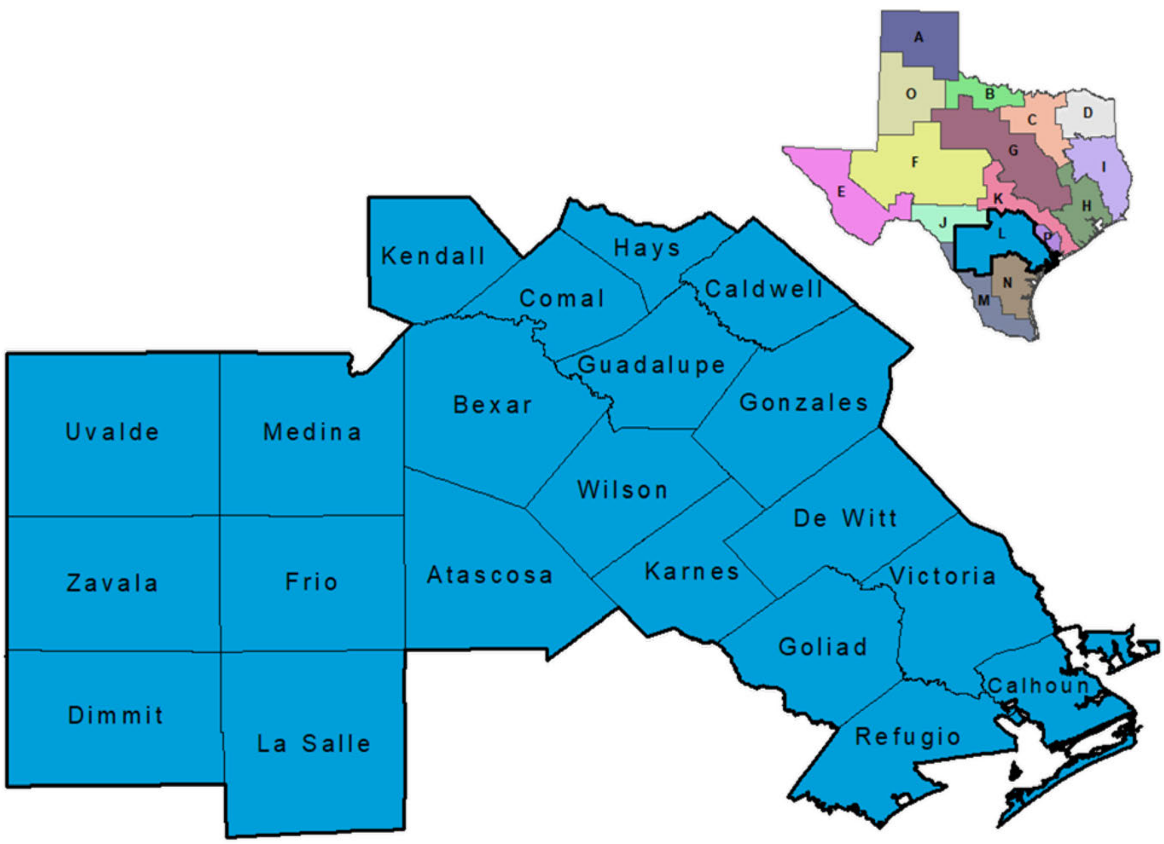

Figure 1-1 Counties of the South Central Texas Regional Water Planning Area

Table 1-1 List of Counties within the Edwards Aquifer Authority Area and River and Coastal Basins

County	Edwards Aquifer Authority	Nueces	San Antonio	Guadalupe	Lower Colorado	Colorado-Lavaca	Lavaca	Lavaca-Guadalupe	San Antonio-Nueces	Rio Grande
Atascosa	●	●	●							
Bexar	●	●	●							
Caldwell	●			●	●					
Calhoun				●		●		●	●	
Comal	●		●	●						
DeWitt			●	●			●	●		
Dimmit		●								●
Frio		●								
Goliad			●	●					●	
Gonzales				●			●			
Guadalupe	●		●	●						
Hays (part)	●			●						
Karnes		●	●	●					●	
Kendall			●	●	●					
La Salle		●								
Medina	●	●	●							
Refugio			●						●	
Uvalde	●	●								
Victoria			●	●			●	●		
Wilson		●	●	●						
Zavala		●								
Note: A bullet point indicates that all or part of the county is located in the area identified in the column heading.										

1.3 Climate

The SCTRWPA lies in four climatic divisions of Texas: the Edwards Plateau, the South Central, Upper Coast, and Southern (Figure 1-2). The climate of the region is classified as humid subtropical. Summers are usually hot and humid, while winters are often mild and dry. The hot weather persists from late May through September, accompanied by prevailing southeasterly winds. Occasional summer thunderstorms produce much of the annual precipitation within the region. The cool season, beginning about the first of November and extending through March, is also typically the driest season of the year. Winters are ordinarily short and mild, with most of the precipitation falling as drizzle or light rain. Accumulation of snow is a rare occurrence. Polar air masses, which penetrate the region in winter, bring northerly winds and sharp drops in temperature for short periods of time. In the coastal region, the climate is characterized by proximity to the Gulf of Mexico and prevailing southeasterly winds. During the long humid summers, high daytime temperatures are moderated in coastal areas by the Gulf breeze.

Mean annual precipitation in the region ranges from a high of 41 inches per year in the Colorado-Lavaca River Basin in the southeastern part of the region, to a low of 23 inches per year in the Nueces River Basin in the west [1] (Table 1-2). There is a general trend of decreasing precipitation from the eastern, coastal portions of the region to western inland portions. Figure 1-3 shows the mean annual precipitation from 1981 to 2010 [2].

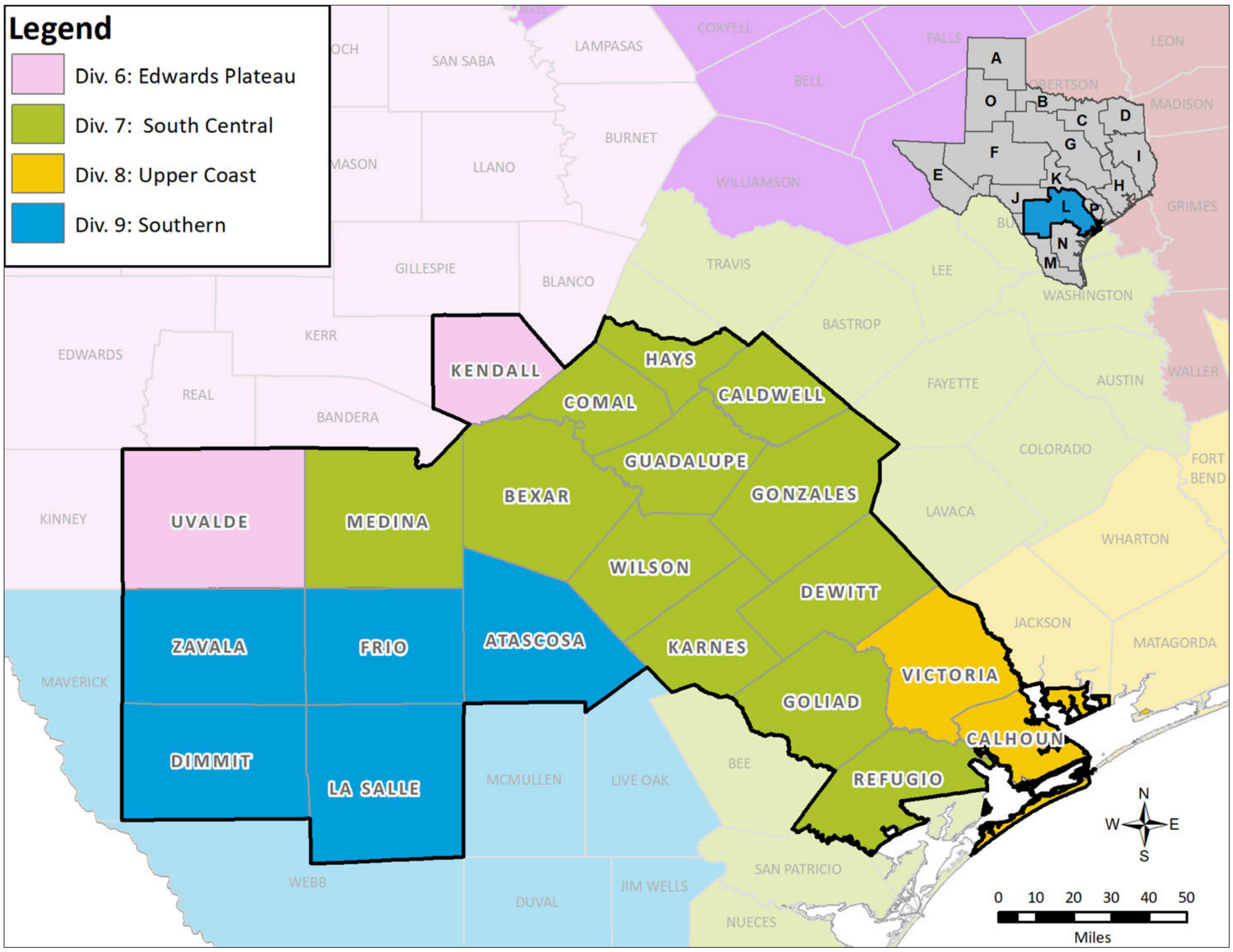

Figure 1-2 Climate Regions of the South Central Texas Region

[1] Texas Water Development Board (TWDB). "Continuing Water Resources Planning and Development for Texas." May 1977.

[2] Texas Water Development Board (TWDB) GIS Data. Texas Precipitation Data from the Natural Resources Conservation Service (NRCS). https://www.twdb.texas.gov/mapping/gisdata.asp.

Table 1-2 Precipitation by River and Coastal Basin

Basin	Mean Annual Precipitation (inches)	Wettest Month(s)	Driest Month(s)
Rio Grande	25	September	March
Nueces	23	May, September	March
San Antonio	30	September	March, December
Guadalupe	32	May, September	March
Colorado	34	May, September	Jan.
Lavaca	38	May, September	March, July
Lavaca-Guadalupe	37	September	March, July
San Antonio-Nueces	33	September	March
Colorado-Lavaca	41	September	March, July

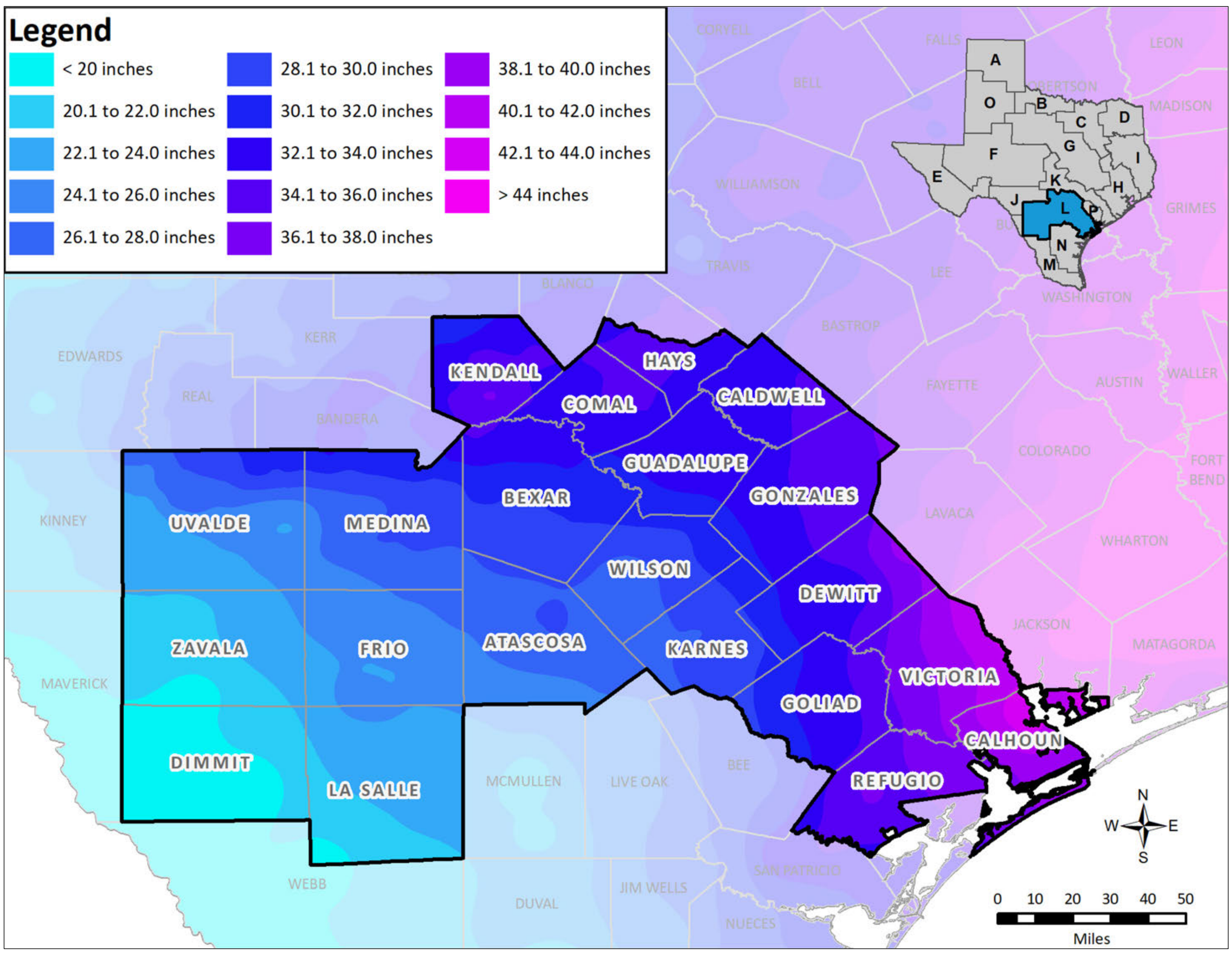

Figure 1-3 Mean Annual Precipitation in the South Central Texas Region (1981-2010)

Although mean annual temperatures are basically uniform throughout the region, there are some marked seasonal variations, which lead to widely varied values for annual net reservoir surface evaporation (Table 1-3). The values for annual net reservoir surface evaporation range from a high of 5.4 feet per year in the southwestern portion of the region to a low of 1.7 feet in the eastern portion of the region.

The SCTRWPA is subject to the threat of hurricanes each year from mid-June through the end of October, and, in those parts of the region along and near the coastline, the hazard of hurricane tides is prevalent. Although hurricane winds and tornadoes spawned by hurricanes cause extensive damage and occasional loss of life, surveys of hurricanes reaching the Texas Coast indicate that storm tides cause by far the greatest destruction and largest number of deaths. Elsewhere, in the inland areas of the region, the greatest concern with regard to hurricanes is the damage that results from winds and flooding. Records dating back to 1871 show that, on average, a tropical storm or hurricane has affected the region once every three years.

Table 1-3 Temperature and Reservoir Evaporation by River and Coastal Basin

Basin	Mean Annual Temperature (° F)	Mean Daily Minimum Temperature, January (° F)	Mean Daily Minimum Temperature, July (° F)	Mean Daily Maximum Temperature, January (° F)	Mean Daily Maximum Temperature, July (° F)	Annual Net Reservoir Surface Evaporation (inches)
Rio Grande	74	48	74	71	96	65
Nueces	71	40	72	65	98	45
San Antonio	70	41	74	64	96	31
Guadalupe	79	37	71	60	95	37
Colorado	68	39	74	60	96	35
Lavaca	70	41	72	65	98	24
Lavaca-Guadalupe	70	44	76	64	94	25
San Antonio-Nueces	71	43	73	65	96	30
Colorado-Lavaca	70	43	78	64	91	20
Source: Texas Water Development Board. "Continuing Water Resources Planning and Development for Texas." May 1977.						

1.4 General Geology

The Hill Country area of the SCTRWPA is underlain by Cretaceous Age limestone, which forms the Edwards Plateau. East and south of the plateau are upper Cretaceous chalk, limestone, dolomite, and clay, with the extensive Balcones Fault Zone System marking the boundary between the Edwards Plateau and the Gulf Coastal Region. The entire sequence dips gently toward the southeast.

A Tertiary Age sequence of southeasterly dipping sand, silts, clay, glauconite, volcanic ash, and lignite overlie the Cretaceous Age strata. The primary water-bearing unit of this sequence is the Carrizo Aquifer. A sequence of clay, sand, caliche, and conglomerate of the Pliocene Age Goliad Formation underlie the coastal areas of the region.

Overlying the Goliad Formation is the Quaternary Age Lissie Formation, which consists of sand, silt, clay, and minor amounts of gravel. Clay, silt, and fine-grained sand of the Beaumont Formation overlie the Lissie Formation. Throughout the region, alluvial sediments of Recent Age occur along streams and coastal areas.

1.5 Water Resources and Quality Considerations

1.5.1 Groundwater

Groundwater is regulated locally by groundwater conservation districts (GCDs) except in locations that do not have a district. In areas that do not have a district, water availability may be set by a county commissioners' court pursuant to Texas Water Code §35.019. There are 18 GCDs in the SCTRWPA, as shown on Figure 1-4. A GCD serves all or a portion of each county in the region. The responsibilities and authorities of these GCDs vary depending on legislation and governing law, and some districts are not responsible for all aquifers within the geographic boundaries of the district.

GMAs are a different concept in that every county in the State is in one or more of sixteen GMAs. For the most part, the major aquifers are not split across multiple GMAs, and the goal is to manage entire aquifer systems across political subdivisions in a consistent way. There are five GMAs located wholly or partially within the SCTRWPA, including GMA 7, GMA 9, GMA 10, GMA 13, and GMA 15.

There are five major and six minor aquifers supplying water to the SCTRWPA. The five major aquifers are the Edwards-BFZ, Carrizo-Wilcox, Trinity, Gulf Coast, and Edwards-Trinity (Plateau) (Figure 1-5). The six minor aquifers are the Austin Chalk, Buda Limestone, Leona Gravel, Sparta, Queen City, and Yegua-Jackson (Figure 1-6). Other aquifers include the Austin Chalk, Buda Limestone, and Leona Gravel Aquifers. Subsequent sections describe these major aquifers. A summary of estimated groundwater availabilities and supplies is presented in Chapter 3.

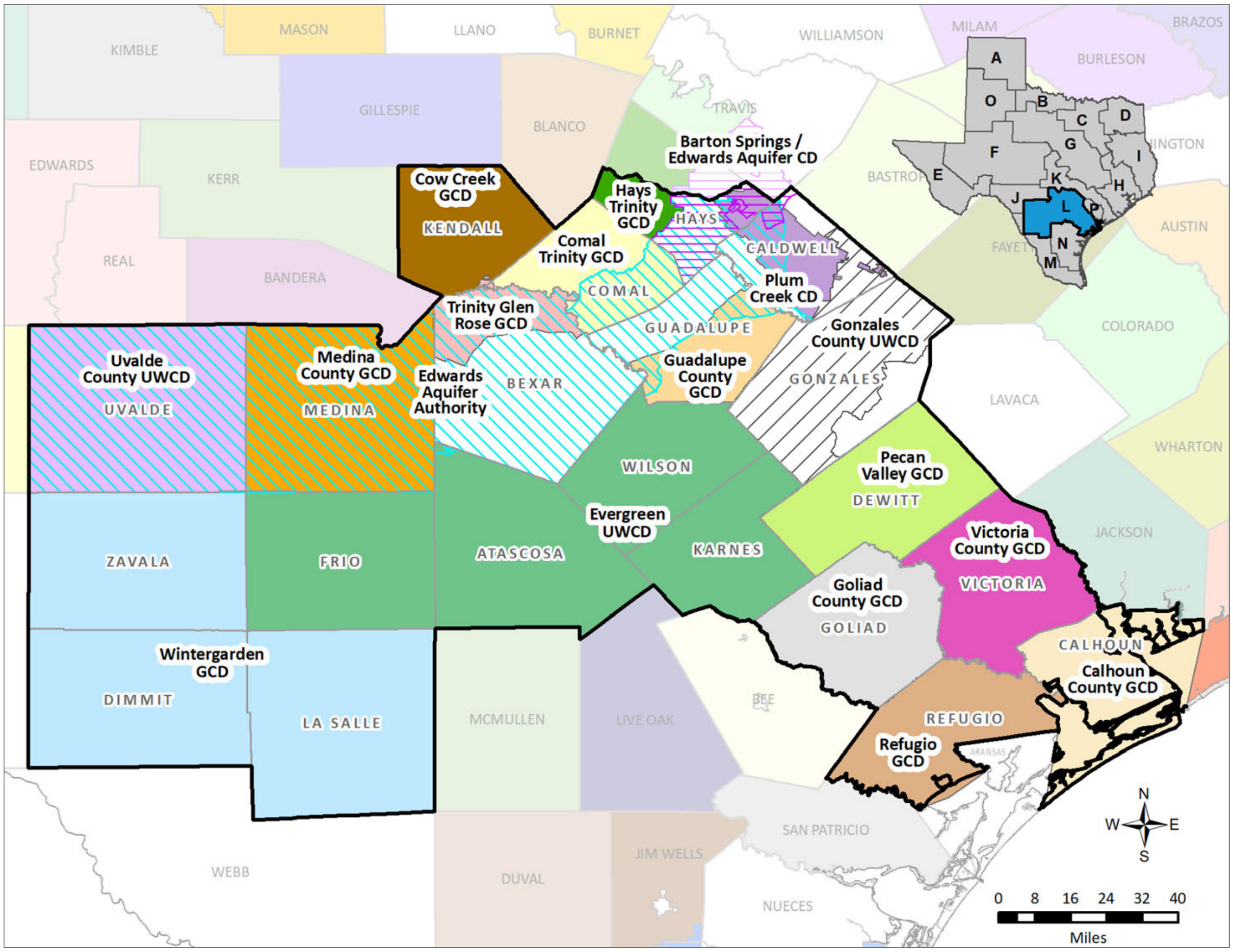

Figure 1-4 Groundwater Conservation Districts

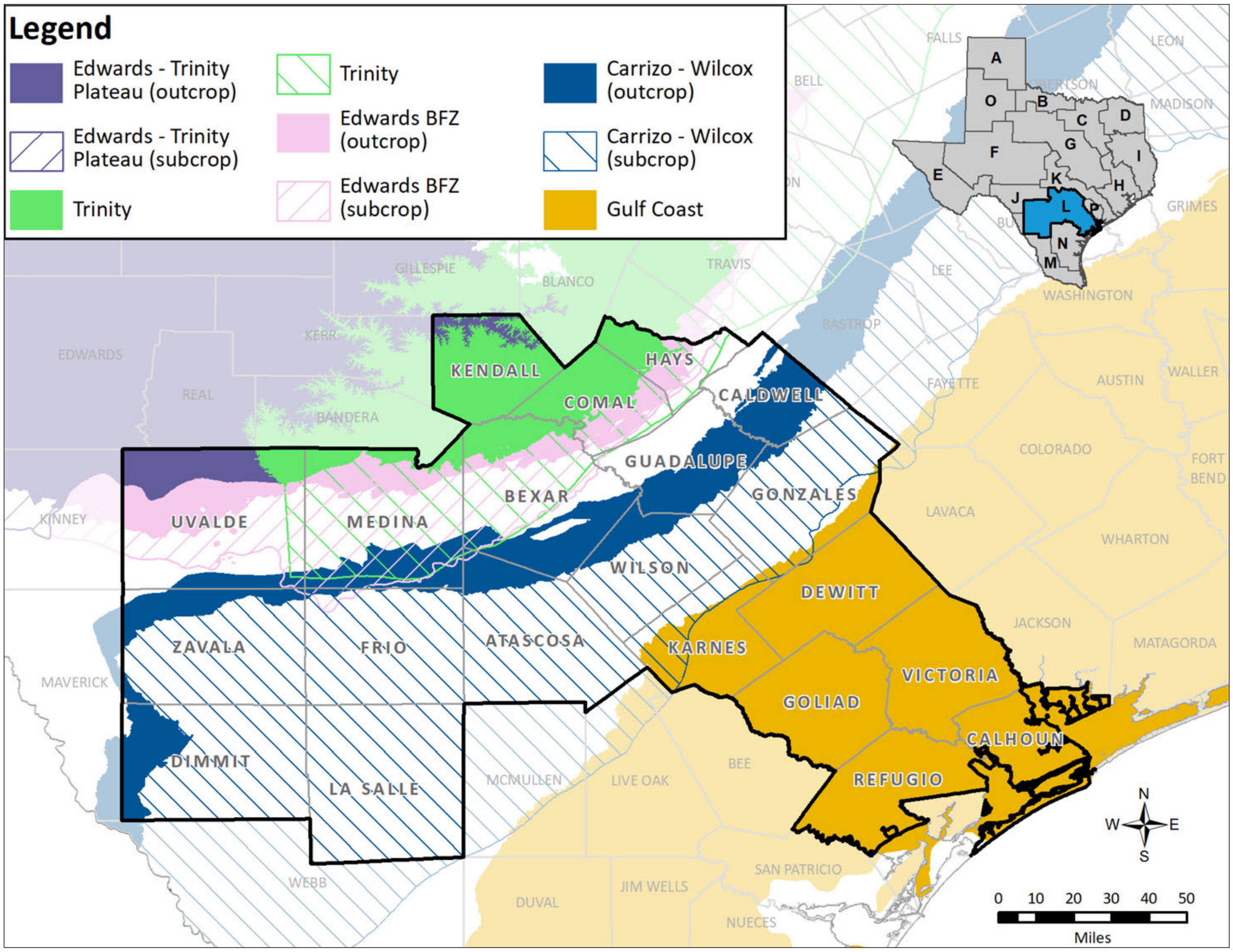

Figure 1-5 Major Aquifers

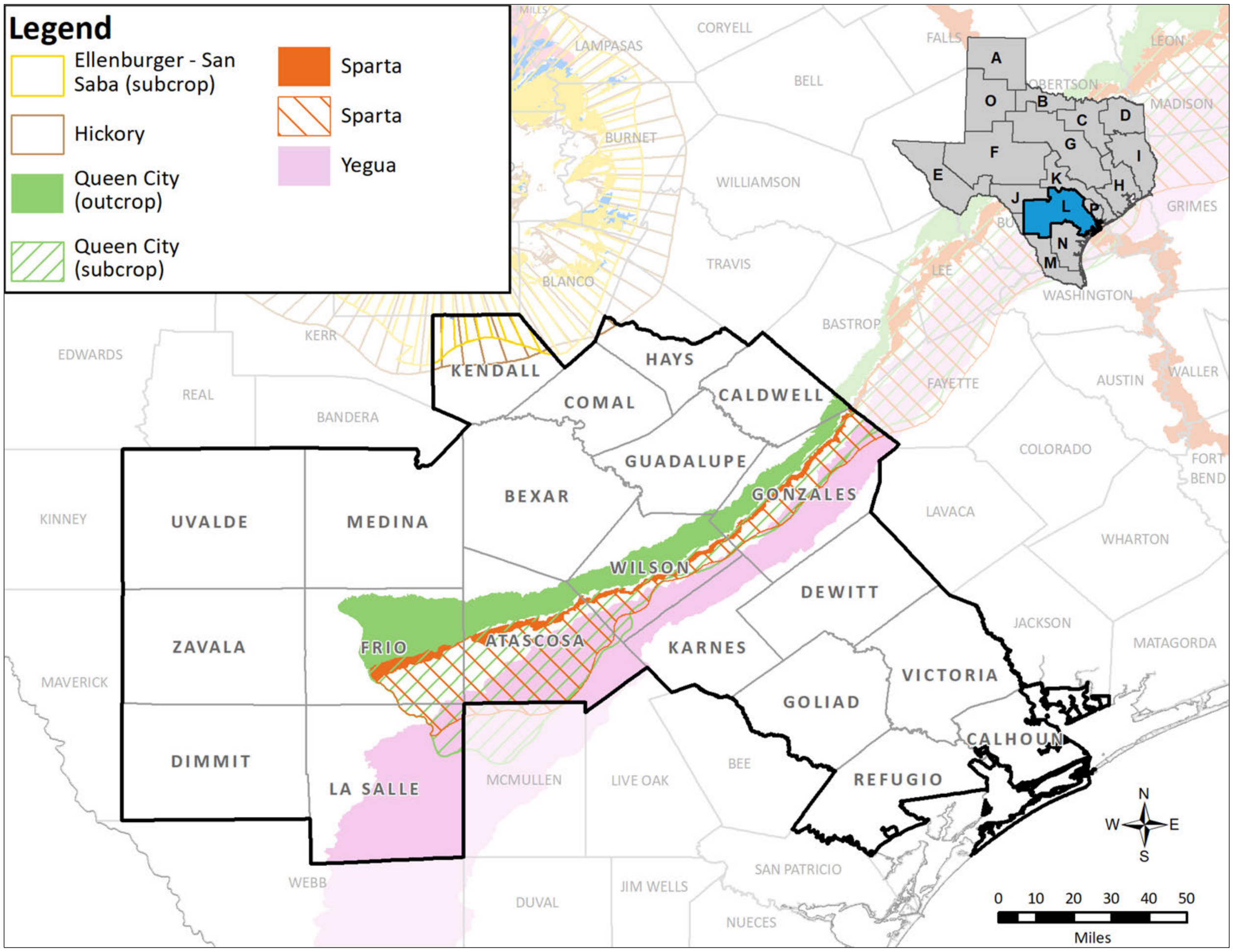

Figure 1-6 Minor Aquifers

1.5.1.1 Edwards-Balcones Fault Zone Aquifer (Edwards-BFZ Aquifer)

The Edwards-BFZ Aquifer underlies parts of nine counties (Uvalde, Medina, Bexar, Atascosa, Comal, Guadalupe, Hays, Frio, and Zavala) in the SCTRWPA. The aquifer forms a narrow belt extending from a groundwater divide in Kinney County through the San Antonio area northeastward to the Leon River in Bell County. A groundwater divide near Kyle, in Hays County, hydrologically separates the aquifer into the San Antonio and the Austin regions except during severe drought. The Edwards-BFZ Aquifer is distinct and different from the Edwards-Trinity (Plateau) and the Edwards-Trinity (High Plains) Aquifers; however, it is frequently referred to as simply the Edwards Aquifer.

The aquifer consists primarily of partially dissolved limestone having high permeability. Aquifer thickness ranges from 200 to 600 feet, and fresh water saturated thickness averages 560 feet in the southern part of the aquifer. The groundwater, although hard, is generally fresh and contains less than 500 milligrams per liter (mg/L) of total dissolved solids (TDS). The aquifer feeds several well-known springs, including Comal Springs in Comal County, which is the largest spring in the state, and San Marcos Springs in Hays County, which is the second largest. Hueco, San Pedro, San Antonio, and Leona springs also discharge from the aquifer. Because of its highly permeable nature, Edwards Aquifer water levels and springflows respond quickly to rainfall, drought, and pumping. Water from the aquifer is primarily used for municipal, irrigation, industrial, and recreational purposes.

1.5.1.2 Carrizo-Wilcox Aquifer (Carrizo Aquifer)

The Wilcox Group, including the Calvert Bluff, Simsboro, and Hooper Formations, and the overlying Carrizo Formation of the Claiborne Group, form a hydrologically connected system known as the Carrizo-Wilcox Aquifer, which is sometimes referred to as the Carrizo Aquifer. The Carrizo-Wilcox Aquifer is a major aquifer extending from the Louisiana border to the border of Mexico. The aquifer is composed of sand locally interbedded with gravel, silt, clay, and lignite. Although the Carrizo-Wilcox Aquifer reaches 3,000 feet in thickness, the fresh water saturated thickness of the sands averages 670 feet. The groundwater, although hard, is generally fresh and typically contains less than 500 mg/L of TDS in the outcrop; whereas softer groundwater with TDS concentrations of more than 1,000 mg/L may occur in the confined zone. High iron and manganese content greater than secondary drinking water standards is characteristic of the deeper, confined portions of the aquifer. Parts of the aquifer in the Winter Garden area are slightly to moderately saline, with TDS concentrations ranging from 1,000 to 7,000 mg/L.

1.5.1.3 Trinity Aquifer

The Trinity Aquifer provides water to all or parts of 55 counties in Texas, including six counties (Bexar, Caldwell, Comal, Guadalupe, Hays, Kendall, Medina, Uvalde, and Wilson) in the SCTRWPA. The Trinity Aquifer is composed of several smaller aquifers contained within the Trinity Group. Although referred to differently in various parts of the state, they include the Antlers, Glen Rose, Paluxy, Twin Mountains, Travis Peak, Hensell, and Hosston Aquifers. These aquifers consist of limestones, sands, clays, gravels, and conglomerates. Their combined fresh water saturated thickness averages about 600 feet in North Texas and about 1,900 feet in Central Texas. In general, groundwater is fresh but hard in the outcrop of the aquifer. TDS concentrations increase from less than 1,000 mg/L in the east and southeast to between 1,000 and 5,000 mg/L, or slightly to moderately saline, as depth to the aquifer increases. Sulfate and chloride concentrations also tend to increase with depth. The aquifer is one of the most extensive and widely used groundwater resources in Texas. Although its primary use is for municipalities, it is also used for irrigation, livestock, and domestic purposes.

1.5.1.4 Gulf Coast Aquifer

The Gulf Coast Aquifer is a major aquifer paralleling the Gulf of Mexico coastline from the Louisiana border to the border of Mexico. It consists of several aquifers, including the Jasper, Evangeline, and Chicot, which are composed of discontinuous sand, silt, clay, and gravel beds. The maximum total sand thickness of the Gulf Coast Aquifer ranges from 700 feet in the south to 1,300 feet in the north. Fresh water saturated thickness averages about 1,000 feet. Water quality varies with depth and locality; it is generally good in the central and northeastern parts of the aquifer, where the water contains less than 500 mg/L of TDS but declines to the south, where it typically contains 1,000 mg/L to greater than 10,000 mg/L of TDS.

1.5.1.5 Edwards-Trinity (Plateau) Aquifer

The Edwards-Trinity (Plateau) Aquifer is a major aquifer extending across much of the southwestern part of the state. The water-bearing units are predominantly composed of limestone and dolomite of the Edwards Group and sands of the Trinity Group. Although maximum saturated thickness of the aquifer is greater than 800 feet, fresh water saturated thickness averages 433 feet. Water quality ranges from fresh to slightly saline, with dissolved solids ranging from 100 mg/L to 3,000 mg/L, and the water is generally characterized as hard within the Edwards Group. Water typically increases in salinity to the west within the Trinity Group. Springs occur along the northern, eastern, and southern margins of the aquifer, primarily near the bases of the Edwards and Trinity groups where exposed at the surface. San Felipe Springs, near Del Rio, is the largest exposed spring along the southern margin. Of the groundwater pumped from this aquifer, more than two-thirds is used for irrigation, with the remainder used for municipal and livestock supplies. Water levels have remained relatively stable because recharge has generally kept pace with the relatively low amounts of pumping over the extent of the aquifer.

1.5.1.6 Sparta Aquifer

The Sparta Aquifer is a minor aquifer extending across East and South Texas, parallel to the Gulf of Mexico coastline and about 100 miles inland. Water is contained within a part of the Claiborne Group known as the Sparta Formation, a sand-rich unit interbedded with silt and clay layers and with massive sand beds in the bottom section. The thickness of the formation changes gradually from more than 700 feet at the Sabine River to about 200 feet in South Texas. Fresh water saturated thickness averages about 120 feet. In outcrop areas and for a few miles in the subsurface, the water is usually fresh, with an average TDS concentration of 300 mg/L; however, water quality deteriorates with depth (below about 2,000 feet), where the groundwater has an average TDS concentration of 800 mg/L. Elevated iron concentrations are common throughout the aquifer. Water from the aquifer is predominantly used for domestic and livestock purposes, and its quality has not been significantly affected by pumping. No significant water level declines have been detected throughout the aquifer in wells measured by the TWDB.

1.5.1.7 Queen City Aquifer

The Queen City Aquifer is a minor but widespread aquifer that stretches across the Texas upper coastal plain. Water is stored in the sand, loosely cemented sandstone, and interbedded clay layers of the Queen City Formation that reaches 2,000 feet in thickness in South Texas. Average freshwater saturation in the Queen City Aquifer is about 140 feet. Water is generally fresh, with an average TDS concentration of about 300 mg/L in the recharge zone and about 750 mg/L in deeper portions of the aquifer. Although salinity decreases from south to north, areas of elevated iron concentrations and high acidity occur in the northeast. The aquifer is used primarily for livestock and domestic purposes, with significant municipal and industrial use in northeast Texas. Water levels have remained fairly stable over time in the northern part of the aquifer. Water level declines are more common in the central (10 to 70 feet) and southern (5 to 130 feet) parts of the aquifer.

1.5.1.8 Yegua-Jackson Aquifer

The Yegua-Jackson Aquifer is a minor aquifer stretching across the southeast part of the state. It includes water bearing parts of the Yegua Formation (part of the upper Claiborne Group) and the Jackson Group (comprising the Whitsett, Manning, Wellborn, and Caddell formations). These geologic units consist of interbedded sand, silt, and clay layers originally deposited as fluvial and deltaic sediments. Fresh water saturated thickness averages about 170 feet. Water quality varies greatly because of sediment composition in the aquifer formations, and in all areas the aquifer becomes highly mineralized with depth. Most groundwater is produced from the sand units of the aquifer where the water is fresh and ranges from less than 50 mg/L to 1,000 mg/L of TDS. Some slightly to moderately saline water, with concentrations of TDS ranging from 1,000 mg/L to 10,000 mg/L, also occurs in the aquifer. No significant water level declines have occurred in wells measured by the TWDB. Groundwater for domestic and livestock purposes is available from shallow wells over most of the aquifer’s extent. Water is also used for some municipal, industrial, and irrigation purposes.

1.5.1.9 Austin Chalk, Buda Limestone, and Leona Gravel Aquifers

The Austin Chalk and Buda Limestone are Upper Cretaceous in age. The Del Rio Clay provides a confining layer between the deeper Edwards Aquifer and shallower Buda Limestone, and the Eagle Ford Group separates the lower Buda and upper Austin Chalk formations. There are limited areas where the Buda Formation and the Austin Chalk Formation are at favorable elevations and have sufficient hydraulic conductivity to produce significant quantities of water. Water quality in the Austin Chalk and Buda Limestone formations is similar to the Edwards Aquifer water quality, and there is likely some interconnectivity between the aquifers. While most wells completed in this formation are for domestic or livestock use, there are some higher flowing municipal wells.

The Leona Formation includes alluvial aquifers adjacent to the Leona, Nueces, Frio, and other rivers in Central and South Texas. These alluvial aquifers generally depend on associated streamflow, springs, and recharge from adjacent aquifers and are, therefore, subject to depletion during drought conditions. The majority of wells in this formation are small-flow domestic or livestock wells.

1.5.2 Surface Water

The SCTRWPA includes parts of the Rio Grande, Nueces, San Antonio, Guadalupe, Colorado, and Lavaca River Basins and parts of the San Antonio-Nueces, Lavaca-Guadalupe, and Colorado-Lavaca Coastal Basins (Figure 1-7). Existing surface water supplies of the region include those derived from storage reservoirs and run-of-river water rights. The TWDB defines major reservoirs as those having a storage capacity of 5,000 acre-feet (acft) or more. According to this definition, the SCTRWPA has five major reservoirs: Calaveras Lake, Canyon Lake, Coleto Creek Reservoir, Medina Lake System, and Victor Braunig Lake. The geographical characteristics of the various river basins are described in the following sections. Surface water availabilities and supplies available during drought are summarized in Chapter 3.

1.5.2.1 Rio Grande Basin

The southwestern corner of Dimmit County, an area of approximately 164 square miles, is located in the Rio Grande Basin and in the SCTRWPA. The only surface water presently available to this area is that which can be captured in stock tanks and small stock ponds.

1.5.2.2 Nueces River Basin

The Nueces River Basin is bounded on the north and east by the Colorado, San Antonio, and Guadalupe River Basins and the San Antonio-Nueces Coastal Basin, and on the west and south by the Rio Grande River Basin and the Nueces-Rio Grande Coastal Basin. The total drainage area of the basin is about 16,920 square miles above Calallen Dam, of which 8,973 square miles are located in the South Central Texas planning region. The Nueces River rises in Edwards County and flows 371 river miles from the gage at Laguna in Uvalde County to Nueces Bay on the Gulf of Mexico near Corpus Christi. Principal tributaries of the Nueces River are the Frio and Atascosa Rivers. Major population centers located in the basin include the cities of Uvalde (Uvalde County), Crystal City (Zavala County), Pearsall (Frio County), Pleasanton (Atascosa County), Hondo (Medina County), and Carrizo Springs (Dimmit County).

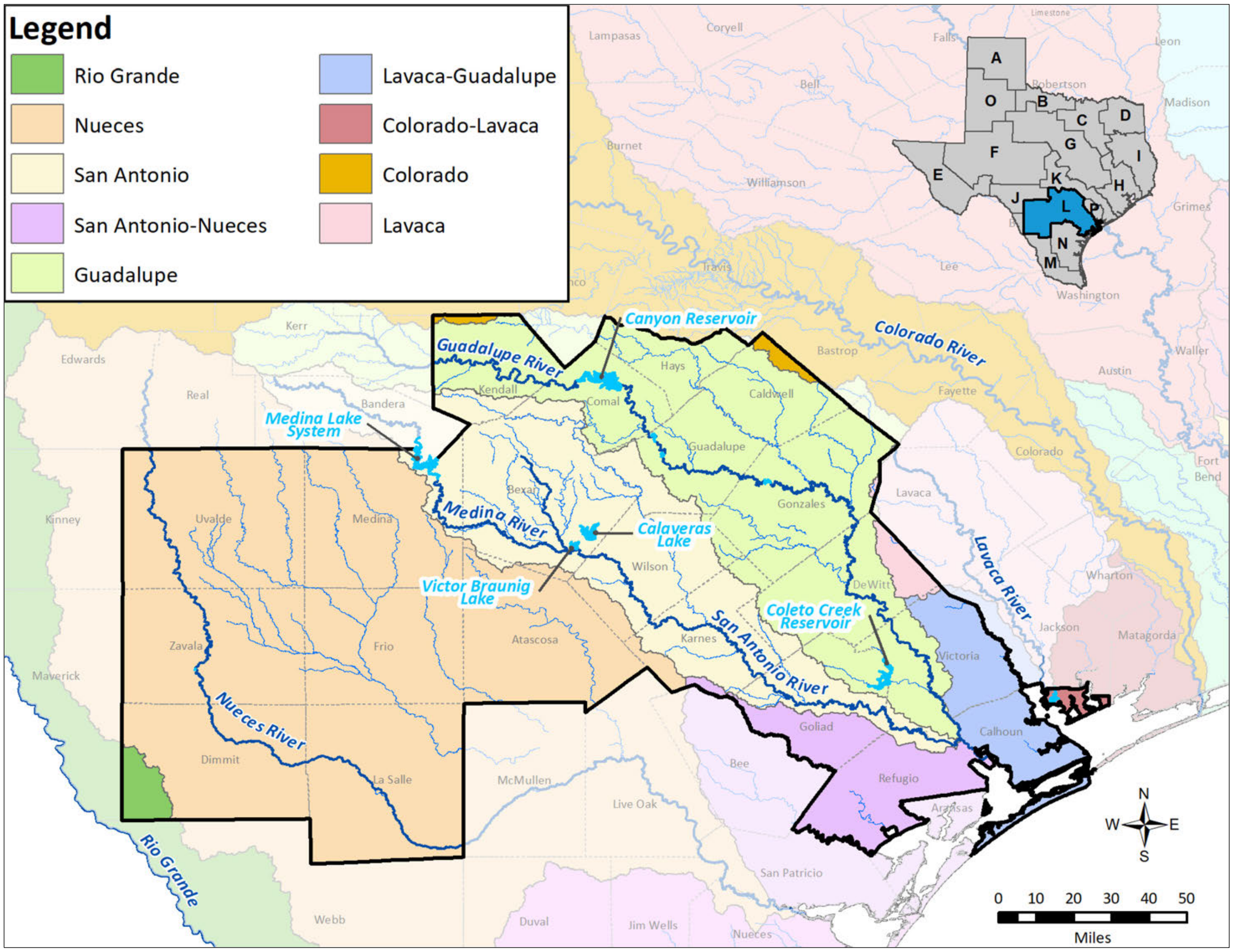

Figure 1-7 River and Coastal Basins and Major Reservoirs

1.5.2.3 San Antonio River Basin

The San Antonio River Basin is bounded on the north and east by the Guadalupe River Basin and on the west and south by the Nueces River Basin and the San Antonio-Nueces Coastal Basin. Total drainage area of the basin is about 4,180 square miles, of which 3,506 square miles are located in the SCTRWPA. The San Antonio River has its source in large springs within and near the city limits of San Antonio. The river flows more than 230 river miles across the Coastal Plain until it confluences with the Guadalupe River at the corners of Victoria, Refugio, and Calhoun Counties. Its principal tributaries are the Medina River and Cibolo Creek, both spring-fed streams. Major population centers located in the basin include the cities of San Antonio (Bexar County), Universal City (Bexar County), Schertz (Guadalupe County), Live Oak (Bexar County), Leon Valley (Bexar County), Converse (Bexar County), Kirby (Bexar County), Alamo Heights (Bexar County), and Floresville (Wilson County). Major reservoirs in the San Antonio River Basin include Calaveras Lake with authorized diversions of 36,900 acft/yr, Medina Lake System with authorized diversions of 70,750 acft/yr, and Victor Braunig Lake with authorized diversions of 12,000 acft/yr.

1.5.2.4 Guadalupe River Basin

The Guadalupe River Basin is bounded on the north by the Colorado River Basin, on the east by the Lavaca River Basin and the Lavaca-Guadalupe Coastal Basin, and on the west and south by the Nueces and San Antonio River Basins. The Guadalupe River rises in the west-central part of Kerr County. A spring-fed stream, it flows eastward through the Hill Country until it issues from the Balcones Escarpment near New Braunfels. It then crosses the coastal plain to San Antonio Bay. Its total length is more than 430 river miles, and its drainage area is approximately 10,128 square miles above the Lower Guadalupe Saltwater Barrier and Diversion Dam, of which about 4,180 square miles are located within the San Antonio River Basin. Its principal tributaries are the San Marcos River, another spring-fed stream, which joins the Guadalupe River in Gonzales County; the San Antonio River, which joins it just above its mouth on San Antonio Bay; and the Comal River, which joins it at New Braunfels. Comal Springs are the source of the Comal River, which flows about 2.5 miles before joining the Guadalupe River. Major population centers located in the basin include the cities of Victoria (Victoria County), San Marcos (Hays County), New Braunfels (Comal County), Seguin (Guadalupe County), Lockhart (Caldwell County), Cuero (DeWitt County), Gonzales (Gonzales County), and Luling (Caldwell County). Major reservoirs in the Guadalupe River Basin include Canyon Reservoir with authorized diversions of 120,000 acft/yr and Coleto Creek Reservoir with authorized diversions from the Guadalupe River of 24,160 acft/yr.

1.5.2.5 Colorado River Basin

Small portions of the Colorado River Basin are located inside the planning region, in Caldwell and Kendall Counties. The total drainage area of the Colorado River Basin is 41,763 square miles; of which, only 76 square miles are located in the planning region.

1.5.2.6 Lavaca River Basin

Small portions of the Lavaca River Basin are located inside the SCTRWPA in DeWitt, Gonzales, and Victoria Counties. The total drainage area of the Lavaca River Basin is 2,309 square miles, of which 156 square miles are located in the SCTRWPA. The Lavaca-Navidad River Authority owns and operates Lake Texana (located in the Lavaca Region [Region P]) and has contracts to provide raw water to Region L entities, including Formosa Plastics Corporation, City of Point Comfort, and Calhoun County Navigation District.

1.5.2.7 Coastal Basins

Parts of the San Antonio-Nueces, Colorado-Lavaca, and Lavaca-Guadalupe Coastal Basins are located within the SCTRWPA. Currently, none of these coastal basins has large surface water projects. Because of limited surface water availability from local runoff and groundwater quality considerations, these basins generally rely on adjoining river basins to provide surface water to meet their needs. The San Antonio-Nueces Coastal Basin obtains imported surface water supplied from the Nueces River Basin. The Colorado-Lavaca Coastal Basin obtains surface water from Lake Texana in the Lavaca River Basin. The Lavaca-Guadalupe Coastal Basin obtains surface water imported from the Guadalupe River.

1.5.3 Reuse

Reuse is the beneficial use of reclaimed water, which is municipal or industrial wastewater effluent that has been treated to levels that are safe and suitable for the purpose for which they are reused. In Texas, the Texas Commission on Environmental Quality (TCEQ) regulates the use of reclaimed water in Title 30 of the Texas Administrative Code (TAC), Chapter 210. Reuse may be categorized as direct or indirect, and water can be used for potable and non-potable purposes. Examples of beneficial use of reclaimed water include irrigation, cooling, dust suppression, and augmenting water supplies.

There are two types of reclaimed water uses, each with varying water quality requirements: Type I and Type II. Type I reclaimed water may be used where public contact is likely, such as irrigation for public parks, school yards, residential lawns, and athletic fields. Type I water may also be used for fire protection, food crop irrigation, and pasture irrigation. Type II reclaimed water may be used in remote, restricted, controlled, or limited-access areas where human contact is unlikely. Type II reclaimed water uses include irrigation water not likely to contact edible portions of a crop, animal feed-crop irrigation, and supply to non-recreational water bodies.

Major providers of reclaimed water within the SCTRWPA include San Antonio Water System (SAWS), San Antonio River Authority, Guadalupe-Blanco River Authority (GBRA), Cibolo Creek Municipal Authority, San Marcos, and Seguin.

1.5.4 Major Springs

According to selected references [3, 4], six major springs are located within the SCTRWPA, including Comal, San Marcos, Hueco, Leona, San Antonio, and San Pedro. The following sections provide descriptions of each of these six springs.

1.5.4.1 Comal Springs

Comal Springs is located in Landa Park, New Braunfels, in Comal County. Comal Springs discharges water from the Edwards Aquifer and associated limestones of the Edwards Aquifer and issues through the Comal Springs Fault. Unlike San Marcos Springs, Comal Springs is more responsive to drought conditions and ceased flowing in June of 1956 in response to groundwater withdrawals and severe drought conditions.

Senate Bill 3 of the 80th Texas Legislature limited the quantity of water that can be withdrawn from the Edwards Aquifer in each calendar year for the period beginning January 1, 2008, to no more than 572,000 acft, specified critical period withdrawal reductions and triggers, and established the Edwards Aquifer Recovery Implementation Program (EARIP) for protection of species listed as threatened or endangered under federal law and associated with the aquifer. As a result of the EARIP, EAA developed the Edwards Aquifer Habitat Conservation Plan (EAHCP), which was published in November 2012 and approved by the U.S. Fish and Wildlife Service (USFWS) in February 2013. Flow protection measures in the EAHCP seek to ensure a minimum monthly average discharge from Comal Springs in excess of 30 cubic feet per second (cfs) in a repeat of the drought of record. Long-term average discharge from Comal Springs is about 290 cfs.

1.5.4.2 San Marcos Springs

The San Marcos Springs have the greatest flow dependability and environmental stability of any spring system in the southwestern United States. Constancy of its springflow is a key component of the unique ecosystem found in the uppermost San Marcos River. San Marcos Springs is located 2 miles northeast of San Marcos, in Hays County. San Marcos Springs discharges water from the Edwards Aquifer and associated limestones of the Edwards Aquifer and issues through the San Marcos Springs Fault. Senate

[3] Texas Water Development Board. “Major and Historical Springs of Texas (Report No. 189).” March 1975.
[4] Brune, Gunnar. “Springs of Texas,” Volume I. Branch-Smith, Inc. Fort Worth, Texas. 1981.

Bill 3 and the EAHCP, as described in the Comal Springs text above, also apply to San Marcos Springs. Flow protection measures in the EAHCP seek to ensure a minimum monthly average discharge from San Marcos Springs in excess of 60 cfs in a repeat of the drought of record. Long-term average discharge from San Marcos Springs is about 170 cfs.

1.5.4.3 Hueco Springs

Hueco Springs is located about 3 miles north of New Braunfels near the confluence of Elm Creek and the Guadalupe River in Comal County. Two main springs issue from a fault in the Edwards limestone at this location. Sources of water for these springs include the Edwards Aquifer and, possibly, underflow from the Guadalupe River. Long-term average discharge from Hueco Springs is about 40 cfs.

1.5.4.4 Leona Springs

Leona Springs consists of three groups of springs located from 1 to 6 miles southeast of Uvalde, in Uvalde County. These springs discharge water from the Edwards Aquifer. Long-term average discharge from Leona Springs is about 25 cfs.

1.5.4.5 San Antonio Springs

San Antonio Springs is located southeast of Olmos Dam and north of East Hildebrand Avenue in San Antonio, in Bexar County. San Antonio Springs discharges water from the Edwards Aquifer. Long-term average discharge from San Antonio Springs is about 20 cfs.

1.5.4.6 San Pedro Springs

San Pedro Springs is located in San Pedro Park, San Antonio, in Bexar County. San Pedro Springs discharges water from the Edwards Aquifer. Long-term average discharge from San Pedro Springs is about 5 cfs.

1.5.5 Surface Water Quality

To support its charge to restore and maintain the quality of water in the state, the TCEQ establishes the Texas Surface Water Quality Standards (TSWQS) in30 TAC §307. The TCEQ distinguishes between classified and unclassified water bodies. Classified segments are listed and described in Appendix A of the TSWQS. Unclassified segments are water bodies not identified in Appendix A of the Standards. For each classified segment and for some unclassified segments, the TCEQ identifies site-specific uses and water quality criteria.

Within the SCTRWPA, site-specific uses and criteria for classified water bodies are identified for 15 segments in the Guadalupe River Basin, 12 segments in the San Antonio River Basin, 12 segments in the Nueces River Basin, four segments in the San Antonio-Nueces Coastal Basin, nine segments in the Bays and Estuaries Basin, zero segments in the Lavaca River Basin, one segment in the Lavaca-Guadalupe Coastal Basin, and one segment in the Gulf of Mexico Basin. Site-specific uses and criteria for unclassified water bodies within the region include five segments in the Guadalupe River Basin, one segment in the Bays and Estuaries Basin, three segments in the San Antonio River Basin, and two segments in the Nueces River Basin. With the exception of the Victoria Barge Canal, all of the classified and unclassified segments support contact recreation and most support domestic water supply. Aquatic life uses are characterized as exceptional in 33% of these segments and high in 63% of the segments.

Medio Creek and Mid Cibolo Creek, both in the San Antonio River Basin, are characterized as Intermediate Aquatic Life Use and Limited Aquatic Life Use, respectively [5].

Pursuant to Section 303(d) of the federal Clean Water Act, the TCEQ evaluates water bodies in the state and identifies those that do not meet the TSWQS. Every two years, the TCEQ compiles the Texas Integrated Report, which identifies water bodies with water quality impairments [6] and those with concerns for use attainment and screening levels [7]. Impaired segments are water bodies that do not meet one or more water quality standards. Segments with water quality concerns are water bodies that are near nonattainment of the water quality standards based on numeric criteria or that have water quality not meeting screening levels.

At the time of writing, the *2022 Texas 303(d) List* is the most recent, effective list that was adopted by the TCEQ and approved by the US Environmental Protection Agency (EPA). This list identifies 53 water bodies within the SCTRWPA as impaired: 10 in the Bays and Estuaries Basin, 11 in the Guadalupe River Basin, one in the Lavaca River Basin, six in the Nueces River Basin, 21 in the San Antonio River Basin, three in the San Antonio-Nueces Coastal Basin, and one in the Gulf of Mexico. Of these water bodies, 16 have one or more completed and approved Total Maximum Daily Loads (TMDLs). The most common impaired parameters are bacteria and depressed dissolved oxygen, consisting of 64% and 14% of impairments, respectively. The remaining impairments are for the following parameters: copper in water, impaired fish community in water, impaired macrobenthic community in water, mercury in edible tissue, PCBs in edible tissue, and TDS in water.

Surface water quality characteristics typical of streams and bays in the SCTRWPA are generally suitable for raw water uses in the industrial, steam-electric power generation, mining, irrigation, and livestock sectors as well as municipal and domestic potable uses after application of conventional treatment methods. Identification of impaired water quality parameters in some water bodies does not preclude development of proximate or upstream water management strategies (WMSs) but does point to the importance of appropriate wastewater treatment, management of non-point source pollutants, and compliance with environmental flow standards.

There are 12 Watershed Protection Plans (WPPs) for water bodies within the SCTRWPA. WPPs are community-developed documents aimed at preventing or managing nonpoint source pollution by identifying potential sources of water quality impairments and developing implementation strategies to reduce pollution and improve overall water quality. A local entity leads the development of the WPP; the TCEQ and Texas State Soil and Water Conservation Board (TSSWCB) support the local lead with development and implementation of WPPs. Table 1-4 summarizes the WPPs within the SCTRWPA and identifies the segments within the SCTRWPA that are addressed by each WPP.

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[5] Texas Commission on Environmental Quality (TCEQ). *Texas Surface Water Quality Standards*. Effective September 29, 2022.

[6] Texas Commission on Environmental Quality (TCEQ). *2022 Texas Integrated Report - Index of Water Quality Impairments*. https://www.tceq.texas.gov/downloads/water-quality/assessment/integrated-report-2022/2022-imp-index.pdf.

[7] Texas Commission on Environmental Quality (TCEQ). *2022 Texas Integrated Report – Water Bodies with Concerns for Use Attainment and Screening Levels.* https://www.tceq.texas.gov/downloads/water-quality/assessment/integrated-report-2022/2022-concerns.pdf.

Table 1-4 Watershed Protection Plans

Watershed(s) with WPP	Basin	Local Lead	Sponsor	Region L Segment(s) and Name(s) Addressed by WPP
Arenosa and Garcitas	Bays and Estuaries	Texas Water Resources Institute	TCEQ	2453C: Arenosa Creek; 2453A: Garcitas Creek Tidal
Cypress Creek	Guadalupe	Texas State University	TCEQ	1815: Cypress Creek
Dry Comal/ Comal	Guadalupe	City of New Braunfels	TCEQ	1811: Comal River; 1811A: Dry Comal Creek
Geronimo and Alligator Creeks	Guadalupe	Guadalupe Blanco River Authority	TSSWCB	1804A: Geronimo Creek; 1804C: Alligator Creek; 1804D: Bear Creek
Lavaca River	Lavaca	Texas Water Resources Institute	TCEQ	1601A: Catfish Bayou; 1602A: Big Brushy Creek; 1602B: Rocky Creek
Medina River below Medina Diversion Lake	San Antonio	Texas Water Resources Institute	TSSWCB	1903: Medina River Below Medina Diversion Lake; 1903A: Polecat Creek; 1912: Medio Creek; 1912A: Upper Medio Creek
Mid and Lower Cibolo	San Antonio	Texas Water Resources Institute	TSSWCB	1902: Lower Cibolo Creek; 1902A: Martinez Creek; 1902B: Salatrillo Creek; 1902C: Clifton Branch; 1902C: Clifton Branch; 1913: Mid Cibolo Creek
Mission and Aransas	San Antonio-Nueces	Texas Water Resources Institute	TCEQ	2001: Mission River Tidal; 2002: Mission River Above Tidal; 2003: Aransas River Tidal; 2004: Aransas River Above Tidal
Plum Creek	Guadalupe	Guadalupe Blanco River Authority	TSSWCB	1810: Plum Creek; 1810A: Town Branch
Upper Cibolo Creek	San Antonio	City of Boerne	TCEQ	1908: Upper Cibolo Creek
Upper San Antonio River	San Antonio	San Antonio River Authority	TCEQ	1911: Upper San Antonio River; 1911B: Apache Creek; 1911C: Alazan Creek; 1911D: San Pedro Creek; 1911E: Sixmile Creek; 1911I: Martinez Creek
Upper San Marcos	Guadalupe	Texas State University	TCEQ	1814: Upper San Marcos River

1.5.6 Ecologically Significant and Ecologically Unique Stream Segments

In 2005, the Texas Parks and Wildlife Department (TPWD) identified 21 water bodies within the SCTRWPA as being ecologically significant river and stream segments [8]. The TPWD used available studies, existing data, and in-house expertise to evaluate a segment's ecological importance based on factors related to biological or hydrologic function, presence of riparian conservation areas, high water quality or exceptional aquatic life or high aesthetic value, and threatened or endangered species or unique communities. Figure 1-8 shows the locations of the 21 river and stream segments identified by the TPWD as being ecologically significant.

31 TAC §357.43 specifies that RWPGs may choose to adopt recommendations in Regional Water Plans for all or parts of river and stream segments as being of unique ecological value, based on criteria defined in 31 TAC §358.2(6). The South Central Texas Regional Water Planning Group (SCTRWPG) used the TPWD's list of ecologically significant river and stream segments in Region L as a starting point to assess whether to recommend designation of any water bodies as ecologically unique stream segments. In the 2011 and 2016 Region L Regional Water Plans, the SCTRWPG recommended five stream segments as having unique ecological value for designation by the Texas Legislature (Figure 1-8). In 2015, the Texas Legislature passed House Bill 1016 (HB 1016, 84th Texas Legislature), which designated the following five river or stream segments as being of unique ecological value:

1. The Nueces River from the northern boundary of Region L [downstream] to United States Geological Survey (USGS) gauge #08190000 [at Laguna];
2. The Frio River from the northern boundary of Region L [downstream] to USGS gauge #08195000 [at Concan];
3. The Sabinal River from the northern boundary of Region L [downstream] to its intersection with State Highway 187 [located approximately 2.7 miles upstream of USGS gauge #08198000 near Sabinal];
4. The San Marcos River extending from a point 0.4 miles upstream from its intersection with State Highway Loop 82 [in San Marcos] to its intersection with Interstate Highway 35; and
5. The Comal River from its intersection with East Klingemann Street in New Braunfels to its confluence with the Guadalupe River.

In designating the five river or stream segments, HB 1016 further clarified the effect of designation of a river or stream segment as being of unique ecological value as follows:

1. Means only that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in the designated segment;
2. Does not affect the ability of a state agency or political subdivision of the state to construct, operate, maintain, or replace a weir, a water diversion, flood control, drainage, or water supply system, a low water crossing, or a recreational facility in the designated segment;
3. Does not prohibit the permitting, financing, construction, operation, maintenance, or replacement of any WMS to meet projected water supply needs recommended in, or designated as an alternative in, the 2011 or 2016 Regional Water Plan for Region L; and

[8] Texas Parks and Wildlife Department (TPWD). 2005. *Ecologically Significant River and Stream Segments of Region L (South Central) Regional Water Planning Area*. WRTS-2005-01.

4. Does not alter any existing property right of an affected landowner.

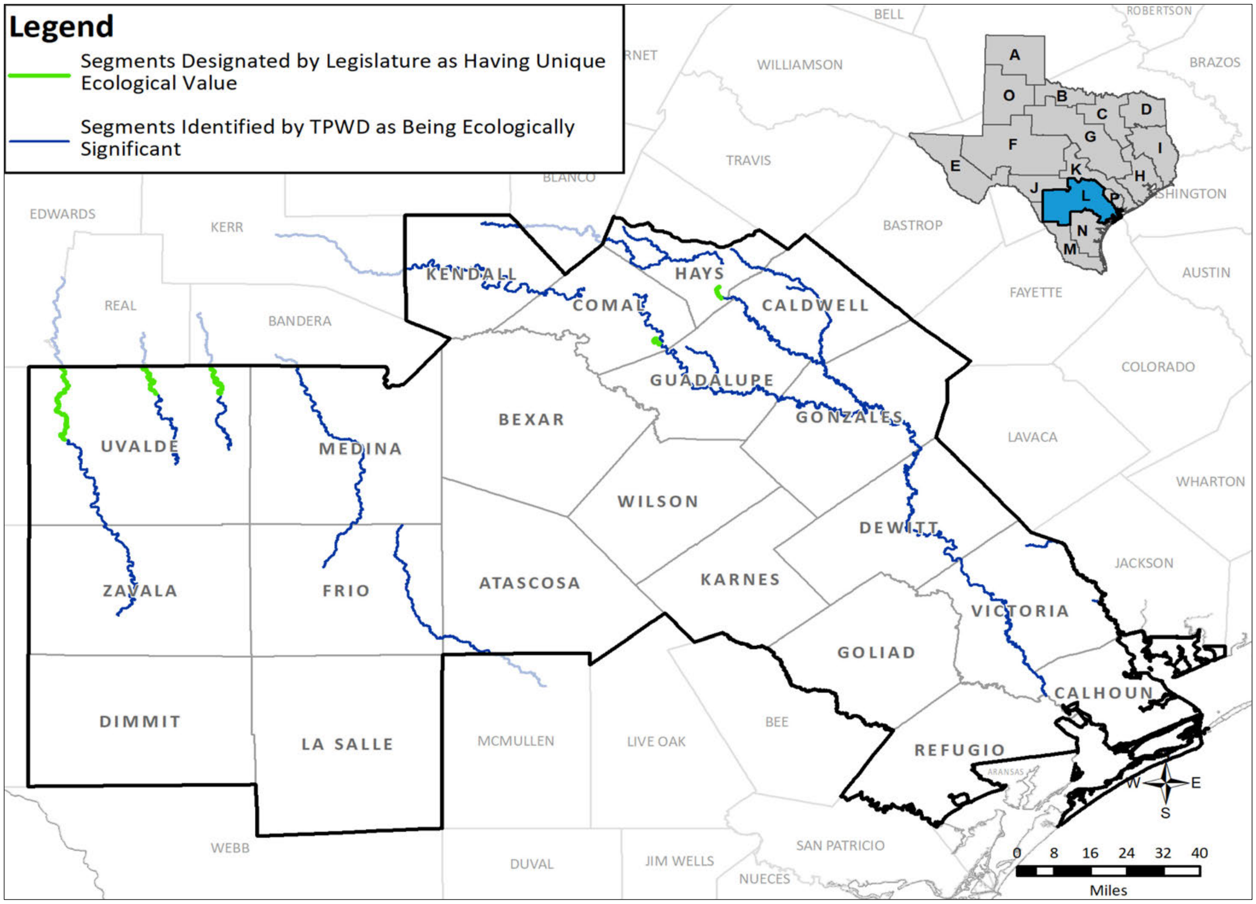

Figure 1-8 South Central Texas Streams Designated by the Legislature as Having Unique Ecological Value and Segments Identified by TPWD as Being Ecologically Significant

1.6 Natural Resources

1.6.1 Vegetational Areas

Biologically, the SCTRWPA is a region of transition from the lowland forests of the southeastern United States to the arid grasslands of the western uplands and thornscrub to the south. The landscape consists of dendritic networks of wooded stream corridors, typically populated by eastern species that dissect upland grasslands, and savannas that harbor western species. The vegetational areas or ecoregions containing portions of the SCTRWPA are the Edwards Plateau, Southern Texas Plains, Texas Blackland Prairies, East Central Texas Plains, and the Western Gulf Coastal Plain (Figure 1-9). Each ecoregion is described in subsequent sections.

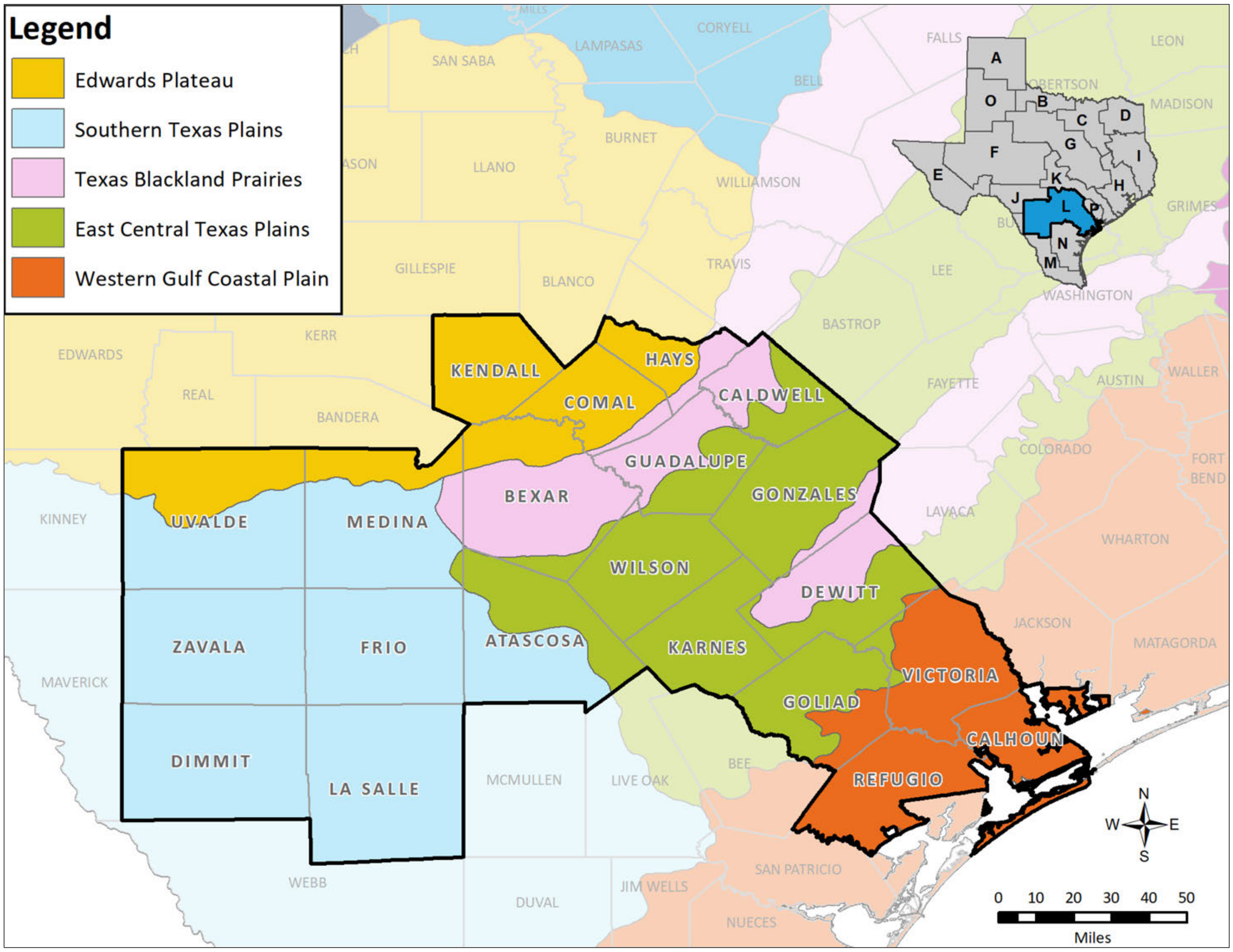

Figure 1-9 Ecoregions of the South Central Texas Region

1.6.1.1 Edwards Plateau

In the SCTRWPA, the Edwards Plateau vegetational area includes all of Kendall County, the northern portions of Uvalde, Medina, Bexar, and Comal Counties, and the western portion of Hays County. This limestone-based area is characterized by springfed, perennially flowing streams that originate in its interior and flow across the Balcones Escarpment, which bounds it on the south and east. This area is also characterized by the occurrence of numerous ephemeral streams that are important conduits of storm runoff, which contributes to the recharge of the Edwards Aquifer. The soils are shallow, ranging from sands to clays, and are calcareous in reaction. This area is predominantly rangeland, with cultivation confined to limited areas having deeper soils.

The bald cypress (*Taxodium distichum*) grows extensively along the perennially flowing streams. Separated by many miles from cypress growth of the moist Southern Forest Belt, they constitute one of Texas' several "islands" of vegetation.

The principal grasses of the clay soils include several species of bluestem (*Schizachyrium* and *Andropogon* spp.), gramas (*Bouteloua* spp.), Indiangrass (*Sorghastrum nutans*), common curly mesquite (*Hilaria belangeri*), buffalograss (*Buchloe dactyloides)*, and Canadian wild rye (*Elymus canadensis*). The rocky areas support tall or mid-grasses with an overstory of live oak (*Quercus virginiana*) and other oaks

(*Q. fusiformis, Q. buckleyi, Q. sinuata* var. *breviloba*), cedar elm (*Ulmus crassifolia*), and mesquite (*Prosopis glandulosa*). The heavy clay soils have a mixture of buffalograss, sideoats grama (*Bouteloua curtipendula*), and mesquite.

1.6.1.2 Southern Texas Plains

The Southern Texas Plains ecoregion, also known as the Tamaulipan Thornscrub or brush country includes all or parts of Uvalde, Medina, Zavala, Frio, Atascosa, Dimmit, and La Salle Counties. The ecoregion is characterized by rolling or irregular plains with short trees, shrubs, and thorny vegetation. Principal plants are honey mesquite (*Prosopis glandulosa* var. *torreyana*), live oak (*Quercus virginiana*), post oak (*Q. stellata*), several members of the cactus family (Cactaceae), blackbrush acacia (*Acacia rigidula*), guajillo (*Acacia berlandieri*), huisache (*Acacia farnesiana*), and others that often grow very densely. The original vegetation was mainly perennial warm-season bunchgrass in post oak, live oak, and mesquite savannas. Other brush species form dense thickets on ridges and along streams. Long-continued grazing, as well as the control of wildfires, has contributed to the dense cover of brush. Most of the desirable grasses have persisted under the protection of brush and cacti. Dominant grasses are little bluestem, cane bluestem (*Bothriochloa barbinodis*), bristlegrasses (*Setaria* spp.), silver bluestem (*Bothriochloa saccharoides*), multiflowered false rhodesgrass (*Trichloris pluriflora*), Arizona cottontop (*Trichachne californica*), bristlegrasses, sideoats grama, lovegrasses (*Eragrostis* spp), and tobosa.

1.6.1.3 Texas Blackland Prairies

This area includes parts of Medina, Bexar, Comal, Guadalupe, Hays, Caldwell, Wilson, Gonzales, and DeWitt Counties. While called a “prairie,” this ecoregion has timber along streams, including a variety of oaks, pecan (*Carya illinoinensis*), cedar elm, and mesquite. In its native state, it was largely a grassy plain. This region is distinguished from surrounding regions by its fine-textured, clay soils and predominantly prairie potential natural vegetation.

Most of this fertile area has been cultivated, and only small acreages of meadowland remain in original vegetation. In heavily grazed pastures, buffalograss, Texas grama (*Bouteloua rigidiseta*), and other less-productive grasses have replaced the tall bunchgrass. Mesquite and other woody plants have invaded the grasslands.

The original grass vegetation included big bluestem (*Andropogon gerardii*) and little bluestem (*Schizachyrium scoparium var. frequens*), Indiangrass, switchgrass, sideoats grama, hairy grama (*Bouteloua hirsuta*), tall dropseed (*Sporobolus asper*), Texas wintergrass, and buffalograss. Non-grass vegetation is largely legumes and composites.

1.6.1.4 East Central Texas Plains

This secondary forest region, also called the Post Oak Savanna or the Claypan Area, includes all or parts of Bexar, Guadalupe, Caldwell, Atascosa, Wilson, Gonzales, Karnes, DeWitt, Goliad, and Victoria Counties. It is immediately west of the pine forests, with less annual rainfall and slightly higher elevation. Principal trees are post oak, blackjack oak (*Quercus marilandica*), and cedar elm. Pecans, walnuts (*Juglans* spp.), and other types of water-demanding trees grow along streams. The southwestern extension of this belt is often poorly defined, with large areas of prairie.

The original vegetation consisted mainly of little bluestem, big bluestem, Indiangrass, switchgrass, silver bluestem, Texas wintergrass, post oak, and blackjack oak. The area is still largely native or improved grasslands, with farms located throughout. Intensive grazing has contributed to dense stands of woody understories of yaupon (*Ilex vomitoria*) and oak brush. In addition, the control of wildfires has led to the encroachment of brush species on savanna range lands. Plants such as broomsedge, broomweed, bullnettle, and western ragweed have replaced plants that are important for foraging and higher in nutritional quality.

1.6.1.5 Western Gulf Coastal Plain

The Western Gulf Coastal Plain includes all or parts of DeWitt, Victoria, Goliad, Refugio, and Calhoun Counties. The principal, distinguishing characteristic of this ecoregion is the relatively flat coastal plain topography and mainly grassland potential natural vegetation. Oaks, elm, and other hardwoods grow to some extent, especially along streams, and the area has some post oak and brushy extensions along its borders. Much of the Western Gulf Coastal Plain is fertile farmland.

Principal grasses of the Gulf Coastal Plan are tall bunchgrasses, including big bluestem, little bluestem, seacoast bluestem, Indiangrass, eastern gamagrass (*Tripsacum dactyloides*), Texas wintergrass, switchgrass, and gulf cordgrass. Seashore saltgrass occurs on most saline sites. Heavy grazing has changed the range vegetation in many cases so that the predominant grasses are less desirable broomsedge (*Andropogon virginicus*), smutgrass (*Sporobolus indicus*), threeawns (*Aristida* spp.), and many other grasses of less nutritional quality for livestock grazing. Other plants that have invaded the productive grasslands include oak underbrush, huisache, mesquite, pricklypear (*Opuntia* spp.), ragweed (*Ambrosia psilostachya*), broomweed (*Xanthocephalum* spp.), and others.

1.6.2 Fish and Wildlife

The streams and reservoirs of the SCTRWPA encompass habitats that range from the clear, rocky headwaters of the Guadalupe and Nueces Rivers on the Edwards Plateau to the sluggish, turbid river reaches of the coastal plains, all supporting fish communities typical of warm, carbonate dominated hard waters. Typical species of the coastal plains streams include gar, minnows, topminnows, sunfishes, bass, catfish, and a few species of darters and suckers. Although strongly dependent on the physical habitat factors present, typical species in Edwards Plateau streams include the common carp, red shiner, blacktail shiner, topminnow, longear and bluegill sunfish, largemouth and Guadalupe bass, channel catfish, bullheads, dusky darter, bigscale logperch, and grey redhorse. The Guadalupe Estuary, at the mouth of the Guadalupe River, is habitat for brown and white shrimp, blue crabs, eastern oysters, red drum, spotted seatrout, black drum, flounder, mullet, Atlantic croaker, sharks, and kingfish.

Common types of wildlife found in the area include white-tailed deer, raccoons, ringtails, gray foxes, coyotes, bobcats, and several species of skunks. Wintering songbirds such as robins and cedar waxwings may also be found. In addition, a growing population of endangered whooping cranes winters in and near the Aransas National Wildlife Refuge, which is located on Blackjack Peninsula and Matagorda Island adjacent to San Antonio Bay.

The SCTRWPA is home to numerous species that are designated as threatened or endangered, or considered species of concern. Various species in the planning region are listed by the USFWS or the TPWD as threatened or endangered. These species are discussed in Chapter 5.

1.7 Agricultural Resources

Of the approximate 12.8 million acres of land area in the planning region, over 10.0 million acres (79%) are classified as farmland and ranchland (Table 1-5). In 2022, there were 24,531 farms and ranches in the region, with an average size of 659 acres. Of the 10.0 million acres of farmland, over 1.35 million acres were classified as cropland, of which about 696,069 acres were harvested in 2022. Approximately 29% (204,499 acres) of the total cropland in the region was reported to be irrigated in 2022 [9]. The leading irrigation counties are located in the western part of the region and include Atascosa, Frio, Medina, Uvalde, and Zavala Counties. The sum of irrigated acres in these five counties decreased by 20.2% between 2017 and 2022. Medina and Uvalde Counties, which rely primarily on the Edwards Aquifer, demonstrated a decrease in irrigated acres by 9.2 and 15.8%, respectively, between 2017 and 2022.

Major irrigated crops in the SCTRWPA are corn, cotton, grain sorghum, wheat, rice, soybeans, and vegetables. Cow-calf operations are the predominant type of livestock industry, although beef cattle, hogs and pigs, sheep and lambs, and poultry are also produced. Agricultural production and livestock production are discussed in greater detail in Sections 1.10.2 and 1.10.3, respectively.

Table 1-5 Agricultural Resources

County	Total Land Area (acres)	Number of Farms and Ranches	Farms and Ranches Land Area (acres)	Average Land Area (acres)	Total Cropland (acres)	Harvested Cropland (acres)	Irrigated Land (acres)
Atascosa	780,506	1,673	688,382	411	81,698	33,387	15,614
Bexar	793,518	2,107	248,545	118	76,669	34,390	6,417
Caldwell	348,958	1,329	244,313	184	58,230	34,929	1,784
Calhoun	324,377	257	122,971	506	31,143	27,727	(D)
Comal	358,067	888	107,388	121	7,577	3,211	437
DeWitt	581,745	1,533	411,339	268	39,658	24,575	1,118
Dimmit	850,486	211	344,379	1,632	41,629	3,269	3,287
Frio	725,441	592	566,717	162	121,521	60,015	49,861
Goliad	545,286	1,092	416,291	381	48,073	16,900	3,586
Gonzales	682,680	1,870	630,773	337	65,113	40,921	7,651
Guadalupe	455,212	2,369	291,287	123	81,585	55,080	2,163
Hays (part)[1]	216,956	940	142,428	152	11,350	6,499	606
Karnes	478,443	958	389,854	407	68,844	40,933	1,891
Kendall	423,974	1,142	269,055	236	19,708	2,965	542
La Salle	951,482	344	552,478	1,606	11,484	3,199	1,643
Medina	848,230	2,204	634,224	288	160,659	55,599	35,754
Refugio	493,082	315	369,313	1,172	73,951	55,230	(D)
Uvalde	993,245	580	993,079	1,712	115,702	47,330	27,470
Victoria	564,571	1,412	526,006	373	106,033	81,132	10,140
Wilson	514,390	2,503	393,148	157	85,199	45,378	12,040

[9] *2022 Census of Agriculture*, Volume 1. Chapter 2: County Level Data. “Table 1: County Summary Highlights.”

County	Total Land Area (acres)	Number of Farms and Ranches	Farms and Ranches Land Area (acres)	Average Land Area (acres)	Total Cropland (acres)	Harvested Cropland (acres)	Irrigated Land (acres)
Zavala	830,340	212	740,758	3,494	48,593	23,400	22,495
Total	**12,760,989**	**24,531**	**9,082,728**	**13,840**	**1,354,419**	**696,069**	**204,499 + (D)**

[1] Estimate is for the portion of Hays County located in Region L (~50%).
(D) – Withheld to avoid disclosing data for individual producers.
Source: 2022 Census of Agriculture, Volume 1. Chapter 2: County Level Data. "Table 1: County Summary Highlights."

1.8 Threats to Agricultural and Natural Resources

Pursuant to 31 TAC §357.30, the SCTRWPG has identified the following threats to agricultural and natural resources in the SCTRWPA due to water quantity problems or water quality problems related to water supply:

- A shortage of economically accessible fresh water of suitable quantity and quality for irrigation and for livestock drinking and sanitation purposes. For example, such a shortage could result from groundwater production at insufficiently sustainable rates and/or lack of control over groundwater production; and
- Deterioration of water quality, so that the quantities available are not usable for irrigation or livestock drinking and sanitation. Increased salinity is an example of a water quality threat to agriculture.

The SCTRWPG identified the following threats to natural resources in the planning region:

- Reductions of quantity and/or quality of fresh water available to fish and wildlife;
- Changes to aquatic and riparian habitats associated with use of water from streams and aquifers; and
- Temporary or permanent inundation of aquatic, riparian, and terrestrial habitats associated with surface water impoundment.

Technical evaluations of WMSs (Chapter 5) and/or assessments of the cumulative effects of plan implementation (Chapter 6) include quantitative and/or qualitative discussion of how identified threats to agricultural or natural resources are expected to be addressed or affected by a WMS and/or the plan. The following summarizes specific quantitative and/or qualitative measures used to meet this requirement:

- Reliance upon TWDB application of groundwater availability models (GAMs) to illustrate projected changes in regional aquifer levels (desired future conditions) consistent with modeled available groundwater (MAG) estimates and portray spring discharges and surface water/groundwater interactions at the end of the planning period;
- Comparison of the gross business effects (as provided by the TWDB) associated with failure to meet projected agricultural water needs with the costs of potential WMSs available to the region;
- Applications of surface water availability models (WAMs), along with the flow regime application tool (FRAT) (when necessary), for compliance with TCEQ environmental flow

standards in evaluating proposed new appropriations and quantifying projected changes in streamflow and/or freshwater inflows to bays and estuaries. Graphical and tabular summaries of projected changes focus on time series data, monthly medians, and/or frequency of occurrence;

- Qualitative assessment of potential changes in groundwater or surface water quality based on available information; and
- Acreage temporarily or permanently inundated by a planned reservoir and the frequency of such inundation.

1.9 Population and Demography

1.9.1 Historical and Recent Trends in Population

According to the US Census Bureau, the SCTRWPA population has increased from 1,014,752 people in 1960 to 3,023,291 people in 2020, a three-fold increase (Table 1-6). The largest percentage increase occurred between the years 2000 and 2010 (24.2%), while the smallest occurred between 1960 and 1970 (16.2%). During the period 1960 to 2020, 16 counties had a positive annual growth rate, while five counties (DeWitt, Dimmit, Karnes, Refugio, and Zavala) had a negative annual growth rate. Historically, the fastest growing counties in the region were Hays (4.24%), Kendall (3.42%), Comal (3.56%), and Guadalupe (3.02%), while the slowest growing counties were Gonzales (0.16%), La Salle (0.18%), Calhoun (0.32%), and Goliad (0.43%). Chapter 2 summarizes population projections through the year 2080 for the SCTRWPA.

Table 1-6 Historical Census Estimates by County (1960 to 2020)

County	1960	1970	1980	1990	2000	2010	2020	Growth Rate [1] (%)
Atascosa	18,828	18,696	25,055	30,533	38,628	44,911	48,981	1.61%
Bexar	687,151	830,460	988,800	1,185,394	1,392,931	1,714,773	2,009,324	1.80%
Caldwell	17,222	21,178	23,637	26,392	32,194	38,066	45,883	1.65%
Calhoun	16,592	17,831	19,574	19,053	20,647	21,381	20,106	0.32%
Comal	19,844	24,165	36,446	51,832	78,021	108,472	161,501	3.56%
DeWitt	20,683	18,660	18,903	18,840	20,013	20,097	19,824	-0.07%
Dimmit	10,095	9,039	11,367	10,433	10,248	9,996	8,615	-0.26%
Frio	10,112	11,159	13,785	13,472	16,252	17,217	18,385	1.00%
Goliad	5,429	4,869	5,193	5,980	6,928	7,210	7,012	0.43%
Gonzales	17,845	16,375	16,883	17,205	18,628	19,807	19,653	0.16%
Guadalupe	29,017	33,554	46,708	64,873	89,023	131,533	172,706	3.02%
Hays (part)[2]	15,947	22,114	32,475	52,491	72,499	125,686	192,853	4.24%
Karnes	14,995	13,462	13,593	12,455	15,446	14,824	14,710	-0.03%
Kendall	5,889	6,964	10,635	14,589	23,743	33,410	44,279	3.42%
La Salle	5,972	5,014	5,514	5,254	5,866	6,886	6,664	0.18%

County	1960	1970	1980	1990	2000	2010	2020	Growth Rate [1] (%)
Medina	18,904	20,249	23,164	27,312	39,304	46,006	50,748	1.66%
Refugio	10,975	9,494	9,289	7,976	7,828	7,383	6,741	-0.81%
Uvalde	16,814	17,348	22,441	23,340	25,926	26,405	24,564	0.63%
Victoria	46,475	53,766	68,807	74,361	84,088	86,793	91,319	1.13%
Wilson	13,267	13,041	16,756	22,650	32,408	42,918	49,753	2.23%
Zavala	12,696	11,370	11,666	12,162	11,600	11,677	9,670	-0.45%
Total	**1,014,752**	**1,178,808**	**1,420,691**	**1,696,597**	**2,042,221**	**2,535,451**	**3,023,291**	**1.84%**

[1] Compound annual growth rate.

[2] It is estimated that 80% of the total Hays County population resides within the SCTRWPA.

Source: United States Census Bureau. Decadal Censuses of 1960, 1970, 1980, 1990, 2000, 2010, and 2020. US Department of Commerce.

1.9.2 Demographic Characteristics

Population within the SCTRWPA is primarily distributed along the Interstate Highway 35 (IH-35) corridor, with more than 80% of the total population located within four counties: Bexar, Comal, Guadalupe, and Hays (partial). With the exception of the City of Victoria in Victoria County, the five most-populous cities in the SCTRWPA are located within these four counties. Figure 1-10 identifies the population centers located within the SCTRWPA.

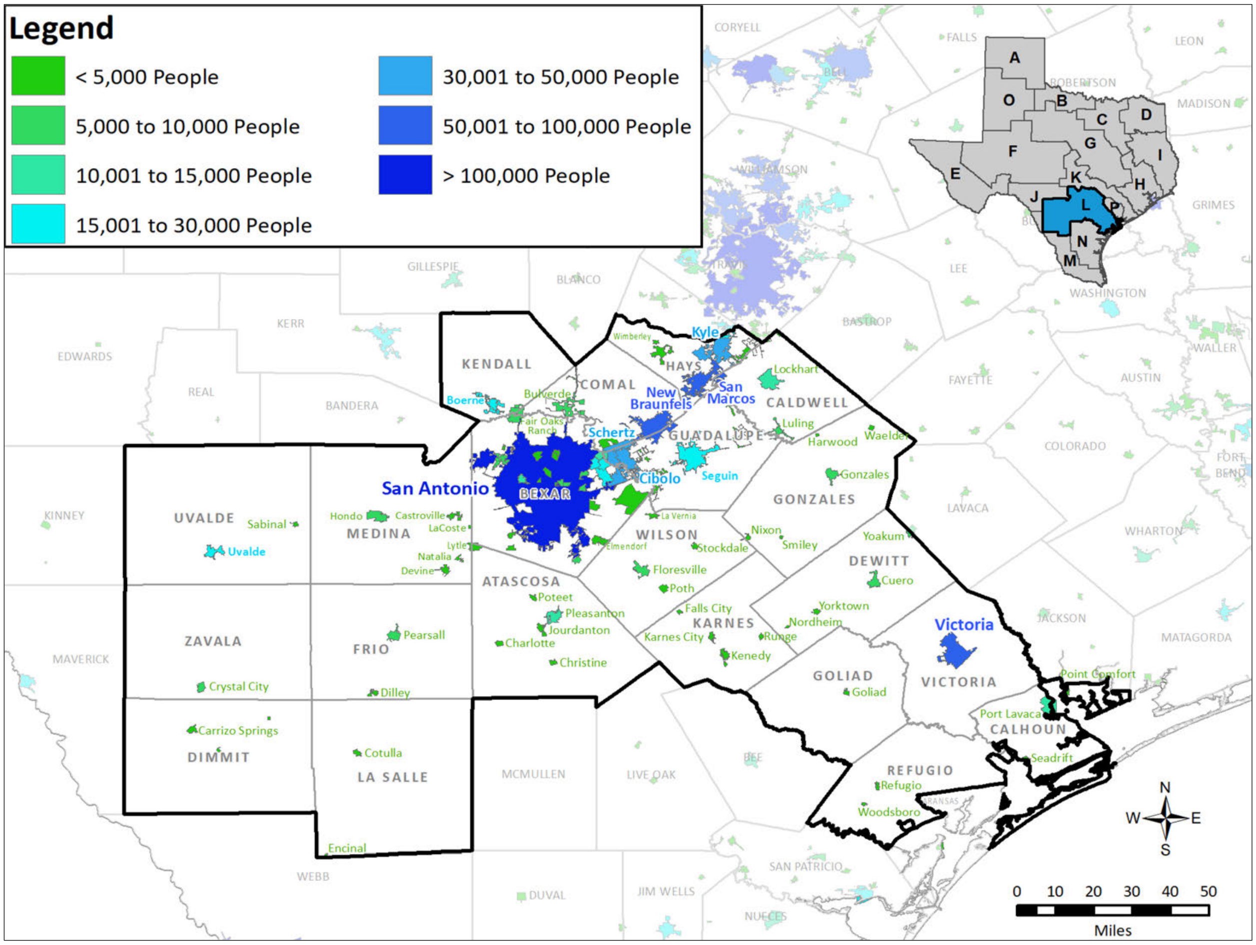

Figure 1-10 Population Centers

In 2020, 86% of the SCTRWPA population resided in urban areas, while only 14% resided in rural areas (Figure 1-11). La Salle County had the lowest population in 2020, with 6,664 residents (averaging 4.5 persons per square mile), while Bexar County had the highest population in the region with 2,009,324 residents (averaging 1,611.3 persons per square mile) (Table 1-7).

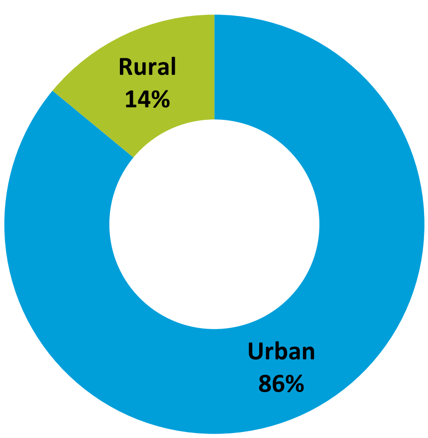

Figure 1-11 Percent of Population Residing in Urban and Rural Areas (2020)

Table 1-7 County Population, Area, and Density (2020)

County	2020 Census Population	Area (Square Mile)	Population Density (Persons per Square Mile)
Atascosa	48,981	1,232	39.8
Bexar	2,009,324	1,247	1611.3
Caldwell	45,883	546	84.0
Calhoun	20,106	512	39.3
Comal	161,501	562	287.4
DeWitt	19,824	909	21.8
Dimmit	8,615	1,331	6.5
Frio	18,385	1,133	16.2
Goliad	7,012	854	8.2
Gonzales	19,653	1,068	18.4
Guadalupe	172,706	711	242.9
Hays (part)	192,853	374	515.6
Karnes	14,710	750	19.6
Kendall	44,279	663	66.8
La Salle	6,664	1,489	4.5
Medina	50,748	1,328	38.2
Refugio	6,741	770	8.8
Uvalde	24,564	1,557	15.8
Victoria	91,319	883	103.4
Wilson	49,753	807	61.7
Zavala	9,670	1,299	7.4
Total	**2,535,451**	**20,025**	**151.0**
Source: United States Census Bureau, US Department of Commerce.			

Age distribution across the region is characterized by a relatively young population. The two age groups with the highest percentage of the population are under 20 years of age (27.5%) and from 25 to 34 years of age (14.5%). The age groups with the lowest percentage of the population are ages 20 to 24 (7.6%) and ages 55 to 64 (11.0%) (Figure 1-12).

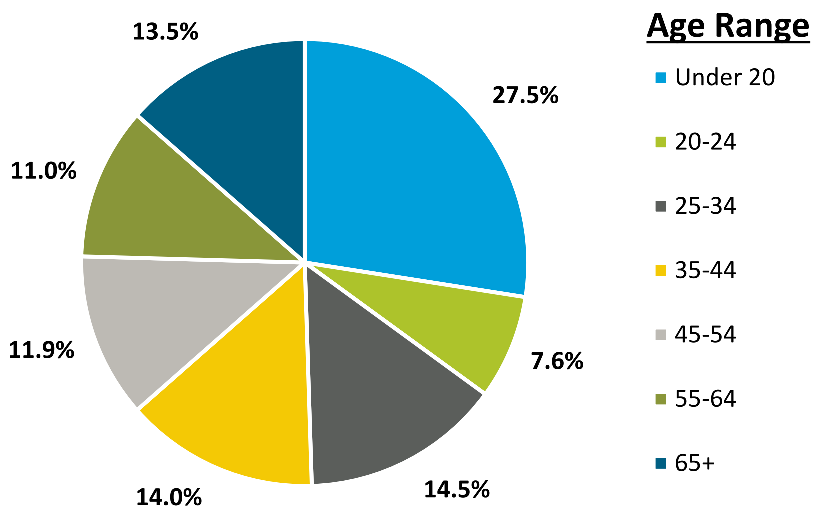

Figure 1-12 Population Distribution by Age Group (2022)

Of those residents in the SCTRWPA who are 25 years of age or older, 88.54% have at least a high school diploma, while 11.46% do not. The two largest groups rated according to educational achievement are those who have completed high school but have not attended college (27.07%) and those who have a bachelor's degree (19.29%). Only 10.18% of the population who are 25 years or older have a graduate degree (Figure 1-13).

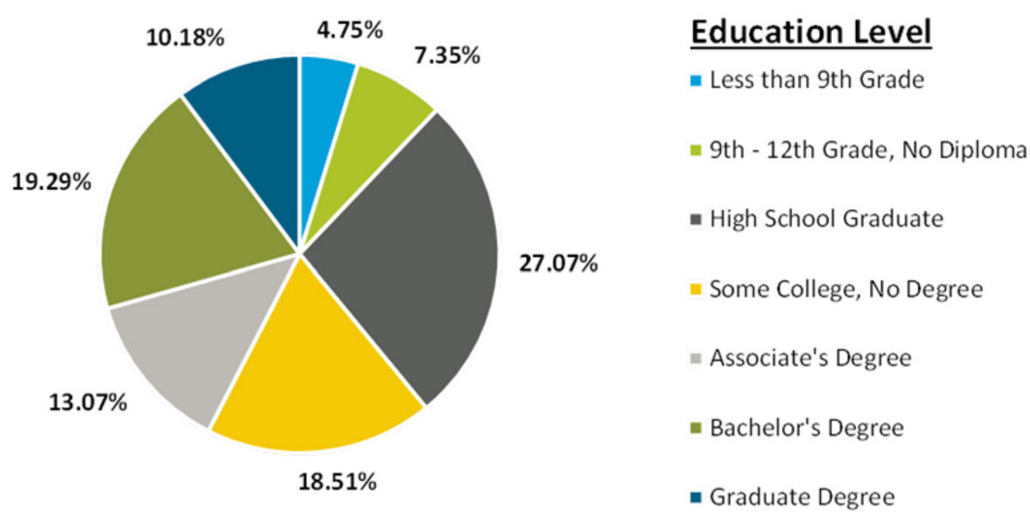

Figure 1-13 Level of Educational Achievement (2022)

1.10 Economy – Major Sectors and Industries

1.10.1 Regional Economy

The SCTRWPA has an economic base centered on agricultural production, livestock production, mining, manufacturing, and trades and services. The region has experienced economic ups and downs throughout the past decade, but all sectors of the economy have experienced growth in recent years. Table 1-8 provides a county-by-county summary of economic activity in the key sectors most significantly affecting the economy of the SCTRWPA. A strong trades and services sector, including a thriving tourism industry in San Antonio, comprises about 36% of regional economic activity (summarized in Table 1-8). Fabricated metal products, industrial machinery, petrochemicals, and food processing form the core of the manufacturing sector, which accounts for approximately 35% of regional economic activity. Beef cattle, corn, and grain sorghum are the dominant agricultural enterprises, although vegetables produced in the Winter Garden area add diversity to the agricultural sector. The agricultural sector, including both livestock and crops, accounts for about 2% of regional economic activity. Finally, oil and gas production dominates the mining sector of the economy and, together, represent about 22% of the regional economic activity summarized in Table 1-8. Additional information regarding the agricultural, livestock, mining, manufacturing, and trades and services sectors is presented in the following sections.

Table 1-8 Summary of Economic Activity by County

County	Trades & Services Economic Activity (million dollars) [1]	Manufacturing Economic Activity (million dollars) [2]	Market Value of All Livestock (million dollars) [3]	Market Value of All Crops (million dollars) [3]	Value of Oil Production (million dollars) [4]	Value of Gas Production (million dollars) [5]	Total (million dollars)
Atascosa	750	(D)	49	16	2,091	114	2,620
Bexar	40,554	18,293	25	48	4	0	36,716
Caldwell	475	177	54	9	78	0	671
Calhoun	272	7,398	21	11	9	5	7,782
Comal	2,979	963	4	1	0	0	3,653
DeWitt	243	83	28	3	1,739	276	2,058
Dimmit	161	5	4	7	2,741	949	2,840
Frio	197	17	81	87	595	67	926
Goliad	46	(D)	18	4	7	18	70
Gonzales	320	400	965	37	2,586	190	4,275
Guadalupe	2,339	4,583	69	25	63	0	6,705
Hays (part) [6]	2,958	1,414	7	22	0	0	3,292
Karnes	190	75	33	6	6,619	734	6,884
Kendall	1,705	395	13	1	0	0	1,558

County	Trades & Services Economic Activity (million dollars) [1]	Manufacturing Economic Activity (million dollars) [2]	Market Value of All Livestock (million dollars) [3]	Market Value of All Crops (million dollars) [3]	Value of Oil Production (million dollars) [4]	Value of Gas Production (million dollars) [5]	Total (million dollars)
La Salle	172	0	6	1	2,993	1,170	3,085
Medina	905	58	45	37	6	0	726
Refugio	94	1	10	28	173	63	292
Uvalde	481	120	45	46	0	0	694
Victoria	2,142	(D)	26	46	71	20	2,359
Wilson	627	73	133	13	307	8	776
Zavala	38	(D)	38	49	747	44	872
Total	**$31,799**	**$34,055**	**$1,674**	**$497**	**$20,829**	**$3,658**	**$88,854**

[1] Source: 2024-2025 Texas Almanac
[2] Source: 2023 Economic Census. US Department of Commerce.
[3] Source: 2022 Census of Agriculture, Volume 1 Geographic Area Series. "Table 1. County Summary Highlights: 2022."
[4] Determined by using the number of barrels produced in 2023 as reported to the Texas Railroad Commission, times $82.49/barrel (the average oil price for 2023).
[5] Determined by using the cubic feet produced in 2023 as reported to the Texas Railroad Commission, times $4.52/cubic feet (the average gas price for 2023).
[6] It is estimated that 70% of economic activity within Hays County takes place within Region L.

1.10.2 Agricultural Production

It is estimated that nearly 1.4 million acres in the SCTRWPA were used in crop production in 2022. Of this total, only 204,499 acres (15.0%) were irrigated; the remaining 85.0% of the total cropland was farmed using dryland techniques. The leading irrigation counties are found primarily in the western part of the region and include Frio, Medina, Uvalde, Zavala, and Atascosa Counties.

According to the 2022 Census of Agriculture, all crops grown in the SCTRWPA had a market value of over $497 million in 2022. The leading agricultural producing counties in the region, by market value of products, are Gonzales, Frio, Wilson, Guadalupe, and Uvalde Counties. The major crops grown in the region include corn, grain sorghum, wheat, and hay (Table 1-9).

Corn and grain sorghum are the leading crops grown in the SCTRWPA. In 2022, it was estimated that nearly 11 million bushels of corn were harvested in the region. The leading corn producing counties in the region are Victoria, Uvalde, Medina, Frio, and Guadalupe Counties (Table 1-9). Grain sorghum also contributes significantly to the agricultural sector in the SCTRWPA. In 2022, it was estimated that nearly 4 million bushels of grain sorghum were harvested in the region. The leading grain sorghum producing counties in the region are Refugio, Uvalde, Guadalupe, Gonzales, and Calhoun Counties (Table 1-9). Although wheat production is not as widespread as corn and grain sorghum production, it is still an important part of the regional agricultural production with over 1.5 million bushels of wheat harvested in 2022. The leading wheat producing counties in the region are Uvalde, Frio, Medina, Zavala, and Bexar Counties (Table 1-9).

Because of favorable climatic and soil conditions, the Victoria County is capable of producing rice. In 2022, Victoria County produced over 500,000 hundredweight of rice (Table 1-9). Cotton production is widespread throughout the region. In 2022, 18 counties in the SCTRWPA produced cotton, totaling over 170,000 bales (Table 1-9). Leading counties for cotton production are Uvalde, Refugio, and Victoria Counties.

Soybean production in the region reportedly occurs in seven counties, but total production and leading counties are uncertain because data provided by the 2022 Census of Agriculture is withheld for some counties to avoid disclosing production data by individual producers.

Table 1-9 Farm Production by County (2022)

County	Corn (Bushels)	Grain Sorghum (Bushels)	Wheat (Bushels)	Rice (100 Pounds)	Cotton (Bales)	Soybeans (Bushels)	Hay, Alfalfa, Other (Tons)
Atascosa	291,363	167,607	67,213	0	3,298	0	58,244
Bexar	288,378	76,573	150,241	0	(D)	(D)	23,694
Caldwell	444,430	169,784	35268	(D)	2,808	432	20,805
Calhoun	703,107	301,764	0	0	11,480	(D)	2,807
Comal	7,800	(D)	(D)	0	(D)	0	2,210
DeWitt	46,218	32,337	0	(D)	(D)	0	34,151
Dimmit	322,995	0	0	0	24,433	0	2,955
Frio	1,061,046	103,326	254,515	0	12,602	0	98,169
Goliad	158,933	(D)	(D)	0	(D)	(D)	19,751
Gonzales	315,688	315,227	(D)	0	0	0	39,522
Guadalupe	966,236	394,895	131,125	0	751	(D)	26,653
Hays (part)[1]	(D)	(D)	(D)	0	(D)	0	8,119
Karnes	133,573	84,664	17,278	0	(D)	0	33,090
Kendall	0	0	(D)	0	0	0	3938
La Salle	(D)	0	(D)	0	0	0	2,050
Medina	1,249,475	128,422	247,426	0	9,107	0	98,344
Refugio	459,092	1,241,214	0	0	37,109	0	3,028
Uvalde	1,363,325	397,536	293,852	0	41,659	0	9,381
Victoria	2,348,608	182,956	(D)	505,454	26,078	36,275	47,138

County	Corn (Bushels)	Grain Sorghum (Bushels)	Wheat (Bushels)	Rice (100 Pounds)	Cotton (Bales)	Soybeans (Bushels)	Hay, Alfalfa, Other (Tons)
Wilson	271,133	109,332	76,083	0	2,498	(D)	66,372
Zavala	177,773	107,072	247,228	0	2,126	0	20,557
Total	**10,609,173 + 2(D)**	**3,812,709 + 3(D)**	**1,520,229 + 7(D)**	**505,454 + 2(D)**	**173,949 + 6(D)**	**36,707 + 5(D)**	**620,978**

[1] It is estimated that 50% of all farm production in Hays County occurs in Region L.
(D) – Withheld to avoid disclosing data for individual producers.
Source: 2022 Census of Agriculture, Volume 1, Chapter 2: County Level Data.

1.10.3 Livestock Production

According to the 2022 Census of Agriculture, livestock marketed in the SCTRWPA had a value of over $1.6 billion, or about 3.4 times the value of all crop production. Major types of livestock produced in the area include cattle and calves, beef cattle, and sheep and lambs. Layers, pullets, and broilers also contribute significantly to livestock production, with Gonzales County producing just under 99% of these types of chickens within the region. Table 1-10 provides a county summary of livestock production in the SCTRWPA. In 2022, the leading livestock producing counties in the region by market value were Gonzales, Wilson, Frio, Guadalupe, and Caldwell Counties (Table 1-8).

Table 1-10 Livestock Production by County (2022)

County	Cattle and Calves (No.)	Beef Cattle (No.)	Milk Cows (No.)	Hogs and Pigs (No.)	Sheep and Lambs (No.)	Layers and Pullets (No.)	Broilers (No.)
Atascosa	65,442	(D)	(D)	472	1,594	4,667	480
Bexar	31,702	(D)	(D)	2,361	7,240	9,061	2,495
Caldwell	35,822	(D)	(D)	144	1,802	(D)	(D)
Calhoun	12,737	8,388	0	95	431	863	0
Comal	7,011	(D)	(D)	138	2,231	4,137	614
DeWitt	67,343	44,239	0	157	1,206	2,716	(D)
Dimmit	9,447	(D)	(D)	0	95	295	0
Frio	52,999	(D)	(D)	11	171	1,241	156
Goliad	44,083	29,307	0	96	220	2,879	(D)
Gonzales	143,254	(D)	(D)	404	1,284	9,876,002	94,447,112
Guadalupe	44,026	24,461	15	1,258	3,258	(D)	5,100,433
Hays (part)[1]	3805	(D)	(D)	121.5	559	1745.5	470
Karnes	53,100	(D)	(D)	16	582	967	0

County	Cattle and Calves (No.)	Beef Cattle (No.)	Milk Cows (No.)	Hogs and Pigs (No.)	Sheep and Lambs (No.)	Layers and Pullets (No.)	Broilers (No.)
Kendall	13,015	7,093	0	360	8,327	4,568	136
La Salle	11,909	7,569	0	104	177	541	0
Medina	37,161	21,468	0	693	2,717	11,893	350
Refugio	24,249	15,564	0	0	242	1,447	(D)
Uvalde	37,831	16,858	0	101	5,160	966	35
Victoria	58,674	(D)	(D)	238	850	3,664	0
Wilson	110,390	(D)	(D)	259	2,886	7,108	2,050
Zavala	38,198	11,658	0	(D)	191	621	0
Total	**902,198**	**186,605 + 11D**	**15 + 11D**	**7,819**	**41,223 + (D)**	**9,935,382 + 2(D)**	**99,554,331 + (2D)**

[1] It is estimated that 50% of all livestock production in Hays County occurs in Region L.

(D) – Withheld to avoid disclosing data for individual producers.

Source: 2022 Census of Agriculture, Volume 1, Chapter 2: County Level Data. "Table 1: County Summary Highlights."

Source: 2022 Census of Agriculture, Volume 1, Chapter 2: County Level Data. "Table 11: Cattle and Calves"

Source: 2022 Census of Agriculture, Volume 1, Chapter 2: County Level Data. "Table 12: Hogs and Pigs"

Source: 2022 Census of Agriculture, Volume 1, Chapter 2: County Level Data. "Table 19: Poultry"

1.10.4 Mining

The SCTRWPA has numerous sand and gravel quarries and is also rich in petroleum products including oil, natural gas, and lignite. Much of the stone quarried is used in the production of cement. The leading cement producing areas in the region are located in Bexar and Hays Counties. Most of the stone, gravel, and sand mining activities are located in Bexar, Comal, Gonzales, and Victoria Counties.

The region also derives a significant portion of its mining income from oil and gas activities. All but four counties (Comal, Hays, Kendall, and Uvalde Counties) in the region had economic activity derived from oil or gas production in 2023. Oil and gas production in the remaining 17 counties generated nearly $24.5 billion in 2023. The leading oil and gas producing counties in the region were Karnes, La Salle, Dimmit, Gonzales, and Atascosa Counties (Table 1-8).

1.10.5 Manufacturing

In 2023, manufacturing facilities contributed over $34 billion in sales in the SCTRWPA (Table 1-8) [10]. The leading manufacturing counties in the region for which data are disclosed, by value of shipments, are Bexar, Calhoun, Guadalupe, Hays, and Comal Counties. Significant economic activity associated with manufacturing also occurs in Atascosa, Goliad, Victoria, and Zavala Counties, although data are withheld to avoid disclosing data for individual producers. Types of manufacturing plants and products in the

[10] Source: 2023 Economic Census. US Department of Commerce.

region include plastics, nylon intermediates, automobiles, printing and related support activities, fabricated metal products, miscellaneous products, and food products.

1.10.6 Trades and Services

In 2023, wholesale trade, retail trade, and services contributed nearly $31.8 billion in sales or receipts in the SCTRWPA (Table 1-8). The counties leading trades and services, by value of sales or receipts, in the region are Bexar, Comal, Hays, Guadalupe, and Victoria Counties.

1.11 Current Water Use and Major Water Demand Centers

1.11.1 Current Water Use

In 2021, total water use in the region was estimated to be 904,179 acre-feet per year (acft/yr). Water use in 2021 within the SCTRWPA as reported to or estimated by the Texas Water Development Board (TWDB) [11] is summarized by source for each of the use types in Table 1-11. Municipal use accounted for 485,732 acft/yr (53.2%), and irrigation use accounted for 245,948 acft/yr (27.2%) of the total water use within the region. Surface water use totaled 166,216 acft/yr (18.4%), groundwater use totaled 658,093 acft/yr (72.8%), and reuse totaled 79,870 acft/yr (8.83%). Surface water is the primary source for manufacturing uses. Surface water and reuse are the primary sources for steam-electric uses, and groundwater is the primary water source for other use types.

Table 1-11 Current Water Use by Use Type (2021)

Use Type	2021 Total Water Use	Surface Water Use	Groundwater Use	Reclaimed Water Use
Irrigation (acft/yr)	245,948	30,437	214,538	973
Irrigation (percent)	27.20%	12%	87%	0%
Livestock (acft/yr)	24,960	10,521	14,439	0
Livestock (percent)	2.76%	42%	58%	0%
Manufacturing (acft/yr)	54,173	42,503	7,752	3,918
Manufacturing (percent)	5.99%	78%	14%	7%
Mining (acft/yr)	49,521	645	36,204	12,672
Mining (percent)	5.48%	1%	73%	26%
Municipal (acft/yr)	485,732	68,743	376,673	40,316
Municipal (percent)	53.72%	14%	78%	8%
Steam-Electric Power (acft/yr)	43,845	13,367	8,487	21,991
Steam-Electric Power (percent)	4.85%	30%	19%	50%
Total (acft/yr)	**904,179**	**166,216**	**658,093**	**79,870**
Total (percent)	**100.0%**	**18.38%**	**72.78%**	**8.83%**

[11] Source: 2021 Historical Water Use Summary Estimates. Texas Water Development Board.

1.11.2 Major Water Demand Centers

In the SCTRWPA, there are four major water demand centers. These centers are the IH-35 corridor from San Antonio to San Marcos, the Edwards Aquifer region west of the City of San Antonio, the Winter Garden area south of the Edwards Aquifer area, and the coastal area. The IH-35 corridor includes San Antonio, New Braunfels, and San Marcos, which represent some of the fastest growing cities in Texas. In the next 60 years, its water use will follow the same trend as population growth, with most of the demand being for municipal use.

The Edwards Aquifer region west of San Antonio, including Uvalde and Medina Counties, is a major demand center for water to be used for irrigated agriculture. The Winter Garden area, including Zavala, Dimmit, Frio, La Salle, and Atascosa Counties, is also a major water demand center for irrigated agriculture. The coastal area, including the cities of Victoria and Port Lavaca, are major demand centers for water for industrial purposes, with some demand for irrigation in Calhoun County.

1.12 Major Water Providers

A major water provider (MWP) is defined as a WUG or a WWP of particular significance to the region's water supply as determined by the RWPG. This may include public or private entities that provide water for any water use category. At the August 1, 2024, RWPG meeting, the SCTRWPG defined the following entities as MWPs for the sixth cycle of regional water planning:

- Canyon Lake Water Service (Texas Water Company)
- GBRA;
- New Braunfels;
- SAWS; and
- San Marcos.

1.13 Summary of Existing Plans

1.13.1 2022 State Water Plan

In Section 16.051 of the Texas Water Code, the Executive Administrator of the TWDB is charged with producing a State Water Plan that addresses the broad public interest of the state.[12] State Water Plans are to be developed every 5 years and incorporate the regional water plans. In accordance with Section 16.051, "The state water plan shall provide for the orderly development, management, and conservation of water resources and preparation for and response to drought conditions, in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of the entire state."

The goal of the State Water Plan is to identify policies and actions that may be needed to meet Texas' near- and long-term water needs, based on projected uses of water during a drought of record, affordable water supply availability, and the goal of conservation of the state's natural resources. The State Water Plan provides a statewide perspective that places local and regional needs within the state context. In formulating water supply solutions, the plan focuses on economic viability while taking environmental impacts into consideration.

[12] Texas Water Development Board (TWDB). 2022 State Water Plan: Water for Texas. 2022.

The current and most-recent State Water Plan was adopted in 2022. The 2022 State Water Plan includes approximately 5,800 WMSs statewide. If implemented, these strategies would provide 7.7 million acft/yr of water by 2070. Approximately one-third of this volume is from demand management strategies, such as water conservation and short-term drought management efforts. The remaining two-thirds is from projects that would develop new sources of water supply, including new reservoirs (37%), reuse (15%), groundwater development (12%), aquifer storage and recovery (3%) and seawater desalination (3%).

Another key component of the State Water Plan is that projects included in the plan may be eligible for financial assistance from the State Water Implementation Fund for Texas (SWIFT) program. The SWIFT program assists communities in developing and optimizing water supply projects at cost-effective rates by offering low-interest loans, extended repayment terms, and deferral of loan repayments. According to the TWDB's 2022 SWIFT Report to the 88th Legislature [13], the SWIFT program has committed nearly $10 billion to 68 projects included in the State Water Plan since its establishment in 2013. In 2023 and 2024, the TWDB committed an additional $1.5 billion and $3 billion, respectively, bringing the total SWIFT funding commitments to $14.5 billion.

For the SCTRWPA, the 2022 State Water Plan estimates the region's water demands to total 1,050,964 acft/yr in 2020, increasing to 1,320,000 acft/yr in 2070. In 2020, municipal use is the largest water demand category (433,481 acft/yr), followed by irrigation use (358,699 acft/yr). By 2070, irrigation demands are projected to decrease slightly by 0.1% over the planning horizon; whereas municipal demands are projected to increase by 162% to 700,477 acft/yr. The annual water needs (shortages) for the STRWPA are estimated to be 204,000 acft/yr in 2020, increasing to 268,000 acft/yr by 2040, and 401,000 acft/yr by 2070. This represents an increase in water needs by 200% over the planning period. In 2020, irrigation and municipal uses account for 64% and 12% of the total needs, respectively. By 2070, irrigation and municipal uses are projected to account for 35% and 54%, respectively.

To address these needs, the 2022 State Water Plan recommended a total of 244 WMSs for the SCTRWPA, which would provide an additional 199,000 acft/yr of water by 2020 and 737,000 acft/yr by 2070. Most of this volume is from groundwater projects and water conservation efforts, each representing 23% of the total WMS volumes by 2070. The total capital costs of recommended WMSs for the SCTWPA are $4.122 billion.

1.13.2 2021 Regional Water Plan

The regional water planning process includes developing projections of population and water demands, identifying existing and future supplies, estimating water needs (shortages), identifying potentially feasible WMSs to meet identified needs, and evaluating such strategies in accordance with TWDB rules. Data associated with demands, population, supplies, needs, and WMSs are defined on the water user group (WUG) level.

The current and most-recent regional water plan for the SCTRWPA is the 2021 South Central Texas Regional Water Plan, adopted by the SCTRWPG in November 2020. The SCTRWPG subsequently adopted a minor amendment to the plan in May 2024.

[13] Texas Water Development Board (TWDB). 2022 Biennial Report on the Use of the State Water Implementation Fund for Texas. 2022 (Updated March 13, 2023).

The 2021 South Central Texas Regional Water Plan outlines the 401 WMSs recommended by the planning group to meet the identified needs in the region. Each potentially feasible WMS was evaluated on the basis of quantity of water, reliability, financial costs, and environmental impacts. Information regarding the methodology and results for the WMS evaluations can be found in Chapter 5, Volume 2 of the 2021 South Central Texas Regional Water Plan.

Selected WMSs contained in the 2021 South Central Texas Regional Water Plan are summarized, as follows:

- Municipal Water Conservation was a recommended WMS for 106 WUGs, with the goal of reducing per capita use to effectively increase supply through demand reduction. The total volume of the WMS is 167,148 acft/yr in 2070, with annual unit costs ranging from $600/acft to $770/acft.
- Recycled Water Strategies includes use of treated wastewater effluent for potable or non-potable purposes. The Recycled Water Strategies within the region are projected to supply 52,388 acft/yr in 2070 with an average annual unit cost of $862/acft.
- Local Groundwater is a WMS that involves the phased development or expansion of well fields in the Carrizo-Wilcox, Trinity, Gulf Coast, Leona Gravel, and Yegua-Jackson aquifers for the purposes of meeting local needs. Planned implementation of this strategy provides new dependable supplies totaling 28,240 acft/yr in 2070, with estimated annual unit costs ranging from $54/acft to $1,317/acft.
- New Braunfels and Victoria both have Aquifer Storage and Recovery (ASR) as a WMS. Both ASR strategies would divert excess treated drinking water to ASR wells for storage in an aquifer. The stored water would then be recovered during times of shortage or drought. The ASR systems would provide New Braunfels and Victoria 10,818 acft/yr and 7,900 acft/yr, respectively.
- Seawater desalination was not included as a recommended WMS because it was not requested for inclusion by WUGs and most needs in the region can be met by fresh water, groundwater, brackish groundwater, reuse, and conservation WMSs.

1.13.3 2023 Regional Flood Plans

In 2019, the Texas legislature passed Senate Bill 8 to establish a new regional and state flood planning process aimed at protecting against loss of life and property from flooding. The TWDB delineated 15 Regional Flood Planning Areas and appointed initial members to the Regional Flood Planning Groups. The Regional Flood Planning Groups then prepared and submitted Regional Flood Plans in January 2023 and submitted Amended Regional Flood Plans to TWDB in July 2023. The approved Regional Flood Plans were then incorporated into the state’s first 2024 State Flood Plan. Similar to the regional water planning process, the regional flood planning process will occur in 5-year cycles.

Each Regional Flood Plan includes a Flood Hazard Risk Assessment, Flood Management Evaluations, Flood Management Strategies, Flood Management Projects, and administrative, regulatory, and legislative recommendations. Identification of evaluations, strategies, and projects in the Regional Flood Plan can enable sponsors to be eligible for certain types of funding from the TWDB, including the newly established Flood Infrastructure Fund.

The SCTRWPA is located within five Regional Flood Planning Areas, as follows:

- Region 10 - Lower Colorado-Lavaca;
- Region 11 – Guadalupe;
- Region 12- San Antonio;
- Region 13 – Nueces; and
- Region 15 Lower Rio Grande.

The five 2023 Regional Flood Plans include a total of 238 recommended Flood Mitigation Projects, totaling $1.5 billion. For more information about the regional flood planning process and for copies of the state and regional flood plans, visit https://www.twdb.texas.gov/flood/planning/.

1.13.4 Local Water Plans

During this planning process, the SCTRWPG worked with each local entity to develop a water management supply plan to meet any identified water needs (shortages) during the planning horizon. In some cases, the SCTRWPG incorporated data, projections, and other information from existing long-range water supply plans developed by local entities. Water management supply plans are reflected in Chapter 5 of this plan.

The TWDB is charged with the approval of groundwater management plans, which are required for all confirmed GCDs in Texas. A groundwater management plan describes a GCD's groundwater management goals, including how to address drought conditions. The districts use methods such as requiring wells in areas that are in danger of over producing groundwater and damaging the aquifers to restrict production by means of production permits, metering the amount of water produced, and working with water utilities, agricultural, and industrial users within the district to promote the efficient use of water.

1.13.5 Current Preparations for Drought

Water providers in the SCTRWPA prepare for drought by participating in the regional water planning process, which attempts to meet projected water demands during a drought of severity equivalent to the drought of record. Water providers that provide accurate information to TWDB and consider recommendations accepted by the regional water planning group should be able to supply water to customers throughout drought periods. In addition, all wholesale water providers (WWPs) and most municipalities develop individual drought contingency plans (DCPs) or emergency action plans to be implemented at various stages of a drought. All DCPs are required to set triggering criteria for initiation and termination of drought response stages and contain supply and demand management measures to be implemented during each stage. The retail and wholesale water suppliers' plans contain measures to limit or restrict the use of water for purposes such as to irrigate landscaped areas, to wash any motor vehicle, to fill or add water to any indoor or outdoor swimming pool, to operate any ornamental fountain, and to irrigate golf courses. DCPs are to be developed, updated, and submitted to the TCEQ every 5 years. Further information on DCPs and drought response measures can be found in Chapter 7 of this plan.

Throughout Texas, including the Guadalupe-San Antonio River Basin, water rights are issued under the prior appropriation system. Curtailment of water rights has become necessary in recent droughts. The South Texas Watermaster Program is responsible for managing surface water rights in an area in South

Central Texas according to "run-of-the-river" rights. The program has jurisdiction over the Guadalupe-San Antonio and Nueces river basins, as well as the Lavaca River Basin. Six watermaster deputies patrol the 50 counties in the jurisdictional area and enforce compliance with water rights.

To manage and sustain Edwards Aquifer levels and springflow during times of drought, the EAA developed a Critical Period Management (CPM) Plan. The CPM Plan is divided into five critical period stages, each with a trigger and corresponding temporary reductions in authorized withdrawal amounts for EAA permit holders. The triggers are based on ten-day averages of aquifer water level at the J-17 index well and springflows from the San Marcos Springs and Comal Springs. To protect unique species and their habitats from future water quantity concerns in the Edwards Aquifer, EAA and stakeholders developed the EAHCP, which establishes springflow protection measures. These provisions apply to all holders of regular permits, the customers of all permittees who are retail water utilities, and owners of exempt wells. Under these provisions, during times of drought, water use restrictions and other flow protection measures are engaged, as appropriate and necessary. More information on the EAHCP or EAA's CPM Plan is available at https://www.edwardsaquifer.org/.

Chapter 7 includes additional information and recommendations of the SCTRWPG regarding drought management.

1.14 Drought of Record

The historical drought of record for the Guadalupe-San Antonio River Basin of the SCTRWPA is that which occurred primarily in the 1950s. In the upper portions of the Guadalupe-San Antonio River Basin, the 1950s drought generally started in summer of 1947 and continued into early 1957. In the lower basin area near the Gulf Coast, the drought generally was a 3 year period between 1954 and 1956.

Although the drought of 2011 was quite severe in terms of combined gauged streamflows for the Guadalupe River at Victoria and the San Antonio River at Goliad, there were three consecutive years in the 1950s drought (1954 through 1956) during which streamflows in each year were less than those in 2011. Similarly, total Edwards Aquifer recharge in 2011 was twice that for 1956. Hence, it is appropriate to use the 1950s drought as the drought of record for the Guadalupe-San Antonio River Basin.

Until recently, the 1950s drought was the drought of record for the Nueces River Basin as well. However, the 1990s drought was severe and prolonged enough that it is now considered the drought of record for the Nueces River Basin within the SCTRWPA.

1.15 Water Loss Audits

In accordance with 31 TAC §357.30, the 2026 South Central Texas Regional Water Plan includes water loss information compiled by the TWDB from water loss audits performed by retail public utilities of the SCTRWPA pursuant to31 TAC §358.6 relating to water loss audits. In addition, in accordance with 31 TAC §357.30, SCTRWPG has considered strategies to address issues identified in the information compiled by the TWDB from the water loss audits performed by retail public utilities.

All retail public water suppliers are required to submit a water loss audit to the TWDB once every five years. Additionally, any retail water supplier with more than 3,300 connections or with an active financial obligation with the TWDB are required to submit an audit annually. The 2020 to 2022 water loss data presented herein were submitted to the TWDB by water utilities in Texas as required HB 3338 of the 78th Texas Legislature. HB 3338 requires the TWDB to compile the information included in water audits by type of retail public utility and by regional water planning area, and to provide the information to RWPGs for use in identifying appropriate WMSs in regional water plans.

The TWDB provided the list of 73 WUGs within the SCTRWPA that filed a water loss audit report between 2020 and 2022. Table 1-12 shows the apparent and real losses and costs for the respective losses. Apparent and Real Water Losses are defined, as follows:

- **Apparent water losses** are non-physical losses; they result from unauthorized consumption (theft of service), inaccurate customer metering, and systematic data handling errors. It is typically measured in gallons per connection per day (GPCD).
- **Real water losses** are the physical losses through leakage on mains or service lines, or tank overflows. This includes all physical losses from the pressurized system between the point of distribution and the customers' meters. Variable Production Cost (VPC) is used to apply a value to the real loss volume. The VPC reflects the costs associated with, energy and maintenance costs for transmission and distribution pumping, and chemical treatment costs. It is typically measured in gallons per connection per day or the Infrastructure Leakage Index. The ILI is defined by the American Water Works Association (AWWA) as the ratio of current annual real losses to unavoidable annual real losses.

The water loss data were acquired as part of the 2020 to 2022 water loss audit reporting efforts. If a water utility is not listed in the table below, then there were no audit data available for 2020-2022. The methodology used relies upon self-reporting data provided by public utilities, and because of this, the self-reported data may need further refinement. Where available, the values presented are the TWDB-corrected values. Further information regarding the methodology can be found in the TWDB's *Water Loss Audit Manual for Texas Utilities*[14].

Table 1-12 Water Loss Audit Reports Summary (2020 to 2022)

Water User Group	Most Recent Report Year	Real Loss (GPCD)	Apparent Loss (GPCD)	Total Water Loss (GPCD)	ILI*	Real Loss Cost ($)	Apparent Loss Cost ($)
Aqua Water Supply Corporation (WSC)	2022	46.80	8.05	54.85		$990,442	$276,169
Atascosa Rural WSC	2020	29.74	0.84	30.58	1.36	$41,251	$2,322
Benton City WSC	2022	44.49	13.44	57.93		$581,655	$136,642
Boerne	2021	19.58	6.76	26.34	1.05	$109,536	$43,435
C Willow Water	2020	91.60	12.90	104.5		$25,008	$3,523

[14] Texas Water Development Board (TWDB). 2008. *Report No. 367 – Water Loss Audit Manual for Texas Utilities.* March 2008. http://www.twdb.texas.gov/publications/brochures/conservation/doc/WaterLossManual_2008.pdf?d=1107885.7699999935.

Water User Group	Most Recent Report Year	Real Loss (GPCD)	Apparent Loss (GPCD)	Total Water Loss (GPCD)	ILI*	Real Loss Cost ($)	Apparent Loss Cost ($)
Canyon Lake Water Service (Texas Water Company)	2020	57.67	14.88	72.55	2.77	$197,745	$248,379
Castroville	2022	56.32	15.26	71.58		$8,293	$70,405
Cibolo	2022	11.64	6.03	17.67	0.79	$153,352	$81,264
Clear Water Estates Water System	2020	9.37	10.40	19.77		$227	$2,616
Concan WSC	2022	10.08	5.01	15.09		$2,047	$2,655
Converse	2022	49.35	1.84	51.18	3.05	$450,955	$22,761
Cotulla	2022	210.67	30.20	240.87		$324,807	$54,126
County Line Special Utility District (SUD)	2021	21.92	9.38	31.3	1.27	$36,199	$56,304
Creedmoor-Maha WSC	2022	18.96	1.33	20.29		$7,135	$10,862
Crystal Clear SUD	2022	84.33	1.22	85.55	2.63	$807,627	$27,103
Devine	2022	16.72	10.48	27.2		$37,157	$40,231
Dilley	2020	353.47	20.98	374.45		$122,914	$47,426
East Medina County SUD	2020	209.03	2.89	211.93		$16,285	$6,060
El Oso WSC	2022	154.16	5.74	159.89		$74,978	$22,358
Elmendorf	2022	16.50	7.27	23.77		$19,659	$29,042
Fair Oaks Ranch	2020	15.36	0.98	16.34	0.82	$34,762	$4,219
Fayette WSC	2020	72.54	5.37	77.91		$258,731	$19,908
Floresville	2021	70.50	1.35	71.86		$183,277	$42,932
Garden Ridge	2022	11.48	14.29	25.77		$36,881	$41,500
Goforth SUD	2022	24.88	11.82	36.7	1.34	$105,634	$100,342
Goliad	2022	100.01	22.91	122.91		$37,306	$43,063
Gonzales	2021	18.72	6.70	25.43	1.24	$65,379	$23,561
Gonzales County WSC	2020	78.32	36.13	114.45		$275,306	$129,657
Green Valley SUD	2020	58.90	3.27	62.17	2.35	$692,779	$73,370

Water User Group	Most Recent Report Year	Real Loss (GPCD)	Apparent Loss (GPCD)	Total Water Loss (GPCD)	ILI*	Real Loss Cost ($)	Apparent Loss Cost ($)
Hondo	2022	63.85	42.80	106.64		$194,862	$130,668
Jourdanton	2021	23.11	10.70	33.81		$78,604	$14,201
Kendall County Water Control and Improvement District (WCID) 1	2020	34.97	3.32	38.29		$6,510	$3,277
Kendall West Utility	2020	67.51	12.14	79.65		$256,129	$50,295
Kenedy	2020	23.67	7.19	30.86		$8,515	$11,674
Kyle	2022	20.04	6.13	26.17	1.43	$266,511	$271,559
La Vernia	2021	82.43	36.57	118.99		$84,054	$44,864
Lockhart	2020	29.15	11.74	40.89	1.87	$147,547	$95,526
Loma Alta Chula Vista Water System	2020	187.94	8.41	196.36		$8,542	$2,172
Luling	2022	42.36	4.23	46.59		$85,825	$13,959
Martindale WSC	2022	18.97	3.62	22.6		$14,806	$4,242
McCoy WSC	2020	64.97	6.51	71.47		$18,731	$16,994
New Braunfels	2022	39.03	7.44	46.46	2.27	$1,160,643	$418,957
Nixon	2020	3.17	34.11	37.28		$2,923	$31,442
Oak Hills WSC	2020	8.44	9.03	17.47		$17,686	$10,085
Pleasanton	2022	24.64	7.67	32.31	1.59	$22,563	$43,309
Polonia WSC	2020	179.33	5.63	184.96		$16,285	$3,705
Port Lavaca	2022	105.29	6.71	112	9.23	$1,128,067	$129,708
Port Oconnor Improvement District	2022	36.00	4.86	40.86		$96,232	$129,873
Poteet	2020	127.16	11.46	138.62		$896,816	$165,713
Refugio	2022	14.96	5.34	20.29		$13,593	$6,062
Sabinal	2020	94.27	14.28	108.54		$7,164	$10,083
San Antonio Water System	2022	59.03	3.41	62.44	3.56	$118,648,119	$8,723,927
San Marcos	2022	61.70	3.25	64.96	2.81	$465,769	$76,851

Water User Group	Most Recent Report Year	Real Loss (GPCD)	Apparent Loss (GPCD)	Total Water Loss (GPCD)	ILI*	Real Loss Cost ($)	Apparent Loss Cost ($)
Schertz	2022	44.50	4.02	48.52	2.61	$514,740	$86,231
Seguin	2022	38.95	22.67	61.62	2.16	$219,053	$350,758
Selma	2022	44.45	5.27	49.72	2.13	$117,173	$32,352
South Buda WCID 1	2022	19.31	3.46	22.77		$52,357	$10,568
Springs Hill WSC	2022	111.19	2.69	113.88	3.64	$1,747,246	$42,344
Stockdale	2020	79.05	6.44	85.49		$73,645	$7,467
Sunko WSC	2022	27.53	1.84	29.37		$44,069	$4,712
The Oaks WSC	2020	5.46	8.12	13.57		$6,138	$12,344
Three Oaks WSC	2021	37.93	10.99	48.92		$2,928	$92,337
Tri Community WSC	2020	27.27	16.76	44.04		$2,419	$8,921
Universal City	2021	15.38	7.89	23.27	0.94	$11,878	$34,172
Victoria	2022	92.12	6.54	98.65	9.67	$401,568	$164,412
Victoria County WCID 1	2022	74.45	11.42	85.87		$3,869	$41,221
West Medina WSC	2020	221.36	9.22	230.58		$14,676	$3,619
Wimberley WSC	2020	17.45	11.98	29.43		$3,693	$23,764
Woodsboro	2022	16.25	6.58	22.83		$11,760	$5,717
Yancey WSC	2020	116.02	7.59	123.61		$335,856	$21,986
Yoakum	2021	10.25	9.96	20.21		$3,093	$32,473
Yorktown	2021	109.49	7.50	116.99		$7,809	$26,732
Zavala County WCID 1	2021	239.19	17.45	256.65		$24,439	$10,824
*ILI is only reported for WUGs with more than 3,300 connections							

INITIALLY PREPARED PLAN

CHAPTER 2: POPULATION AND WATER DEMAND PROJECTIONS

South Central Texas Regional Water Plan

B&V PROJECT NO. 411170

PREPARED FOR

South Central Texas Regional Water Planning Group

3 MARCH 2025

BLACK & VEATCH

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%	Percent
acft/yr	Acre-Feet per Year
DB27	2027 Regional and State Water Planning Database
GBRA	Guadalupe-Blanco River Authority
GPCD	Gallons Per Capita Per Day
IH-35	Interstate Highway 35
MWP	Major Water Provider
RWPG	Regional Water Planning Group
SAWS	San Antonio Water System
SCTRWPA	South Central Texas Regional Water Planning Area
SCTRWPG	South Central Texas Regional Water Planning Group
TDC	Texas Demographic Center
TWDB	Texas Water Development Board
WUG	Water User Group
WWP	Wholesale Water Provider

2.0 Population and Water Demand Projections

2.1 Introduction

This chapter presents the results of Tasks 2A and 2B of the project scope, which is the development of population and water demand projections from 2030 to 2080 for the South Central Texas (Region L) Regional Water Planning Area (SCTRWPA). Additionally, the chapter outlines the guidelines and methodology used to develop the projections.

The Texas Water Development Board (TWDB) collaborated with the Regional Water Planning Groups (RWPGs) to develop the adopted population and water demand projections for the region's water users. The SCTRWPA consists of 20 full counties and part of Hays County. Table 2-1 summarizes the population projections for the SCTRWPA. Table 2-2 summarizes water demand projections for the following water use categories in Region L: irrigation, livestock, manufacturing, mining, municipal, and steam-electric power generation. Demands are presented in acre-feet per year (acft/yr) [1].

Population and municipal demands were estimated for utilities and rural areas for municipal water user group (WUG) projections. Water demand projections for non-municipal water users were aggregated into WUGs based on their geographical locations within a given county and river basin. TWDB estimated demands using historical data and recent studies for each water use category to establish the base year. The base year was used with a rate of change to project decadal estimates over the 50-year planning horizon.

Table 2-1 Population Projections for the South Central Texas Region (No. of People)

Regional Projections	2030	2040	2050	2060	2070	2080
Total	3,987,279	4,793,957	5,469,629	6,176,459	6,897,460	7,689,377

Table 2-2 Water Demand Projections for the South Central Texas Region (acft/yr)

Use Type	2030	2040	2050	2060	2070	2080
Irrigation	314,645	314,645	314,645	314,645	314,645	314,645
Livestock	24,641	24,641	24,641	24,641	24,641	24,641
Manufacturing	110,929	115,034	119,292	123,706	128,283	133,030
Mining	74,126	77,971	81,760	85,423	88,890	48,880
Municipal	530,751	616,476	691,969	773,195	856,949	956,362
Steam-Electric Power	79,879	79,879	79,879	79,879	79,879	79,879
Total	**1,134,971**	**1,228,646**	**1,312,186**	**1,401,489**	**1,493,287**	**1,557,437**

[1] One acft is approximately 325,851 gallons.

2.2 Population Projections

The population projections in this plan were developed over the 50-year planning horizon (2030 to 2080) in accordance with TWDB guidelines, utilizing the 2020 US Census data and growth projections established by the Texas State Office of the State Demographer. These data were further refined on a county, subcounty, and WUG basis by the TWDB in consultation with Texas Commission on Environmental Quality, Texas Department of Agriculture, and the Texas Parks and Wildlife Department. RWPGs were provided an opportunity to review and suggest adjustments to population projections, as necessary, for municipal WUGs delineated by utility service area boundaries.

The 2026 Regional Water Plan population projections are based on county-level projections from the Texas Demographic Center (TDC), which used migration rates between the 2010 Census and 2020 Census to project future growth. These projections included associated updates in the TDC cohort model to reflect updated birth and mortality rates. The TWDB drafted WUG-level population and water demand projections using the TDC's full-migration scenario (1.0) projections and provided the half-migration scenario (0.5) projections by Region-County for the planning groups' consideration. The higher of the total regional populations is the allowable cap on total population for the region. For each county, the South Central Texas Regional Water Planning Group (SCTRWPG) reviewed migration scenarios and solicited feedback from water provider representatives, then selected the most appropriate migration scenario as shown on Figure 2-1.

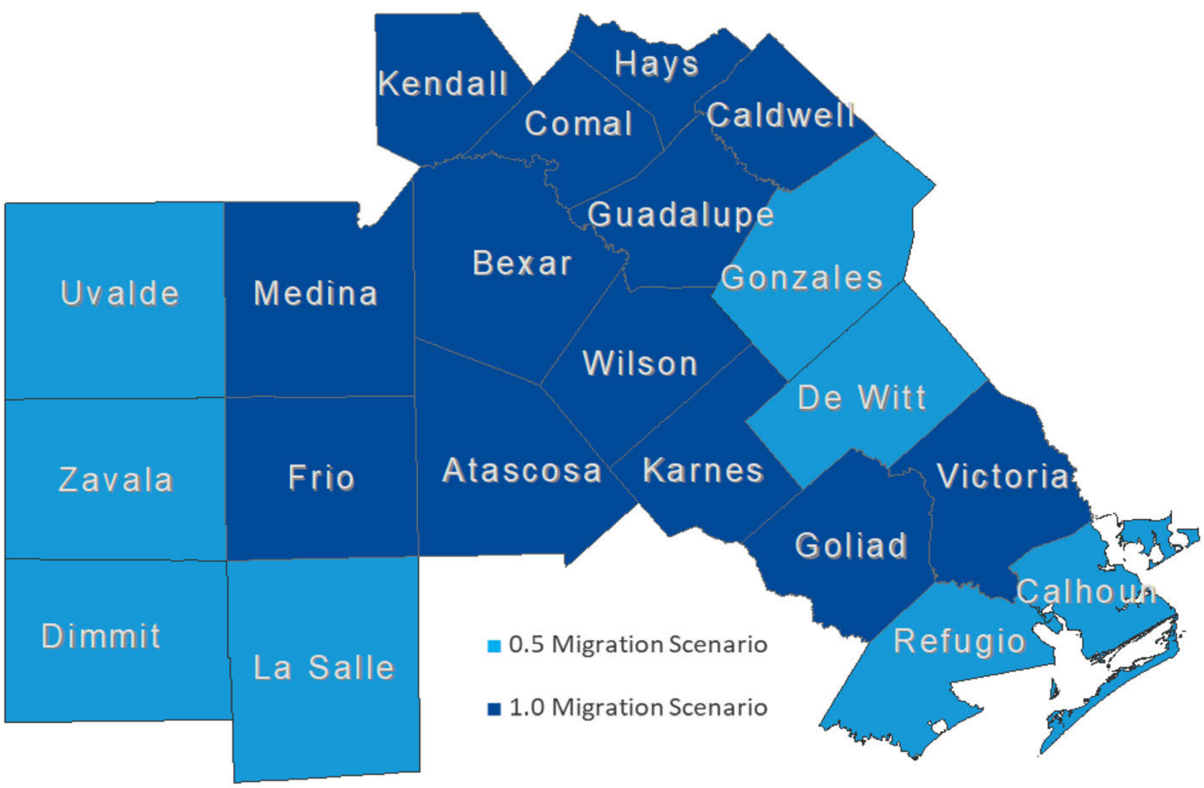

Figure 2-1 Selected Migration Scenarios in the South Central Texas Region

The population of the SCTRWPA is projected to increase from 3,987,279 in 2030 to 7,689,377 in 2080, an increase of 93% (Figure 2-2). Population is projected to increase by 11 to 20% each decade, with the largest decadal population growth of 20% between 2030 and 2040. Most population growth is expected to occur along the Interstate Highway 35 (IH-35) corridor. The following sections present population projections for each planning decade by WUG, counties, river and coastal basins, and major water providers (MWPs).

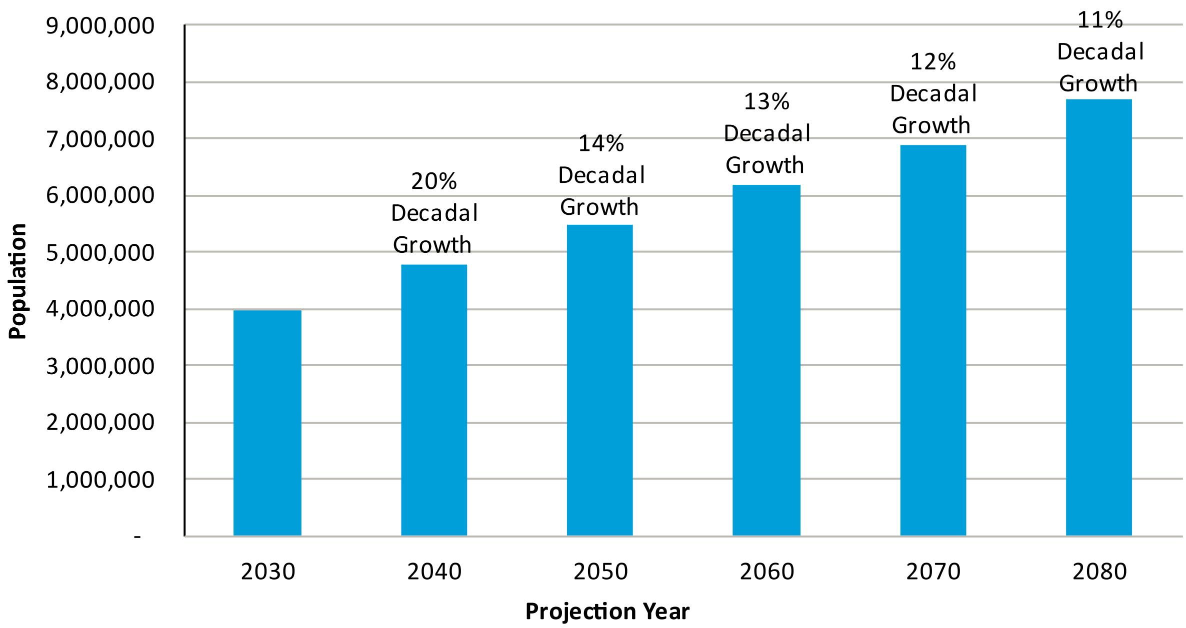

Figure 2-2 South Central Texas Region Population Projections (2030 to 2080)

2.2.1 Water User Groups

Population projections for each WUG within the SCTRWPA are provided in Appendix 2A, which includes relevant reports from the 2027 Regional and State Water Planning Database (DB27).

2.2.2 Counties

Approximately 64% of the SCTRWPA's population is projected to reside in Bexar County in 2030. By 2080, the Bexar County population is expected to increase by approximately 1,390,419 people and comprise 51% of the region's total population (Figure 2-3 and Table 2-3). In addition to Bexar County, Comal, Guadalupe, and Hays counties represent the counties with the largest anticipated population growth between 2030 and 2080, with population increases of 693,793; 446,600; and 904,630, respectively. However, many counties, primarily in rural areas, are projected to experience population declines between 2030 and 2080, including Calhoun, DeWitt, Dimmit, Goliad, Gonzales, La Salle, Refugio, Uvalde, and Zavala Counties.

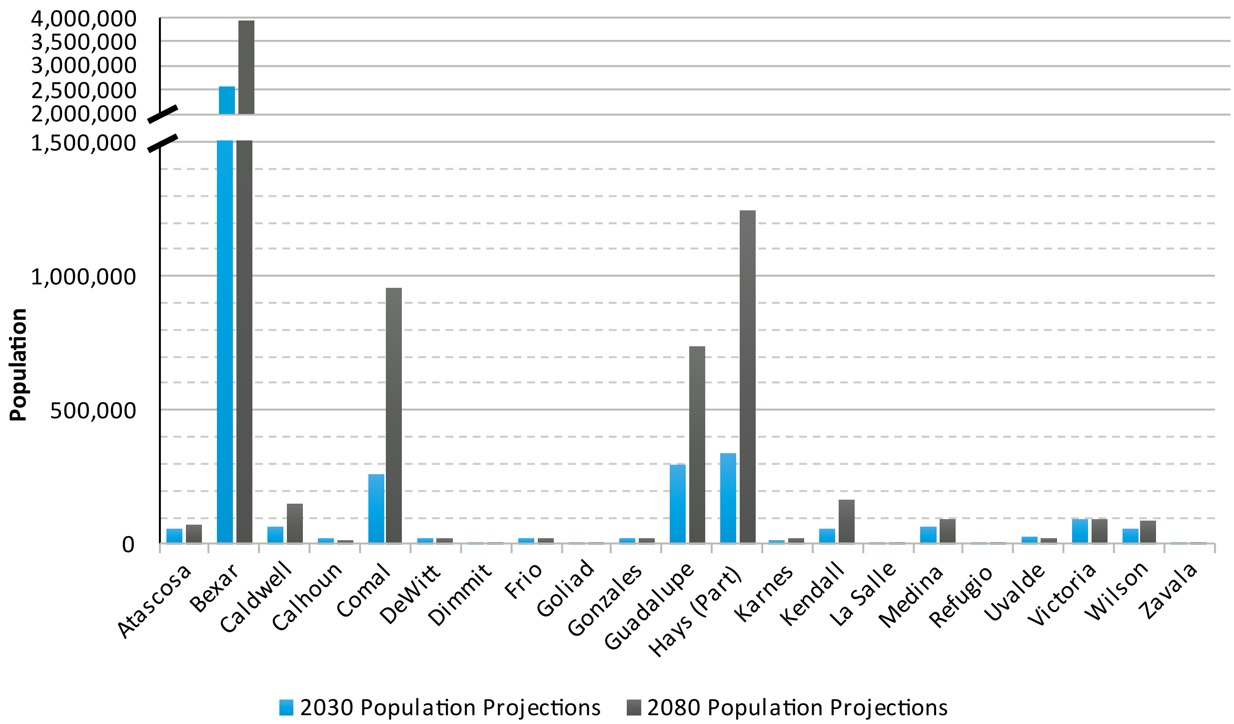

Figure 2-3 Population Projections by County (2030 and 2080)

Table 2-3 Population Projections for Individual Counties (2030 to 2080)

County	2030	2040	2050	2060	2070	2080
Atascosa	53,324	57,374	61,473	64,960	68,952	73,522
Bexar	2,555,076	2,951,404	3,222,978	3,470,641	3,699,975	3,945,495
Caldwell	67,191	83,988	100,497	116,808	134,861	151,345
Calhoun	19,449	18,619	17,599	16,571	15,483	14,332
Comal	259,280	350,779	447,841	584,380	756,273	953,073
DeWitt	19,716	19,687	19,565	19,482	19,394	19,301
Dimmit	8,175	7,818	7,383	6,983	6,560	6,112
Frio	19,512	20,540	21,269	21,643	22,071	22,561
Goliad	6,803	6,648	6,559	6,454	6,334	6,197
Gonzales	19,716	19,697	19,399	19,064	18,710	18,335
Guadalupe	292,903	385,703	462,052	542,643	634,587	739,503
Hays (part)*	336,064	500,806	683,104	877,560	1,051,675	1,240,694
Karnes	15,357	16,052	16,739	17,527	18,429	19,462
Kendall	56,306	70,896	89,665	111,448	136,387	164,940
La Salle	6,723	6,766	6,690	6,529	6,359	6,179

County	2030	2040	2050	2060	2070	2080
Medina	60,936	79,204	83,631	87,079	90,594	92,654
Refugio	6,489	6,243	5,992	5,799	5,595	5,379
Uvalde	24,967	24,478	23,759	22,944	22,080	21,167
Victoria	93,954	96,082	96,608	96,168	95,664	95,087
Wilson	55,858	61,941	67,968	73,304	79,413	86,407
Zavala	9,480	9,232	8,858	8,472	8,064	7,632
Total	**3,987,279**	**4,793,957**	**5,469,629**	**6,176,459**	**6,897,460**	**7,689,377**
* Hays County is split between Region K and Region L; population projections shown above are for Region L. Hays County population totals are 431,531 in 2030; 638,523 in 2040; 876,457 in 2050; 1,146,428 in 2060; 1,406,124 in 2070; and 1,692,131 in 2080.						

2.2.3 River and Coastal Basins

The South Central Texas Region includes portions of the Rio Grande, Nueces, San Antonio, Guadalupe, Colorado, and Lavaca river basins and portions of the San Antonio-Nueces, Lavaca-Guadalupe, and Colorado-Lavaca coastal basins. The most populous river and coastal basins in the SCTRWPA are the San Antonio, Guadalupe, and Nueces. In the year 2080, approximately 59% of the population of the South Central Texas Region is projected to reside in the San Antonio River Basin and 37% in the Guadalupe River Basin (Table 2-4).

Table 2-4 Population Projections for Individual River and Coastal Basins (2030 to 2080)

Basin	2030	2040	2050	2060	2070	2080
Colorado River	12,675	20,877	29,346	37,655	46,383	55,527
Colorado-Lavaca Coastal	1,114	1,109	1,090	1,066	1,046	1,037
Guadalupe River	924,766	1,256,278	1,590,868	1,975,775	2,380,851	2,830,732
Lavaca River	3,508	3,492	3,455	3,405	3,349	3,288
Lavaca-Guadalupe Coastal	50,865	50,795	49,982	48,832	47,593	46,255
Nueces River	167,029	174,122	179,350	182,752	186,764	191,670
Rio Grande River	32	29	25	21	15	6
San Antonio River	2,820,266	3,280,481	3,608,988	3,920,623	4,225,334	4,554,951
San Antonio-Nueces Coastal	7,024	6,774	6,525	6,330	6,125	5,911
Total	**3,987,279**	**4,793,957**	**5,469,629**	**6,176,459**	**6,897,460**	**7,689,377**
Note: Populations shown are representative of portions located within the South Central Texas Region.						

2.2.4 Major Water Providers

A MWP is defined as a WUG or a wholesale water provider (WWP) of particular significance to the region's water supply as determined by the RWPG. This may include public or private entities that provide water for any water use category. At the August 1, 2024, RWPG meeting, the SCTRWPG defined the following entities as MWPs for the sixth cycle of regional water planning:

- Canyon Lake Water Service (Texas Water Company)
- Guadalupe-Blanco River Authority (GBRA);
- New Braunfels;
- San Antonio Water System (SAWS); and
- San Marcos.

Table 2-5 provides population projections for MWPs in the SCTRWPA.

Table 2-5 Population Projections for Major Water Providers (2030 to 2080)

Major Water Provider	2030	2040	2050	2060	2070	2080
Canyon Lake Water Service (Texas Water Company)*	94,804	129,631	151,722	166,056	219,685	278,860
GBRA	8,888	12,326	11,956	11,605	11,202	10,743
New Braunfels	140,358	199,891	275,870	368,213	473,912	594,914
SAWS	2,351,317	2,737,300	2,991,858	3,225,872	3,439,373	3,664,850
San Marcos	141,830	199,786	246,158	280,361	302,406	316,607
Total	**2,737,197**	**3,278,934**	**3,677,564**	**4,052,107**	**4,446,578**	**4,865,974**

* Canyon Lake Water Service (Texas Water Company) is split between Region K and Region L; population projections shown above are for Region L only. Population totals are 97,872 in 2030; 132,769 in 2040; 154,911 in 2050; 169,282 in 2060; 222,938 in 2070; and 282,113 in 2080.

2.3 Water Demand Projections

Water demand projections for the South Central Texas Region are summarized on Figure 2-4. Demands are also shown for each use type or sector. Water demands are measured in acft/yr.

In 2030, water demands for all use sectors in the SCTRWPA are projected to be 1,134,971 acft/yr. By 2080, total water demands for the region are expected to increase by 37% to 1,557,437 acft/yr.

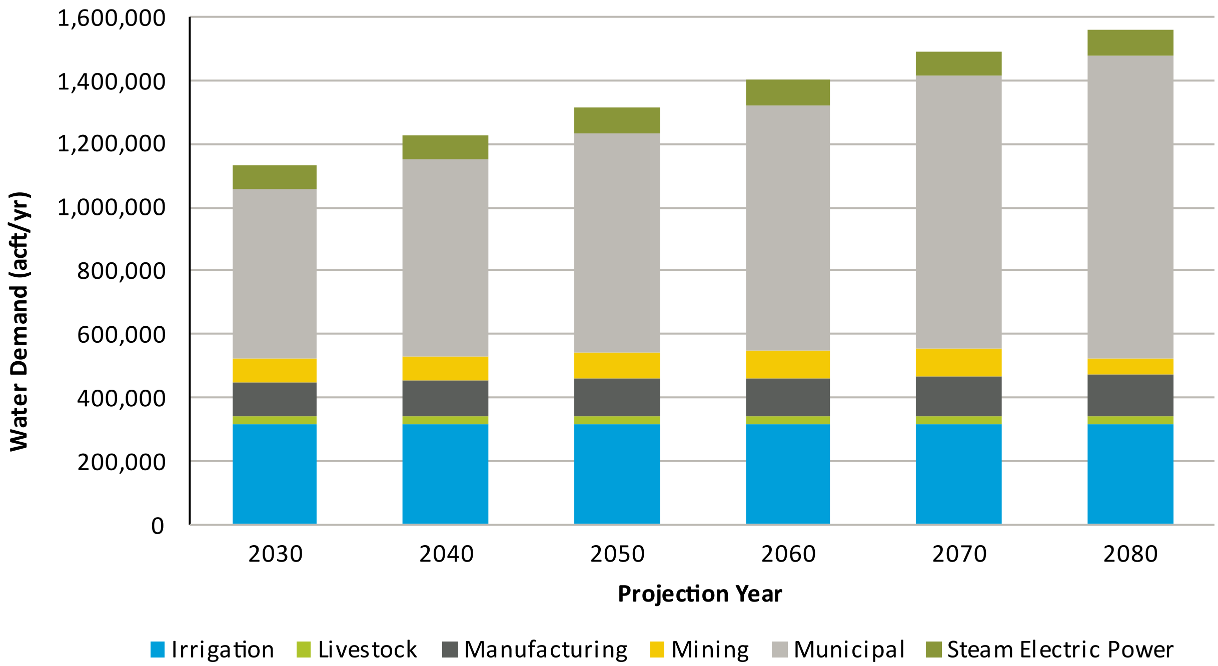

Figure 2-4 Water Demand Projections by Use Sector (2030 to 2080)

2.3.1 Water User Groups

Water demand projections for each WUG within the South Central Texas Region are presented in Appendix 2A. San Antonio Water System, New Braunfels, and Hays County-Other are projected to have the greatest growth in water demands between 2030 and 2080, with increases of 87,633 acft/yr, 70,904 acft/yr, and 23,209 acft/yr, respectively. The WUGs with the greatest percent increase in demands between 2030 and 2080 are Hays County-Other, South Buda WCID 1, and Comal County-Other with percent increases of 1,005%, 534%, and 525%, respectively.

2.3.2 Counties

Water demand projections are summarized by county on Figure 2-5 and in Table 2-6. Bexar, Comal, and Hays Counties are projected to have the greatest growth in water demand volumes between 2030 and 2080, with increases of 107,789 acft/yr, 135,589 acft/yr, and 96,517 acft/yr, respectively. Over the planning horizon, counties with the greatest percent increase in demands are Comal, Hays, and Kendall, growing by 232%, 223%, and 191%, respectively between 2030 and 2080.

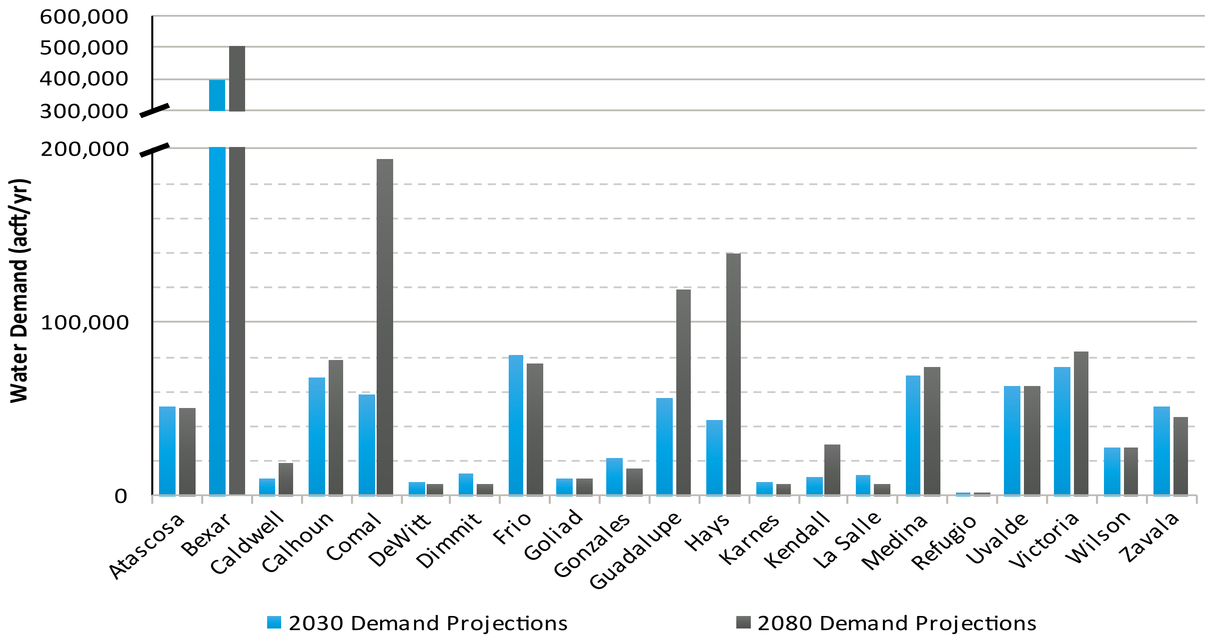

Figure 2-5 Water Demand Projections by County (2030 and 2080)

Table 2-6 Water Demand Projections for Individual Counties (2030 to 2080)

County	Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Atascosa	51,026	51,869	52,764	53,584	54,455	50,215
Bexar	396,152	428,883	451,020	468,589	483,258	503,941
Caldwell	10,019	11,820	13,646	15,439	17,439	18,967
Calhoun	67,994	69,880	71,830	73,857	75,954	78,125
Comal	58,372	76,280	96,597	124,502	157,042	193,961
DeWitt	8,151	8,140	8,125	8,118	8,108	6,412
Dimmit	12,973	12,890	12,803	12,720	12,637	6,412
Frio	81,199	81,534	81,776	81,843	81,917	76,007
Goliad	9,836	9,814	9,803	9,791	9,777	9,761
Gonzales	22,035	22,136	22,196	22,250	22,302	16,183
Guadalupe	56,349	69,418	80,346	91,858	104,977	119,161
Hays*	43,189	60,339	78,814	99,478	118,291	139,706
Karnes	7,417	7,574	7,742	7,932	8,153	6,485
Kendall	10,284	13,140	16,545	20,445	24,885	29,962

County	Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
La Salle	11,768	11,760	11,756	11,750	11,754	6,376
Medina	68,856	71,174	71,959	72,637	73,273	73,731
Refugio	2,311	2,272	2,240	2,216	2,193	2,175
Uvalde	63,276	63,368	63,435	63,475	63,494	63,492
Victoria	74,612	76,401	78,019	79,511	81,048	82,624
Wilson	28,061	28,893	29,760	30,537	31,428	27,829
Zavala	51,091	51,061	51,010	50,957	50,902	45,912
Total	**1,134,971**	**1,228,646**	**1,312,186**	**1,401,489**	**1,493,287**	**1,557,437**

* Hays County is split between Region K and Region L; water demands shown above are for Region L. Hays County water demand totals are 62,581 acft/yr in 2030; 87,220 acft/yr in 2040; 115,456 acft/yr in 2050; 148,881 acft/yr in 2060; 181,784 acft/yr in 2070; and 219,173 acft/yr in 2080.

2.3.3 River and Coastal Basins

Water demand projections for the South Central Texas Region from 2030 to 2080 are summarized by river and coastal basin on Figure 2-6 and in Table 2-7. More than 90% of the water demands in 2030 are in the San Antonio, Nueces, and Guadalupe River basins. Compared to 2030 projected demands, the Guadalupe River Basin water demands in 2080 are expected to increase by 276,591 acft/yr, representing a 115% increase.

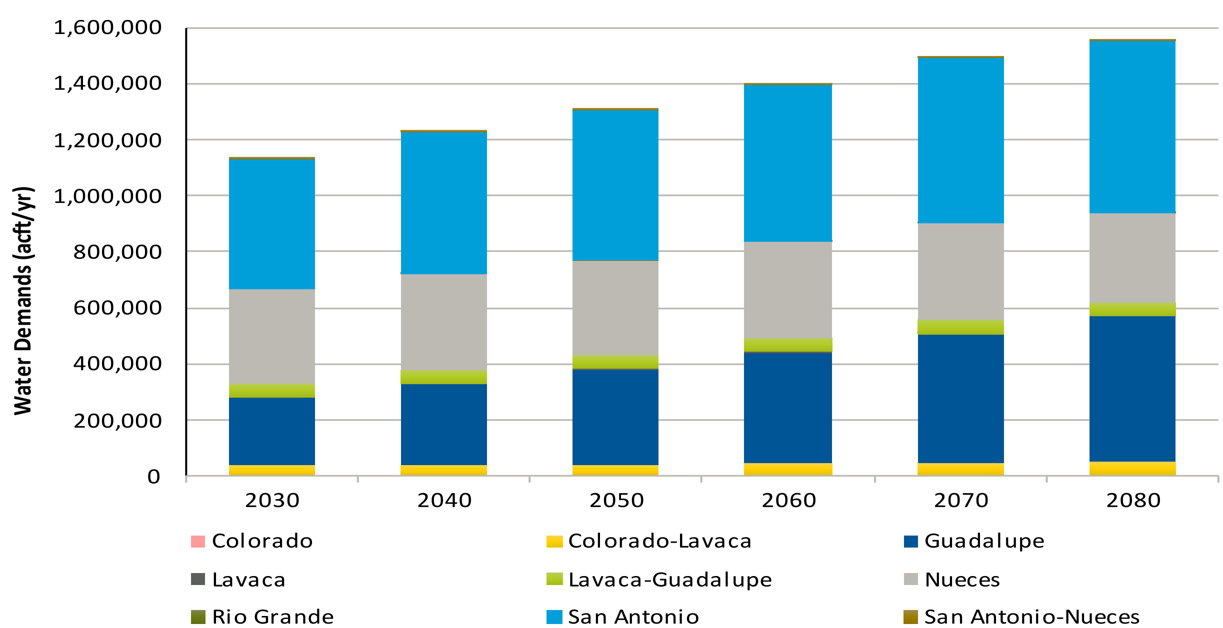

Figure 2-6 Water Demand Projections by River and Coastal Basin (2030 to 2080)

Table 2-7 Water Demand Projections for Individual River and Coastal Basins (2030 to 2080)

Basin	Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Colorado	1,459	2,323	3,230	4,120	5,057	6,042
Colorado-Lavaca	37,227	38,576	39,974	41,426	42,929	44,492
Guadalupe	241,519	288,990	337,440	395,324	456,989	518,110
Lavaca	1,910	1,916	1,923	1,926	1,929	1,478
Lavaca-Guadalupe	46,794	47,408	47,958	48,471	48,997	49,530
Nueces	337,316	339,047	340,585	341,759	342,963	315,890
Rio Grande	1,177	1,177	1,176	1,176	1,175	521
San Antonio	463,648	505,296	535,988	563,368	589,316	617,427
San Antonio-Nueces	3,921	3,913	3,912	3,919	3,932	3,947
Total	**1,134,971**	**1,228,646**	**1,312,186**	**1,401,489**	**1,493,287**	**1,557,437**

2.3.4 Use Type

Water demand projections for the SCTRWPA are categorized by use type, which includes irrigation, livestock, manufacturing, mining, municipal, and steam-electric power. Figure 2-7 shows the water demand projections by use type over the planning horizon, and Table 2-8 shows the projected use sector water demands by volume and as a proportion of the total demands (percent) in 2030, 2050, and 2080. The municipal and manufacturing sectors are expected to increase over the planning horizon; whereas, the irrigation, livestock, and steam-electric power sectors are expected to remain unchanged from 2030 to 2080. The mining sector is expected to experience a gradual increase between 2030 and 2070, then decrease significantly between 2070 and 2080. Further discussion of water demand projections for each use type is provided in the following subsections.

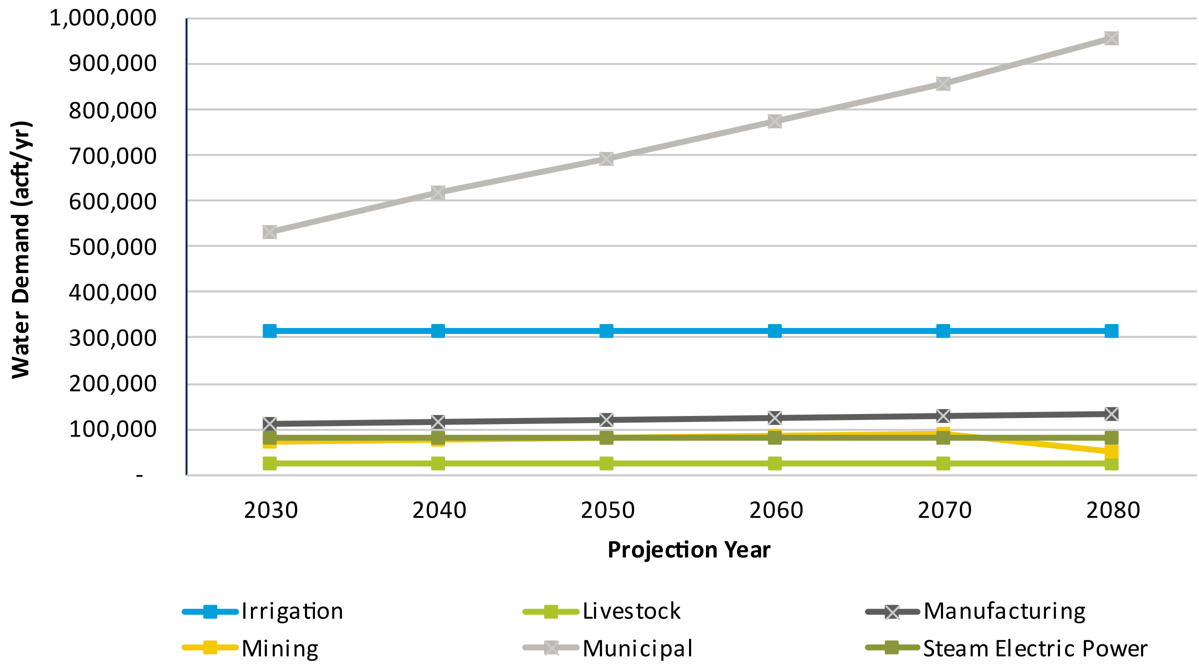

Figure 2-7 Water Demand Projections by Use Type (2030 to 2080)

Table 2-8 Water Demand Projections for Individual Use Types (2030, 2050, and 2080)

Use Type	2030		2050		2080	
	acft/yr	% Total	acft/yr	% Total	acft/yr	% Total
Irrigation	314,645	28%	314,645	24%	314,645	20%
Livestock	24,641	2%	24,641	2%	24,641	2%
Manufacturing	110,929	10%	119,292	9%	133,030	9%
Mining	74,126	7%	81,760	6%	48,880	3%
Municipal	530,751	47%	691,969	53%	956,362	61%
Steam-Electric Power	79,879	7%	79,879	6%	79,879	5%
Total	**1,134,971**	**100%**	**1,312,186**	**100%**	**1,557,437**	**100%**

2.3.4.1 Irrigation Water Demand Projections

In 2030, irrigated agriculture is projected to account for approximately 28% of the total water use in the SCTRWPA. It is projected that approximately 314,645 acft/yr of water will be used to grow a variety of crops ranging from food and feed grains to fruits, vegetables, and cotton throughout the planning horizon. It is projected that water used for irrigation purposes will remain constant throughout the planning period.

Figure 2-8 provides a summary of irrigation water demands by decade. Table 2-9 and Table 2-10 summarize irrigation water demand projections for individual counties and for individual river and coastal basins, respectively.

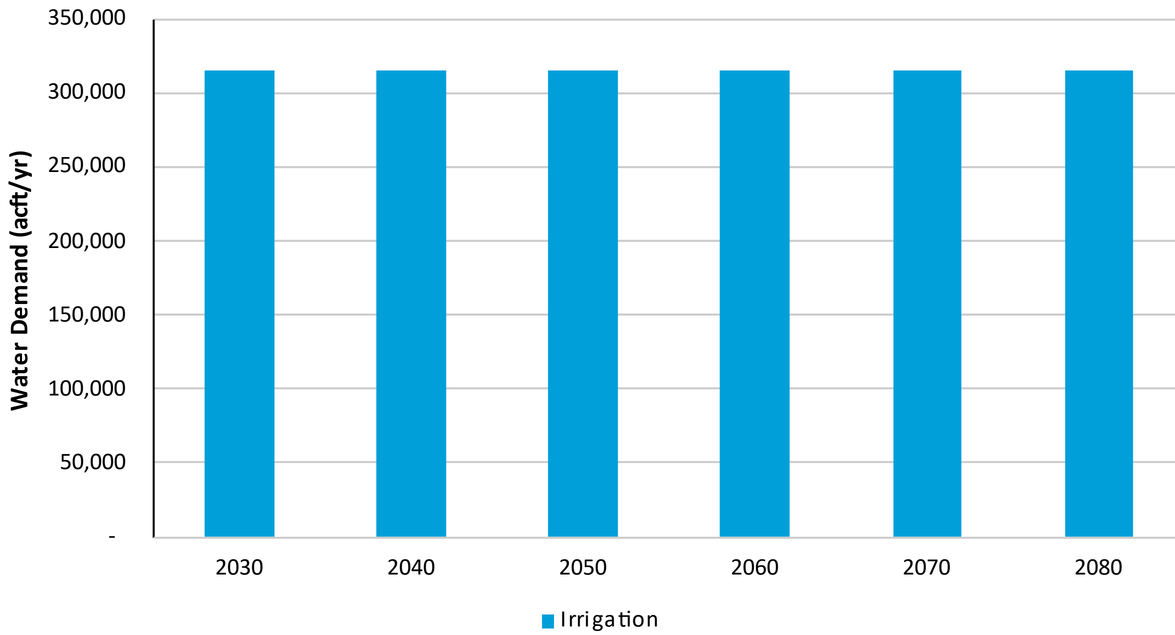

Figure 2-8 Irrigation Water Demand Projections (2030 to 2080)

Table 2-9 Irrigation Water Demand Projections for Individual Counties (2030 to 2080)

County	Irrigation Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Atascosa	25,441	25,441	25,441	25,441	25,441	25,441
Bexar	11,751	11,751	11,751	11,751	11,751	11,751
Caldwell	680	680	680	680	680	680
Calhoun	10,460	10,460	10,460	10,460	10,460	10,460
Comal	591	591	591	591	591	591
DeWitt	590	590	590	590	590	590
Dimmit	4,689	4,689	4,689	4,689	4,689	4,689
Frio	70,567	70,567	70,567	70,567	70,567	70,567
Goliad	3,126	3,126	3,126	3,126	3,126	3,126
Gonzales	4,478	4,478	4,478	4,478	4,478	4,478
Guadalupe	942	942	942	942	942	942
Hays*	130	130	130	130	130	130

County	Irrigation Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Karnes	915	915	915	915	915	915
Kendall	461	461	461	461	461	461
La Salle	4,461	4,461	4,461	4,461	4,461	4,461
Medina	54,809	54,809	54,809	54,809	54,809	54,809
Refugio	867	867	867	867	867	867
Uvalde	52,703	52,703	52,703	52,703	52,703	52,703
Victoria	11,092	11,092	11,092	11,092	11,092	11,092
Wilson	13,318	13,318	13,318	13,318	13,318	13,318
Zavala	42,574	42,574	42,574	42,574	42,574	42,574
Total	**314,645**	**314,645**	**314,645**	**314,645**	**314,645**	**314,645**

* Hays County is split between Region K and Region L; water demands shown above are for Region L.

Table 2-10 Irrigation Water Demand Projections for Individual River and Coastal Basins (2030 to 2080)

Basin	Irrigation Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Colorado	19	19	19	19	19	19
Colorado-Lavaca	525	525	525	525	525	525
Guadalupe	9,073	9,073	9,073	9,073	9,073	9,073
Lavaca	337	337	337	337	337	337
Lavaca-Guadalupe	19,702	19,702	19,702	19,702	19,702	19,702
Nueces	254,046	254,046	254,046	254,046	254,046	254,046
Rio Grande	497	497	497	497	497	497
San Antonio	29,147	29,147	29,147	29,147	29,147	29,147
San Antonio-Nueces	1,299	1,299	1,299	1,299	1,299	1,299
Total	**314,645**	**314,645**	**314,645**	**314,645**	**314,645**	**314,645**

2.3.4.2 Livestock Water Demand Projections

In 2022, Texas livestock production was valued at approximately $24 billion, which was more than double the value of crops produced in the state during that year.[2] Although livestock production is a key component of the regional economy, the industry consumes a relatively small amount of water. In 2030, it is projected that water use in the South Central Texas Region for livestock purposes will be 24,757 acft/yr. It is projected that water used for livestock purposes will remain constant throughout the planning period.

Figure 2-9 provides a summary of irrigation water demands by decade. Table 2-11 and Table 2-12 summarize livestock water demand projections for individual counties and for individual river and coastal basins, respectively.

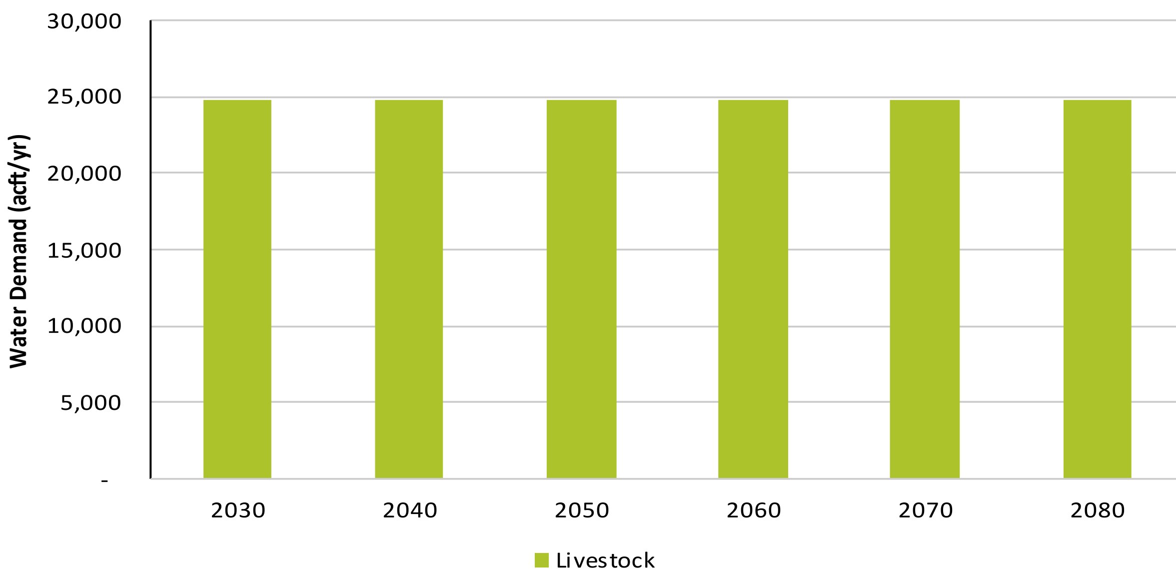

Figure 2-9 Livestock Water Demand Projections (2030 to 2080)

Table 2-11 Livestock Water Demand Projections for Individual Counties (2030 to 2080)

County	Livestock Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Atascosa	1,537	1,537	1,537	1,537	1,537	1,537
Bexar	988	988	988	988	988	988
Caldwell	831	831	831	831	831	831
Calhoun	282	282	282	282	282	282
Comal	271	271	271	271	271	271
DeWitt	1,736	1,736	1,736	1,736	1,736	1,736
Dimmit	367	367	367	367	367	367

[2] https://www.texasagriculture.gov/About/TexasAgStats.aspx

County	Livestock Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Frio	964	964	964	964	964	964
Goliad	789	789	789	789	789	789
Gonzales	4,138	4,138	4,138	4,138	4,138	4,138
Guadalupe	1,179	1,179	1,179	1,179	1,179	1,179
Hays (part)*	2,828	2,828	2,828	2,828	2,828	2,828
Karnes	954	954	954	954	954	954
Kendall	388	388	388	388	388	388
La Salle	394	394	394	394	394	394
Medina	1,058	1,058	1,058	1,058	1,058	1,058
Refugio	461	461	461	461	461	461
Uvalde	2,049	2,049	2,049	2,049	2,049	2,049
Victoria	979	979	979	979	979	979
Wilson	1,709	1,709	1,709	1,709	1,709	1,709
Zavala	855	855	855	855	855	855
Total	**24,757**	**24,757**	**24,757**	**24,757**	**24,757**	**24,757**
* Hays County is split between Region K and Region L; water demands shown above are for Region L.						

Table 2-12 Livestock Water Demand Projections for Individual River and Coastal Basins (2030 to 2080)

Basin	Livestock Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Colorado	159	159	159	159	159	159
Colorado-Lavaca	45	45	45	45	45	45
Guadalupe	11,252	11,252	11,252	11,252	11,252	11,252
Lavaca	307	307	307	307	307	307
Lavaca-Guadalupe	745	745	745	745	745	745
Nueces	7,371	7,371	7,371	7,371	7,371	7,371
Rio Grande	23	23	23	23	23	23
San Antonio	4,106	4,106	4,106	4,106	4,106	4,106
San Antonio-Nueces	749	749	749	749	749	749
Total	**24,757**	**24,757**	**24,757**	**24,757**	**24,757**	**24,757**

2.3.4.3 Manufacturing Water Demand Projections

The use of water for the production of goods for domestic and foreign markets varies widely among manufacturing industries in Texas. Manufactured products in Texas range from food and clothing to refined chemical and petroleum products to computers and automobiles. Some processes require direct consumption of water as part of the products being manufactured, while others require little water consumption, but large volumes of water for cooling or cleaning purposes.

Manufacturing accounts for approximately 10% of the total water demands in the SCTRWPA. Major water users in the manufacturing sector in the SCTRWPA include chemical manufacturing, primary metal manufacturing, food manufacturing, and nonmetallic mineral product manufacturing. All industries in the region are projected to use 110,929 acft/yr of water in 2030 and 133,030 acft/yr in 2080, representing a 20% increase (Figure 2-10, Table 2-13, and Table 2-14).

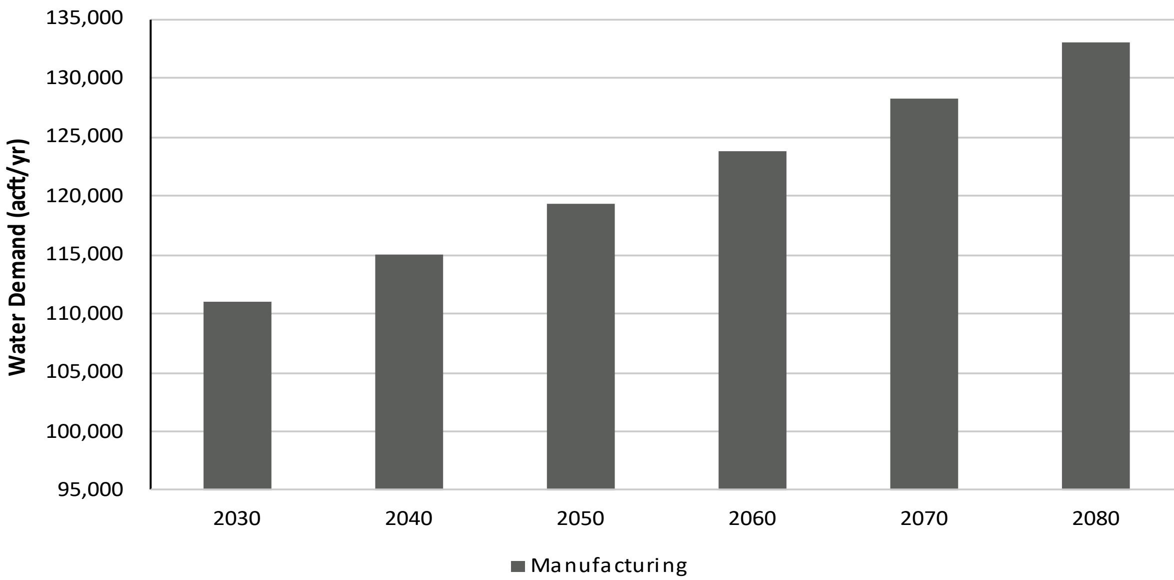

Figure 2-10 Manufacturing Water Demand Projections (2030 to 2080)

Table 2-13 Manufacturing Water Demand Projections for Individual Counties (2030 to 2080)

County	Manufacturing Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Atascosa	56	58	60	62	64	66
Bexar	8,873	9,201	9,541	9,894	10,260	10,640
Caldwell	14	15	16	17	18	19
Calhoun	54,587	56,607	58,701	60,873	63,125	65,461
Comal	901	934	969	1,005	1,042	1,080
DeWitt	248	257	267	277	287	298
Dimmit	-	-	-	-	-	-

County	Manufacturing Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Frio	-	-	-	-	-	-
Goliad	-	-	-	-	-	-
Gonzales	2,311	2,397	2,486	2,578	2,673	2,772
Guadalupe	3,526	3,656	3,792	3,932	4,078	4,229
Hays*	57	59	61	63	65	67
Karnes	69	72	75	78	81	84
Kendall	46	48	50	52	54	56
La Salle	-	-	-	-	-	-
Medina	15	16	17	18	19	20
Refugio	-	-	-	-	-	-
Uvalde	-	-	-	-	-	-
Victoria	39,432	40,891	42,404	43,973	45,600	47,287
Wilson	62	64	66	68	71	74
Zavala	732	759	787	816	846	877
Total	**110,929**	**115,034**	**119,292**	**123,706**	**128,283**	**133,030**
* Hays County is split between Region K and Region L; water demands shown above are for Region L.						

Table 2-14 Manufacturing Water Demand Projections for Individual River and Coastal Basins (2030 to 2080)

Basin	Manufacturing Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Colorado	-	-	-	-	-	-
Colorado-Lavaca	36,503	37,854	39,254	40,707	42,213	43,776
Guadalupe	45,245	46,919	48,657	50,458	52,325	54,261
Lavaca	239	248	258	267	277	287
Lavaca-Guadalupe	17,262	17,901	18,563	19,250	19,962	20,700
Nueces	944	980	1,016	1,054	1,092	1,132
Rio Grande	-	-	-	-	-	-
San Antonio	9,914	10,280	10,660	11,054	11,464	11,889
San Antonio-Nueces	822	852	884	916	950	985
Total	**110,929**	**115,034**	**119,292**	**123,706**	**128,283**	**133,030**

2.3.4.4 Mining Water Demand Projections

Although the Texas mining industry is a leader in the production of crude petroleum and natural gas in the United States, it also produces a wide variety of important non-fuel minerals. Texas is the only state to produce native asphalt and is the leading producer nationally of Frasch-mined sulfur. It is also one of the leading states in the production of clay, gypsum, lime, salt, stone, and aggregate.

According to the TWDB Mining Water Use Report [3], water used for mining in Texas is projected to increase by 2060, because of steady demands for hydraulic fracturing water, gradual increases in demands for aggregates, and decreased coal mining use. In the SCTRWPA, the principal uses of water for mining are for the extraction of stone, clay, petroleum, and natural gas and for sand and gravel washing. Many counties in the SCTRWPA are part of the Eagle Ford Shale production area, which primarily relies of the Carrizo-Wilcox Aquifer as a source of freshwater. Water use associated with the SCTRWPA is projected to gradually increase through 2070 and then decline significantly in 2080. The growth in demand until 2070 reflects anticipated steady demand of hydraulic fracturing use, increases in aggregates industry demand as populations increase, and declines in coal use. The sharp decline in mining demands in 2080 represent declines in hydraulic fracturing water use demands as oil and gas plays mature.

Mining water demands in the South Central Texas Region are projected to be 74,126 acft/yr in 2030 and decrease to 48,880 acft/yr in 2080, a decrease of more than 34% (Figure 2-11, Table 2-15, and Table 2-16).

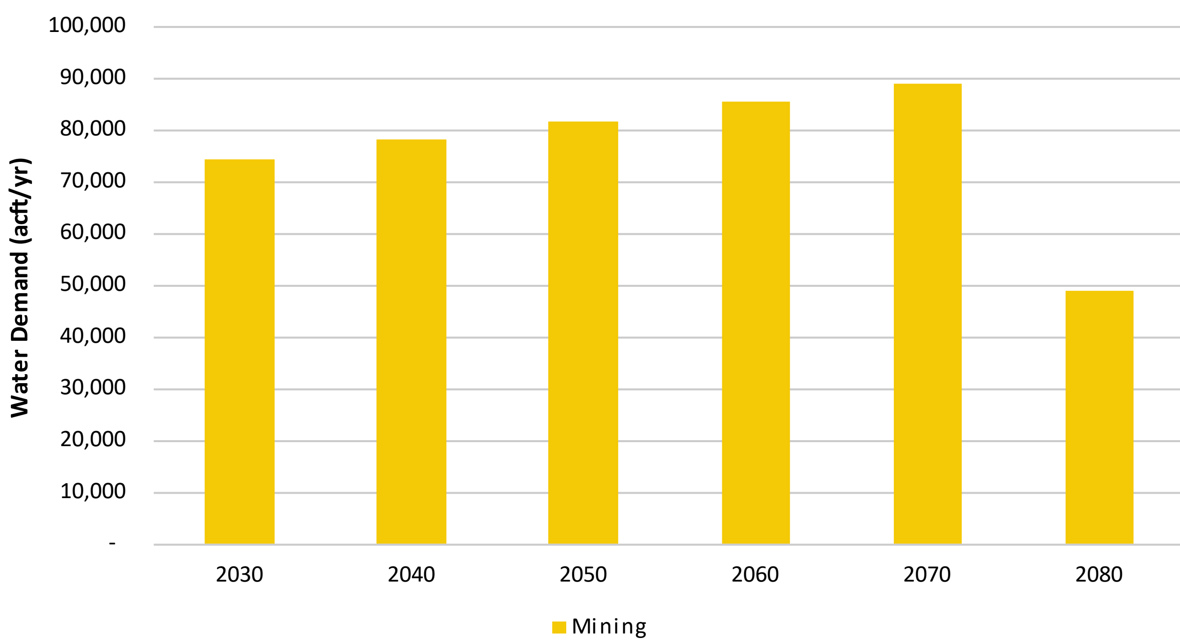

Figure 2-11 Mining Water Demand Projections (2030 to 2080)

[3] TWDB. 2022 Mining Water Use Study. https://www.twdb.texas.gov/waterplanning/data/projections/MiningStudy/index.asp

Table 2-15 Mining Water Demand Projections for Individual Counties (2030 to 2080)

County	Mining Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Atascosa	8,039	8,352	8,658	8,947	9,217	4,281
Bexar	7,634	8,366	9,072	9,724	10,322	10,851
Caldwell	352	352	352	352	352	2
Calhoun	0	0	0	0	0	0
Comal	12,013	14,130	16,264	18,386	20,432	22,314
DeWitt	1,695	1,695	1,695	1,695	1,695	8
Dimmit	6,146	6,146	6,146	6,146	6,146	3
Frio	6,002	6,003	6,003	6,004	6,004	10
Goliad	8	8	8	8	8	8
Gonzales	6,592	6,625	6,663	6,701	6,740	606
Guadalupe	770	770	770	770	770	0
Hays (part)*	30	37	43	51	61	71
Karnes	1,919	1,919	1,919	1,919	1,919	3
Kendall	0	0	0	0	0	0
La Salle	5,396	5,396	5,396	5,396	5,396	0
Medina	4,324	4,718	5,065	5,380	5,657	5,886
Refugio	0	0	0	0	0	0
Uvalde	3,204	3,423	3,650	3,866	4,074	4,271
Victoria	390	409	426	439	451	460
Wilson	4,680	4,690	4,698	4,707	4,714	105
Zavala	4,932	4,932	4,932	4,932	4,932	1
Total	**74,126**	**77,971**	**81,760**	**85,423**	**88,890**	**48,880**
* Hays County is split between Region K and Region L; water demands shown above are for Region L.						

Table 2-16 Mining Water Demand Projections for Individual River and Coastal Basins (2030 to 2080)

Basin	Mining Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Colorado	0	0	0	0	0	0
Colorado-Lavaca	0	0	0	0	0	0
Guadalupe	21,276	23,449	25,641	27,819	29,923	23,422
Lavaca	482	484	487	489	492	42
Lavaca-Guadalupe	0	0	0	0	0	0
Nueces	38,210	39,088	39,923	40,704	41,423	13,709
Rio Grande	653	653	653	653	653	0
San Antonio	13,505	14,297	15,056	15,758	16,399	11,707
San Antonio-Nueces	0	0	0	0	0	0
Total, Region L	**74,126**	**77,971**	**81,760**	**85,423**	**88,890**	**48,880**

2.3.4.5 Municipal Water Demand Projections

Municipal water demand is primarily for drinking, bathing, dish and clothes washing, cleaning, sanitation, air conditioning, and landscape watering for residential and commercial establishments and public offices and institutions. Residential and commercial uses are categorized together under the Municipal Use Type because they are provided treated drinking water from a common system (e.g., a public water system). The projected quantity of water needed for municipal purposes depends on the size of the population of the service area, climatic conditions, and water conservation measures. In addition to these factors, per capita water use (gallons per person per day of water use) is a key municipal water planning parameter. Population and per capita water use are used to estimate municipal water demand projections for each of the 144 municipal WUGs in the SCTRWPA. Appendix 2A provides water demand projections and per capita water use for individual WUGs in the SCTRWPA.

The objective of municipal water conservation programs is to reduce the per capita water use parameter without adversely affecting the quality of life of the people involved. For municipal water supplies, this is primarily achieved with use of passive water conservation efforts from plumbing code savings, such as low flow plumbing fixtures (e.g., toilets and shower heads that are designed for low quantities of flow per unit of use). Expected water-efficiency savings (passive conservation) are incorporated into the current TWDB municipal water demand projections and include estimated or anticipated savings due to state and federal specifications for fixture and appliance design. The savings projected by the TWDB include complete replacement of existing plumbing fixtures to water-efficient fixtures by the 2040 decade. The projections also assume that all new construction includes water-efficient plumbing fixtures. Table 2-17 summarizes county water savings due to plumbing code savings that were incorporated in the development of the South Central Texas Region's municipal water demand projections, and Table 2-18 summarizes water savings for individual river and coastal basins. Appendix 2A includes passive conservation water savings from plumbing code savings for each municipal WUG in the SCTRWPA.

Table 2-17 Passive Conservation Water Savings from Plumbing Code Savings for Individual Counties (2030 to 2080)

County	Passive Conservation Water Savings (acft/yr)					
	2030	2040	2050	2060	2070	2080
Atascosa	263	349	395	444	496	544
Bexar	11,578	27,781	39,624	53,056	67,222	77,349
Caldwell	333	467	566	658	762	853
Calhoun	104	113	108	102	96	89
Comal	1,227	1,843	2,359	3,116	4,036	5,079
DeWitt	105	119	118	117	117	117
Dimmit	43	47	45	41	38	36
Frio	99	117	120	122	124	126
Goliad	36	40	39	37	37	37
Gonzales	101	114	113	111	110	105
Guadalupe	1,436	2,113	2,525	2,962	3,456	4,023
Hays*	2,368	4,111	6,044	7,769	9,306	10,455
Karnes	80	91	97	102	108	113
Kendall	279	394	496	619	757	916
La Salle	35	40	39	37	37	34
Medina	302	537	649	772	904	962
Refugio	35	37	35	34	33	33
Uvalde	132	146	143	137	133	125
Victoria	500	579	583	579	575	573
Wilson	275	341	376	403	435	472
Zavala	48	53	51	49	46	44
Total	**19,379**	**39,432**	**54,525**	**71,267**	**88,828**	**102,085**
* Hays County is split between Region K and Region L; water savings shown above are for Region L.						

Table 2-18 Passive Conservation Water Savings from Plumbing Code Savings for Individual River and Coastal Basins (2030 to 2080)

Basin	Passive Conservation Water Savings (acft/yr)					
	2030	2040	2050	2060	2070	2080
Colorado	67	126	179	229	283	338
Colorado-Lavaca	7	8	8	8	8	8
Guadalupe	5,265	8,238	10,987	13,753	16,526	19,061
Lavaca	19	21	21	20	20	20
Lavaca-Guadalupe	269	305	302	294	287	280
Nueces	840	1,062	1,157	1,247	1,350	1,432
Rio Grande	0	0	0	0	0	0
San Antonio	12,875	29,632	41,834	55,680	70,319	80,911
San Antonio-Nueces	37	40	37	36	35	35
Total	**19,379**	**39,432**	**54,525**	**71,267**	**88,828**	**102,085**

According to regional water demand projections adopted by the TWDB, per capita water use in the SCTRWPA is projected to decline over the planning period from 119 gallons per capita per day (GPCD) in year 2030 to 111 GPCD in 2080. However, because of projected population growth between 2030 and 2080, municipal water demand in the SCTRWPA is projected to increase from 530,751 acft/yr in 2030 to 956,362 acft/yr in 2080 (Figure 2-12, Table 2-19, and Table 2-20). Because Bexar County has the highest population (417,418 acft/yr in 2080), it also has the largest projected water demand, with almost 44% of the total projected municipal water demand for the region by the year 2080 (Table 2-19).

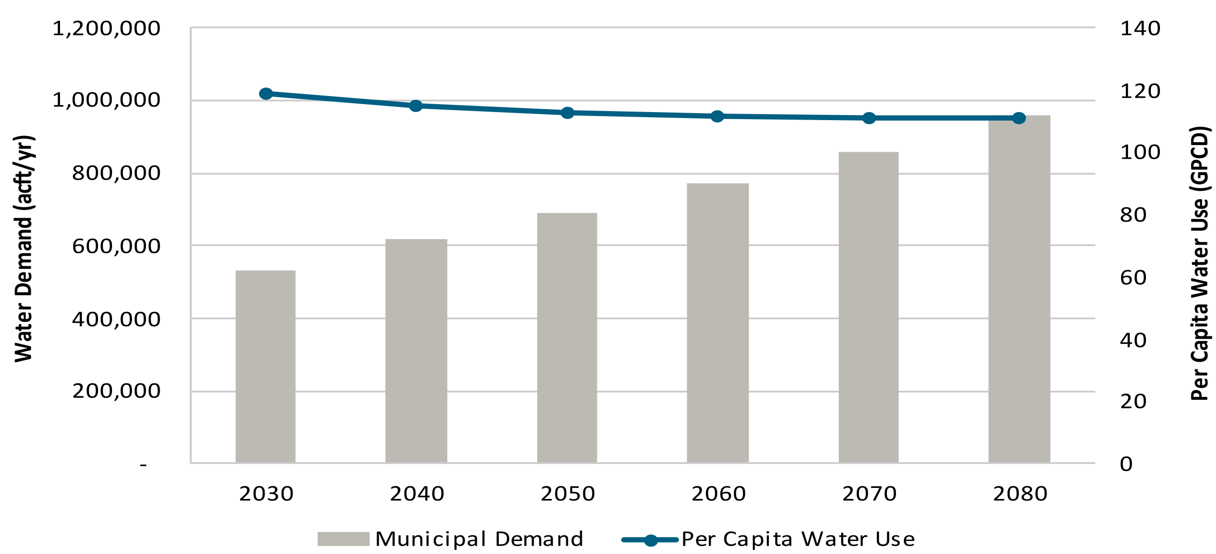

Figure 2-12 Projected Per Capita Water Use and Municipal Water Demand

Table 2-19 Municipal Water Demand Projections for Individual Counties (2030 to 2080)

County	Municipal Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Atascosa	7,991	8,519	9,106	9,635	10,234	10,928
Bexar	314,613	346,284	367,375	383,939	397,644	417,418
Caldwell	8,142	9,942	11,767	13,559	15,558	17,435
Calhoun	2,628	2,494	2,350	2,205	2,050	1,885
Comal	44,596	60,354	78,502	104,249	134,706	169,705
DeWitt	3,882	3,862	3,837	3,820	3,800	3,780
Dimmit	1,771	1,688	1,601	1,518	1,435	1,353
Frio	3,612	3,946	4,188	4,254	4,328	4,412
Goliad	919	897	886	874	860	844
Gonzales	4,516	4,498	4,431	4,355	4,273	4,189
Guadalupe	40,540	53,479	64,271	75,643	88,616	103,419
Hays*	38,311	55,452	73,919	94,573	113,374	134,777
Karnes	3,560	3,714	3,879	4,066	4,284	4,529
Kendall	9,389	12,243	15,646	19,544	23,982	29,057
La Salle	1,517	1,509	1,505	1,499	1,503	1,521
Medina	8,650	10,573	11,010	11,372	11,730	11,958
Refugio	983	944	912	888	865	847
Uvalde	5,320	5,193	5,033	4,857	4,668	4,469
Victoria	19,521	19,832	19,920	19,830	19,728	19,608
Wilson	8,292	9,112	9,969	10,735	11,616	12,623
Zavala	1,998	1,941	1,862	1,780	1,695	1,605
Total	**530,751**	**616,476**	**691,969**	**773,195**	**856,949**	**956,362**

* Hays County is split between Region K and Region L; water demands shown above are for Region L.

Table 2-20 Municipal Water Demand Projections for Individual River and Coastal Basins (2030 to 2080)

Basin	Municipal Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Colorado	1,397	2,261	3,168	4,058	4,995	5,980
Colorado-Lavaca	117	115	113	112	109	109
Guadalupe	135,140	178,764	223,284	277,189	334,883	400,569
Lavaca	545	540	534	526	516	505
Lavaca-Guadalupe	9,085	9,060	8,948	8,774	8,588	8,383
Nueces	28,729	29,546	30,213	30,568	31,015	31,616
Rio Grande	4	4	3	3	2	1
San Antonio	354,683	395,173	424,726	451,010	475,907	508,285
San Antonio-Nueces	1,051	1,013	980	955	934	914
Total	**530,751**	**616,476**	**691,969**	**773,195**	**856,949**	**956,362**

2.3.4.6 Steam-Electric Power Water Demand Projections

These changes range from increases in renewables capacity, mostly wind and solar, declines in coal fired and natural gas fired power plants, increased generation efficiency and cooling systems, carbon capture activities, and changes to federal environmental and regulatory policies. These shifts will likely impact how and where power is generated, and the quantities of water needed.

Water demand projections for steam-electric power include volumes consumed by operable power generation facilities that sell power on the open market. The demands exclude facilities or water use projections that are included in manufacturing water demand projections. In the SCTRWPA, the following counties have non-zero steam-electric power generation water demands: Atascosa, Bexar, Calhoun, Frio, Goliad, Guadalupe, Hays, and Victoria Counties.

It is projected that water used for steam-electric power purposes will remain constant throughout the planning period (Figure 2-13, Table 2-21, and Table 2-22). Water demand for steam-electric power generation in the SCTRWPA is projected to be 79,879 acft/yr in 2030 to 2080.

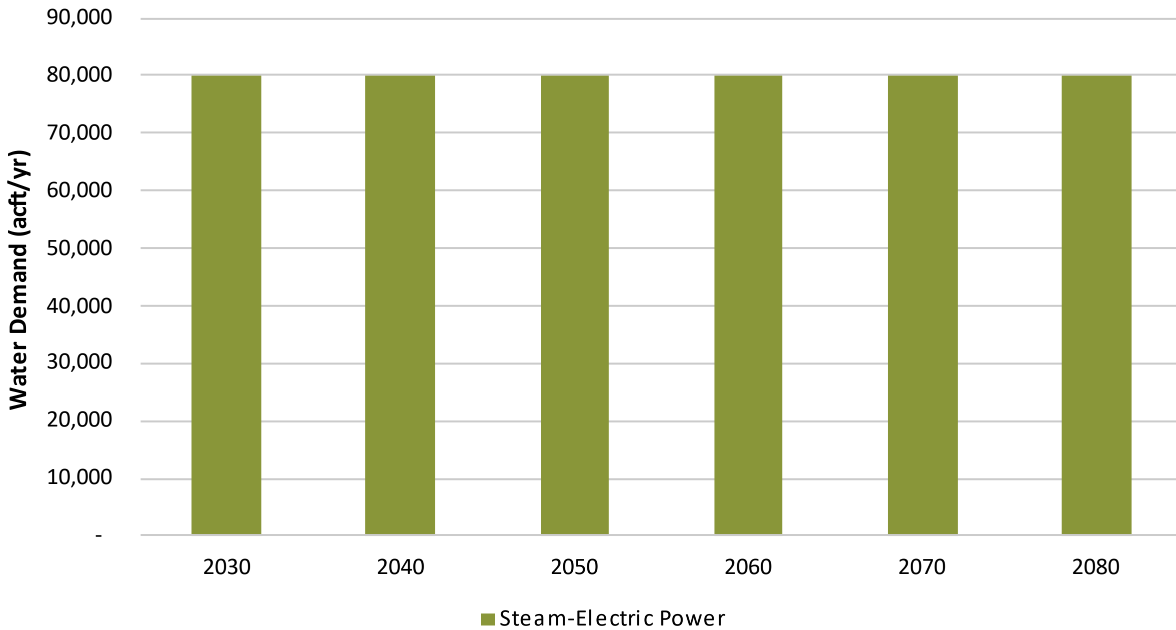

Figure 2-13 Steam-Electric Power Water Demand Projections (2030 to 2080)

Table 2-21 Steam-Electric Power Water Demand Projections for Individual Counties (2030 to 2080)

County	Steam-Electric Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Atascosa	7,962	7,962	7,962	7,962	7,962	7,962
Bexar	52,293	52,293	52,293	52,293	52,293	52,293
Caldwell	0	0	0	0	0	0
Calhoun	37	37	37	37	37	37
Comal	0	0	0	0	0	0
DeWitt	0	0	0	0	0	0
Dimmit	0	0	0	0	0	0
Frio	54	54	54	54	54	54
Goliad	4,994	4,994	4,994	4,994	4,994	4,994
Gonzales	0	0	0	0	0	0
Guadalupe	9,392	9,392	9,392	9,392	9,392	9,392
Hays (part)*	1,949	1,949	1,949	1,949	1,949	1,949
Karnes	0	0	0	0	0	0
Kendall	0	0	0	0	0	0

County	Steam-Electric Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
La Salle	0	0	0	0	0	0
Medina	0	0	0	0	0	0
Refugio	0	0	0	0	0	0
Uvalde	0	0	0	0	0	0
Victoria	3,198	3,198	3,198	3,198	3,198	3,198
Wilson	0	0	0	0	0	0
Zavala	0	0	0	0	0	0
Total	**79,879**	**79,879**	**79,879**	**79,879**	**79,879**	**79,879**
* Hays County is split between Region K and Region L; water demands shown above are for Region L.						

Table 2-22 Steam-Electric Power Water Demand Projections for Individual River and Coastal Basins (2030 to 2080)

Basin	Steam-Electric Water Demand Projections (acft/yr)					
	2030	2040	2050	2060	2070	2080
Colorado	-	-	-	-	-	-
Colorado-Lavaca	37	37	37	37	37	37
Guadalupe	19,533	19,533	19,533	19,533	19,533	19,533
Lavaca	-	-	-	-	-	-
Lavaca-Guadalupe	-	-	-	-	-	-
Nueces	8,016	8,016	8,016	8,016	8,016	8,016
Rio Grande	-	-	-	-	-	-
San Antonio	52,293	52,293	52,293	52,293	52,293	52,293
San Antonio-Nueces	-	-	-	-	-	-
Total	**79,879**	**79,879**	**79,879**	**79,879**	**79,879**	**79,879**

2.3.5 Major Water Providers

As described in Subsection 2.2.4, the SCTRWPG identified five WUGs and/or WWPs as MWPs. Water demand projections for MWPs are provided in Table 2-23. Water demands are distinguished between WUG demands and contract demands. WUG demands represent the gross volume of water minus water that the WUG must provide to other entities. Contract demands represent contractual obligations to sell water to other entities.

MWPs may be classified as WUGs, WWPs, or WUGs/WWPs, and are distinguished as follows:

- WUG: Has only WUG demands and do not have contract demands.
- WWP: Has only contract demands and do not have WUG demands.
- WUG/WWP: Typically has both WUG demands and contract demands.

Table 2-23 Water Demand Projections for Major Water Providers (2030 to 2080) (acft/yr)

Major Water Provider (Provider Type)	Use Type	2030	2040	2050	2060	2070	2080
Canyon Lake Water Service (Texas Water Company) (WUG/WWP) [1]	**Total**	**12,172**	**16,364**	**19,052**	**20,795**	**27,317**	**34,514**
WUG Demands	Municipal	11,572	15,764	18,452	20,195	26,717	33,914
Contract Demands	Municipal	600	600	600	600	600	600
GBRA (WUG/WWP) [2]	**Total**	**141,803**	**138,343**	**138,285**	**138,229**	**138,165**	**138,093**
WUG Demands	Municipal	1,410	1,950	1,892	1,836	1,772	1,700
Contract Demands	Irrigation	464	464	464	464	464	464
Contract Demands	Manufacturing	29,584	29,584	29,584	29,584	29,584	29,584
Contract Demands	Municipal	91,303	87,303	87,303	87,303	87,303	87,303
Contract Demands	Steam-Electric	6,429	6,429	6,429	6,429	6,429	6,429
Contract Demands	WWP	12,613	12,613	12,613	12,613	12,613	12,613
New Braunfels (WUG/WWP)	**Total**	**29,111**	**40,936**	**56,116**	**74,565**	**95,682**	**119,858**
WUG Demands	Municipal	28,111	39,936	55,116	73,565	94,682	118,858
Contract Demands	Municipal	1,000	1,000	1,000	1,000	1,000	1,000
San Marcos (WUG/WWP)	**Total**	**17,396**	**23,946**	**28,814**	**32,409**	**34,552**	**36,174**
WUG Demands	Municipal	17,396	23,946	28,814	32,409	34,552	36,174
Contract Demands	--	--	--	--	--	--	--

Major Water Provider (Provider Type)	Use Type	2030	2040	2050	2060	2070	2080
SAWS (WUG/WWP)	**Total**	**321,119**	**349,309**	**367,669**	**381,961**	**393,080**	**409,761**
WUG Demands	Municipal	268,649	298,339	316,699	330,991	342,110	358,791
Contract Demands	Municipal	2,470	970	970	970	970	970
Contract Demands	Steam-Electric	50,000	50,000	50,000	50,000	50,000	50,000

[1] Canyon Lake Water Service (Texas Water Company) is split between Region K and Region L; WUG demand projections shown above are for Region L only. WUG demand projections for all regions are 11,947 acft/yr in 2030; 16,145 acft/yr in 2040; 18,839 acft/yr in 2050; 20,588 acft/yr in 2060; 27,112 acft/yr in 2070; and 34,309 acft/yr in 2080. Contract demands are representative of contracts with entities in any region.

[2] GBRA WUG demands are all located within Region L; however, contract demands are representative of contracts with entities in any region.

2.4 Contractual Obligations for Water User Groups and Wholesale Water Providers

An evaluation of current contractual obligations of WUGs and WWPs in the SCTRWPA was performed to identify obligations of water to be supplied to other entities. The evaluation consisted of collecting information from all WWPs and certain WUGs regarding current contracts, volumes, and duration of those contracts. Results of the evaluation were incorporated into DB27 and used in subsequent chapters to estimate surpluses and needs, and to identify water supply plans to meet needs in the SCTRWPA. A summary of contractual obligations is provided in Appendix 2A.

Appendix 2A: Relevant Reports from the 2027 Regional and State Water Planning Database (DB27)

DRAFT Region L Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
Atascosa County Total	**53,324**	**57,374**	**61,473**	**64,960**	**68,952**	**73,522**
Atascosa County / Nueces Basin Total	**51,265**	**55,077**	**58,949**	**62,280**	**66,094**	**70,456**
Benton City WSC	12,461	13,936	15,334	16,283	17,380	18,641
Charlotte	1,235	1,127	1,054	1,084	1,114	1,145
El Oso WSC*	106	128	148	158	170	185
Jourdanton	4,958	5,239	5,540	5,840	6,182	6,572
Lytle	2,628	2,779	2,941	3,100	3,282	3,489
McCoy WSC*	7,741	8,082	8,470	8,913	9,417	9,989
Pleasanton	12,414	13,521	14,726	16,038	17,467	19,025
Poteet	2,734	2,447	2,244	2,297	2,351	2,403
San Antonio Water System	6,103	6,634	7,037	7,603	8,118	8,695
County-Other	885	1,184	1,455	964	613	312
Atascosa County / San Antonio Basin Total	**2,059**	**2,297**	**2,524**	**2,680**	**2,858**	**3,066**
Benton City WSC	1,965	2,197	2,418	2,568	2,740	2,939
Lytle	68	72	76	80	84	90
San Antonio Water System	26	28	30	32	34	37
Bexar County Total	**2,555,076**	**2,951,404**	**3,222,978**	**3,470,641**	**3,699,975**	**3,945,495**
Bexar County / Nueces Basin Total	**10,515**	**12,233**	**13,462**	**14,538**	**15,557**	**16,552**
Atascosa Rural WSC	839	977	1,101	1,209	1,333	1,475
Lytle	242	273	300	325	352	385
San Antonio Water System	9,340	10,820	11,827	12,752	13,596	14,495
County-Other	94	163	234	252	276	197
Bexar County / San Antonio Basin Total	**2,544,561**	**2,939,171**	**3,209,516**	**3,456,103**	**3,684,418**	**3,928,943**
Air Force Village II Inc	536	536	536	536	536	536
Alamo Heights	7,806	7,806	7,806	7,806	7,806	7,806
Atascosa Rural WSC	12,539	14,605	16,457	18,069	19,919	22,042
Bexar County WCID 10	6,201	7,001	7,717	8,355	9,086	9,922
Converse	28,362	28,398	28,398	28,398	28,398	28,398
East Central SUD	45,458	51,420	56,763	61,513	66,950	73,173
Elmendorf	4,013	5,382	7,210	9,683	12,059	16,657
Fair Oaks Ranch	5,506	6,117	6,422	6,544	6,575	6,575
Fort Sam Houston	8,270	8,270	8,270	8,270	8,270	8,270
Green Valley SUD	1,776	2,164	2,511	2,808	3,149	3,541
Kirby	8,962	10,140	10,365	10,365	10,365	10,365
La Coste	17	19	21	22	24	27

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region L Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
Lackland Air Force Base	14,048	14,048	14,048	14,048	14,048	14,048
Leon Valley	15,085	18,291	18,291	18,291	18,291	18,291
Live Oak	9,829	9,829	9,829	9,829	9,829	9,829
Lytle	11	12	14	15	16	17
Oak Hills WSC	40	55	76	105	145	200
Randolph Air Force Base	1,280	1,280	1,280	1,280	1,280	1,280
San Antonio Water System	2,325,671	2,694,204	2,944,909	3,175,196	3,385,292	3,609,290
Schertz	9,641	13,665	17,272	20,265	23,714	27,687
Selma	10,477	13,541	16,288	18,599	21,258	24,318
Shavano Park	1,804	2,041	2,252	2,441	2,656	2,903
The Oaks WSC	1,277	1,445	1,595	1,729	1,881	2,057
Universal City	20,327	21,357	21,702	21,702	21,702	21,702
Water Services	3,642	4,119	4,547	4,928	5,364	5,863
County-Other	1,983	3,426	4,937	5,306	5,805	4,146
Caldwell County Total	**67,191**	**83,988**	**100,497**	**116,808**	**134,861**	**151,345**
Caldwell County / Colorado Basin Total	**12,323**	**20,537**	**28,935**	**37,155**	**45,779**	**54,803**
Creedmoor-Maha WSC*	9,420	17,076	24,703	32,306	39,966	47,692
Polonia WSC*	2,740	3,244	3,841	4,549	5,386	6,378
County-Other	163	217	391	300	427	733
Caldwell County / Guadalupe Basin Total	**54,868**	**63,451**	**71,562**	**79,653**	**89,082**	**96,542**
Aqua WSC*	1,143	1,319	1,485	1,643	1,825	2,032
County Line SUD	2,627	3,923	4,830	6,200	7,000	7,440
Creedmoor-Maha WSC*	1,149	2,082	3,013	3,940	4,874	5,816
Goforth SUD*	769	920	1,061	1,193	1,346	1,522
Gonzales County WSC	144	143	141	143	145	145
Lockhart	21,276	23,217	25,158	27,099	29,040	30,977
Luling	5,602	5,747	5,888	6,085	6,296	6,525
Martindale WSC	3,897	5,125	5,540	6,001	6,512	7,076
Maxwell SUD	9,631	11,048	12,632	14,277	16,714	16,494
Polonia WSC*	5,805	6,875	8,141	9,639	11,415	13,517
San Marcos	917	917	917	917	917	917
Tri Community WSC	1,368	1,416	1,463	1,521	1,585	1,655
County-Other	540	719	1,293	995	1,413	2,426

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region L Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
Calhoun County Total	**19,449**	**18,619**	**17,599**	**16,571**	**15,483**	**14,332**
Calhoun County / Colorado-Lavaca Basin Total	**1,114**	**1,109**	**1,090**	**1,066**	**1,046**	**1,037**
Point Comfort	556	531	501	472	439	406
County-Other	558	578	589	594	607	631
Calhoun County / Lavaca-Guadalupe Basin Total	**18,286**	**17,459**	**16,457**	**15,453**	**14,384**	**13,240**
Guadalupe-Blanco River Authority	3,669	3,326	2,956	2,605	2,202	1,743
Port Lavaca	11,546	11,088	10,524	9,954	9,358	8,725
Port Oconnor Improvement District	839	804	758	713	664	612
Seadrift	905	865	816	767	714	659
County-Other	1,327	1,376	1,403	1,414	1,446	1,501
Calhoun County / San Antonio-Nueces Basin Total	**49**	**51**	**52**	**52**	**53**	**55**
County-Other	49	51	52	52	53	55
Comal County Total	**259,280**	**350,779**	**447,841**	**584,380**	**756,273**	**953,073**
Comal County / Guadalupe Basin Total	**227,956**	**311,261**	**401,228**	**526,428**	**682,700**	**861,662**
3009 Water	1,417	1,816	2,346	3,017	3,787	4,669
Canyon Lake Water Service*	77,802	106,365	124,520	136,314	180,503	229,262
Clear Water Estates Water System	898	1,253	1,725	2,325	3,010	3,795
Crystal Clear SUD	15,217	19,162	19,162	19,162	19,162	19,162
Garden Ridge	3,410	4,215	5,022	5,952	7,055	8,363
Green Valley SUD	1,315	1,956	2,811	3,893	5,131	6,549
KT Water Development	2,652	4,105	6,045	8,498	11,306	14,521
New Braunfels	103,841	147,327	205,331	278,735	362,773	458,988
San Antonio Water System	1,438	1,592	1,740	1,876	2,001	2,001
Schertz	1,371	1,912	2,634	3,549	4,595	5,793
Wingert Water Systems	1,638	1,847	2,126	2,178	2,178	2,178
County-Other	16,957	19,711	27,766	60,929	81,199	106,381
Comal County / San Antonio Basin Total	**31,324**	**39,518**	**46,613**	**57,952**	**73,573**	**91,411**
3009 Water	48	61	79	102	128	158
Canyon Lake Water Service*	16,606	22,703	26,578	29,095	38,527	48,935
Fair Oaks Ranch	1,893	2,259	2,442	2,515	2,533	2,533
Garden Ridge	2,376	2,937	3,500	4,148	4,917	5,828
Guadalupe-Blanco River Authority	3,500	3,500	3,500	3,500	3,500	3,500
San Antonio Water System	956	1,059	1,158	1,248	1,331	1,331

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DRAFT Region L Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
Selma	633	1,098	1,718	2,502	3,399	4,426
Water Services	1,620	1,609	1,592	1,576	1,558	1,538
County-Other	3,692	4,292	6,046	13,266	17,680	23,162
DeWitt County Total	**19,716**	**19,687**	**19,565**	**19,482**	**19,394**	**19,301**
DeWitt County / Guadalupe Basin Total	**15,668**	**15,656**	**15,574**	**15,536**	**15,500**	**15,464**
Cuero	8,446	8,436	8,386	8,356	8,324	8,292
Gonzales County WSC	200	198	195	189	185	177
Yorktown	1,826	1,824	1,812	1,803	1,793	1,784
County-Other	5,196	5,198	5,181	5,188	5,198	5,211
DeWitt County / Lavaca Basin Total	**3,390**	**3,373**	**3,336**	**3,289**	**3,236**	**3,177**
Yoakum*	2,019	2,002	1,970	1,921	1,865	1,802
County-Other	1,371	1,371	1,366	1,368	1,371	1,375
DeWitt County / Lavaca-Guadalupe Basin Total	**25**	**25**	**24**	**25**	**25**	**25**
County-Other	25	25	24	25	25	25
DeWitt County / San Antonio Basin Total	**633**	**633**	**631**	**632**	**633**	**635**
County-Other	633	633	631	632	633	635
Dimmit County Total	**8,175**	**7,818**	**7,383**	**6,983**	**6,560**	**6,112**
Dimmit County / Nueces Basin Total	**8,143**	**7,789**	**7,358**	**6,962**	**6,545**	**6,106**
Asherton	684	652	614	579	539	498
Big Wells	418	398	375	352	329	300
Carrizo Hill WSC	663	752	854	981	1,202	1,678
Carrizo Springs	4,507	4,302	4,055	3,825	3,580	3,307
County-Other	1,871	1,685	1,460	1,225	895	323
Dimmit County / Rio Grande Basin Total	**32**	**29**	**25**	**21**	**15**	**6**
County-Other	32	29	25	21	15	6
Frio County Total	**19,512**	**20,540**	**21,269**	**21,643**	**22,071**	**22,561**
Frio County / Nueces Basin Total	**19,512**	**20,540**	**21,269**	**21,643**	**22,071**	**22,561**
Benton City WSC	1,287	1,693	1,974	1,990	2,008	2,028
Dilley	5,260	6,535	7,420	7,497	7,583	7,680
Moore WSC	588	686	754	763	774	787
Pearsall	8,550	9,781	10,640	10,787	10,952	11,139
County-Other	3,827	1,845	481	606	754	927

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DRAFT Region L Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
Goliad County Total	**6,803**	**6,648**	**6,559**	**6,454**	**6,334**	**6,197**
Goliad County / Guadalupe Basin Total	**2,606**	**2,530**	**2,486**	**2,434**	**2,375**	**2,309**
County-Other	2,606	2,530	2,486	2,434	2,375	2,309
Goliad County / San Antonio Basin Total	**3,752**	**3,686**	**3,648**	**3,604**	**3,553**	**3,494**
Goliad	1,495	1,495	1,495	1,495	1,495	1,495
County-Other	2,257	2,191	2,153	2,109	2,058	1,999
Goliad County / San Antonio-Nueces Basin Total	**445**	**432**	**425**	**416**	**406**	**394**
County-Other	445	432	425	416	406	394
Gonzales County Total	**19,716**	**19,697**	**19,399**	**19,064**	**18,710**	**18,335**
Gonzales County / Guadalupe Basin Total	**19,660**	**19,642**	**19,345**	**19,012**	**18,661**	**18,288**
Fayette WSC*	40	52	66	86	113	150
Gonzales	7,512	7,509	7,399	7,279	7,152	7,015
Gonzales County WSC	7,218	7,208	7,096	6,970	6,836	6,693
Luling	54	54	53	53	51	50
Nixon	2,249	2,247	2,211	2,171	2,129	2,084
Smiley	474	474	467	458	449	439
Waelder	1,016	1,015	999	980	962	942
County-Other	1,097	1,083	1,054	1,015	969	915
Gonzales County / Lavaca Basin Total	**56**	**55**	**54**	**52**	**49**	**47**
County-Other	56	55	54	52	49	47
Guadalupe County Total	**292,903**	**385,703**	**462,052**	**542,643**	**634,587**	**739,503**
Guadalupe County / Guadalupe Basin Total	**189,085**	**259,159**	**310,078**	**363,831**	**425,052**	**494,802**
Crystal Clear SUD	35,538	65,308	77,013	91,463	108,106	127,245
Gonzales County WSC	125	160	200	241	288	343
Green Valley SUD	13,814	18,473	23,689	29,189	35,481	42,683
Martindale WSC	557	861	1,072	1,303	1,556	1,836
New Braunfels	36,517	52,564	70,539	89,478	111,139	135,926
Schertz	4,321	5,029	5,819	6,655	7,613	8,711
Seguin	50,517	59,570	63,909	66,466	69,091	71,790
Springs Hill WSC	46,037	54,563	64,014	73,961	85,256	98,083
Tri Community WSC	28	31	34	37	40	44
Water Services	201	179	160	143	129	115

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DRAFT Region L Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
County-Other	1,430	2,421	3,629	4,895	6,353	8,026
Guadalupe County / San Antonio Basin Total	**103,818**	**126,544**	**151,974**	**178,812**	**209,535**	**244,701**
Cibolo	25,890	31,422	37,606	44,137	51,615	60,179
East Central SUD	1,417	1,719	2,057	2,414	2,822	3,291
Green Valley SUD	29,543	39,508	50,664	62,426	75,884	91,286
Marion	1,471	1,546	1,631	1,721	1,825	1,945
Schertz	35,687	41,534	48,064	54,968	62,881	71,944
Selma	5,251	5,251	5,251	5,251	5,251	5,251
Springs Hill WSC	4,079	4,835	5,673	6,554	7,555	8,691
Universal City	198	252	312	376	449	532
County-Other	282	477	716	965	1,253	1,582
Hays County Total	**336,064**	**500,806**	**683,104**	**877,560**	**1,051,675**	**1,240,694**
Hays County / Guadalupe Basin Total	**336,064**	**500,806**	**683,104**	**877,560**	**1,051,675**	**1,240,694**
County Line SUD	34,873	71,077	115,170	148,761	167,956	178,513
Creedmoor-Maha WSC*	54	54	54	54	54	54
Crystal Clear SUD	8,777	15,573	16,746	16,746	16,746	16,746
Goforth SUD*	41,415	65,951	98,260	142,035	192,136	249,490
Kyle	61,050	91,138	124,117	139,145	144,092	147,735
Maxwell SUD	10,915	16,564	24,478	35,595	50,312	57,543
San Marcos	140,913	198,869	245,241	279,444	301,489	315,690
South Buda WCID 1	4,066	6,633	10,014	14,592	19,832	25,829
Texas State University	9,400	9,400	9,400	9,400	9,400	9,400
Wimberley WSC	5,272	7,640	10,758	14,989	19,834	25,379
County-Other*	19,329	17,907	28,866	76,799	129,824	214,315
Karnes County Total	**15,357**	**16,052**	**16,739**	**17,527**	**18,429**	**19,462**
Karnes County / Guadalupe Basin Total	**68**	**70**	**73**	**77**	**81**	**85**
El Oso WSC*	24	24	25	26	27	28
County-Other	44	46	48	51	54	57
Karnes County / Nueces Basin Total	**221**	**229**	**236**	**244**	**254**	**264**
El Oso WSC*	197	203	209	216	224	233
Three Oaks WSC	18	19	20	21	22	23
County-Other	6	7	7	7	8	8

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DRAFT Region L Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
Karnes County / San Antonio Basin Total	**14,968**	**15,649**	**16,322**	**17,094**	**17,977**	**18,990**
El Oso WSC*	5,637	5,811	5,983	6,186	6,418	6,686
Falls City	476	503	529	560	594	634
Karnes City	2,314	2,441	2,566	2,709	2,871	3,057
Kenedy	3,447	3,640	3,831	4,046	4,294	4,577
Runge	876	925	974	1,030	1,094	1,167
Sunko WSC	150	158	167	177	187	199
Three Oaks WSC	69	74	77	82	88	93
County-Other	1,999	2,097	2,195	2,304	2,431	2,577
Karnes County / San Antonio-Nueces Basin Total	**100**	**104**	**108**	**112**	**117**	**123**
El Oso WSC*	53	54	56	58	60	62
County-Other	47	50	52	54	57	61
Kendall County Total	**56,306**	**70,896**	**89,665**	**111,448**	**136,387**	**164,940**
Kendall County / Colorado Basin Total	**352**	**340**	**411**	**500**	**604**	**724**
County-Other	352	340	411	500	604	724
Kendall County / Guadalupe Basin Total	**17,218**	**20,766**	**24,156**	**28,296**	**33,135**	**38,708**
Guadalupe-Blanco River Authority	1,690	5,409	5,409	5,409	5,409	5,409
Kendall County WCID 1	2,873	3,114	3,939	4,896	5,992	7,247
County-Other	12,655	12,243	14,808	17,991	21,734	26,052
Kendall County / San Antonio Basin Total	**38,736**	**49,790**	**65,098**	**82,652**	**102,648**	**125,508**
Boerne	25,482	35,084	47,445	61,796	78,225	97,031
Fair Oaks Ranch	2,519	3,440	3,901	4,085	4,131	4,131
Guadalupe-Blanco River Authority	29	91	91	91	91	91
Kendall West Utility	2,819	3,561	4,515	5,623	6,890	8,342
Water Services	215	192	170	151	135	120
County-Other	7,672	7,422	8,976	10,906	13,176	15,793
La Salle County Total	**6,723**	**6,766**	**6,690**	**6,529**	**6,359**	**6,179**
La Salle County / Nueces Basin Total	**6,723**	**6,766**	**6,690**	**6,529**	**6,359**	**6,179**
Cotulla	3,404	3,346	3,337	3,360	3,428	3,558
Encinal WSC	1,043	1,085	1,146	1,221	1,318	1,449
County-Other	2,276	2,335	2,207	1,948	1,613	1,172

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DRAFT Region L Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
Medina County Total	**60,936**	**79,204**	**83,631**	**87,079**	**90,594**	**92,654**
Medina County / Nueces Basin Total	**35,389**	**36,875**	**37,778**	**38,072**	**38,583**	**39,496**
Benton City WSC	5,897	6,266	6,536	6,710	6,910	7,139
Devine	4,318	4,374	4,430	4,507	4,594	4,692
East Medina County SUD	9,368	9,998	10,455	10,741	11,071	11,450
Hondo	7,907	7,586	7,407	7,448	7,491	7,534
Lytle	623	673	709	730	755	783
Medina County WCID 2	446	431	421	425	428	431
Medina River West WSC	739	787	822	844	870	898
Natalia	1,134	1,101	1,155	1,187	1,192	1,162
Ville Dalsace Water Supply	211	230	244	252	261	271
West Medina WSC	1,003	1,079	1,097	1,122	1,161	1,095
Yancey WSC	474	504	525	539	555	573
County-Other	3,269	3,846	3,977	3,567	3,295	3,468
Medina County / San Antonio Basin Total	**25,547**	**42,329**	**45,853**	**49,007**	**52,011**	**53,158**
Canyon Lake Water Service*	396	563	624	647	655	663
Castroville	6,496	7,081	7,930	9,120	10,214	10,929
East Medina County SUD	770	822	860	884	911	942
La Coste	1,310	1,290	1,281	1,296	1,313	1,330
Medina River West WSC	392	417	435	447	460	476
San Antonio Water System	7,783	22,963	25,157	27,165	29,001	29,001
Ville Dalsace Water Supply	199	217	230	237	245	255
Yancey WSC	5,842	6,202	6,467	6,638	6,834	7,060
County-Other	2,359	2,774	2,869	2,573	2,378	2,502
Refugio County Total	**6,489**	**6,243**	**5,992**	**5,799**	**5,595**	**5,379**
Refugio County / San Antonio Basin Total	**59**	**56**	**52**	**49**	**46**	**40**
County-Other	59	56	52	49	46	40
Refugio County / San Antonio-Nueces Basin Total	**6,430**	**6,187**	**5,940**	**5,750**	**5,549**	**5,339**
Refugio	2,549	2,521	2,506	2,524	2,594	2,749
Woodsboro	1,278	1,204	1,120	1,036	938	823
County-Other	2,603	2,462	2,314	2,190	2,017	1,767
Uvalde County Total	**24,967**	**24,478**	**23,759**	**22,944**	**22,080**	**21,167**
Uvalde County / Nueces Basin Total	**24,967**	**24,478**	**23,759**	**22,944**	**22,080**	**21,167**
Concan WSC	294	286	278	266	254	240

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DRAFT Region L Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
Knippa WSC	495	485	469	450	430	405
Sabinal	1,292	1,262	1,220	1,170	1,116	1,056
Uvalde	16,762	16,457	15,999	15,482	14,949	14,411
Windmill WSC	1,516	1,385	1,249	1,114	960	784
County-Other	4,608	4,603	4,544	4,462	4,371	4,271
Victoria County Total	**93,954**	**96,082**	**96,608**	**96,168**	**95,664**	**95,087**
Victoria County / Guadalupe Basin Total	**61,271**	**62,638**	**62,972**	**62,680**	**62,347**	**61,964**
Quail Creek MUD	1,319	1,365	1,378	1,371	1,363	1,354
Victoria	44,650	45,336	45,486	45,282	45,049	44,782
County-Other	15,302	15,937	16,108	16,027	15,935	15,828
Victoria County / Lavaca Basin Total	**62**	**64**	**65**	**64**	**64**	**64**
County-Other	62	64	65	64	64	64
Victoria County / Lavaca-Guadalupe Basin Total	**32,554**	**33,311**	**33,501**	**33,354**	**33,184**	**32,990**
Victoria	21,645	21,978	22,051	21,952	21,839	21,709
Victoria County WCID 1	1,709	1,753	1,767	1,767	1,766	1,766
County-Other	9,200	9,580	9,683	9,635	9,579	9,515
Victoria County / San Antonio Basin Total	**67**	**69**	**70**	**70**	**69**	**69**
County-Other	67	69	70	70	69	69
Wilson County Total	**55,858**	**61,941**	**67,968**	**73,304**	**79,413**	**86,407**
Wilson County / Guadalupe Basin Total	**302**	**299**	**290**	**268**	**243**	**214**
Sunko WSC	20	23	25	27	29	32
County-Other	282	276	265	241	214	182
Wilson County / Nueces Basin Total	**814**	**903**	**991**	**1,068**	**1,157**	**1,257**
McCoy WSC*	406	451	496	537	583	635
Picosa WSC	32	37	42	46	51	57
Three Oaks WSC	357	396	435	469	508	553
County-Other	19	19	18	16	15	12
Wilson County / San Antonio Basin Total	**54,742**	**60,739**	**66,687**	**71,968**	**78,013**	**84,936**
C Willow Water	664	737	809	873	947	1,030
East Central SUD	1,368	1,525	1,674	1,803	1,900	1,900
El Oso WSC*	170	207	245	277	315	358
Floresville	5,859	6,166	6,482	6,762	7,082	7,448

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DRAFT Region L Water User Group (WUG) Population

	WUG Population					
	2030	2040	2050	2060	2070	2080
La Vernia	3,135	3,476	3,815	4,114	4,457	4,850
Oak Hills WSC	5,987	6,907	7,968	9,192	10,604	12,233
Picosa WSC	3,559	4,105	4,641	5,115	5,659	6,281
Poth	1,550	1,525	1,506	1,491	1,472	1,450
S S WSC	20,066	23,148	26,175	28,850	31,963	35,649
Springs Hill WSC	244	354	461	556	664	789
Stockdale	1,458	1,471	1,488	1,504	1,521	1,540
Sunko WSC	3,975	4,411	4,843	5,225	5,663	6,164
Three Oaks WSC	1,011	1,121	1,230	1,326	1,437	1,563
County-Other	5,696	5,586	5,350	4,880	4,329	3,681
Zavala County Total	**9,480**	**9,232**	**8,858**	**8,472**	**8,064**	**7,632**
Zavala County / Nueces Basin Total	**9,480**	**9,232**	**8,858**	**8,472**	**8,064**	**7,632**
Batesville WSC	860	837	802	767	729	687
Crystal City	5,925	5,773	5,539	5,301	5,050	4,792
Loma Alta Chula Vista Water System	323	315	302	289	274	259
Zavala County WCID 1	1,219	1,186	1,136	1,086	1,032	975
County-Other	1,153	1,121	1,079	1,029	979	919
Region L Population Total	**3,987,279**	**4,793,957**	**5,469,629**	**6,176,459**	**6,897,460**	**7,689,377**

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DRAFT Region L Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Atascosa County Total	**51,026**	**51,869**	**52,764**	**53,584**	**54,455**	**50,215**
Atascosa County / Nueces Basin Total	**50,374**	**51,186**	**52,051**	**52,848**	**53,694**	**49,540**
Benton City WSC	1,297	1,443	1,588	1,686	1,799	1,930
Charlotte	208	189	177	182	187	192
El Oso WSC*	21	26	29	31	34	37
Jourdanton	1,030	1,085	1,148	1,210	1,281	1,361
Lytle	498	525	556	586	620	660
McCoy WSC*	923	957	1,003	1,056	1,115	1,183
Pleasanton	2,660	2,889	3,147	3,427	3,732	4,065
Poteet	326	291	266	273	279	285
San Antonio Water System	697	723	745	780	808	851
County-Other	111	147	180	120	76	39
Manufacturing	56	58	60	62	64	66
Mining	7,863	8,169	8,468	8,751	9,015	4,187
Steam Electric Power	7,962	7,962	7,962	7,962	7,962	7,962
Livestock	1,534	1,534	1,534	1,534	1,534	1,534
Irrigation	25,188	25,188	25,188	25,188	25,188	25,188
Atascosa County / San Antonio Basin Total	**652**	**683**	**713**	**736**	**761**	**675**
Benton City WSC	204	227	250	266	284	304
Lytle	13	14	14	15	16	17
San Antonio Water System	3	3	3	3	3	4
Mining	176	183	190	196	202	94
Livestock	3	3	3	3	3	3
Irrigation	253	253	253	253	253	253
Bexar County Total	**396,152**	**428,883**	**451,020**	**468,589**	**483,258**	**503,941**
Bexar County / Nueces Basin Total	**2,722**	**2,871**	**2,977**	**3,059**	**3,132**	**3,219**
Atascosa Rural WSC	103	120	135	148	163	181
Lytle	46	52	56	61	67	73
San Antonio Water System	1,067	1,179	1,252	1,308	1,352	1,419
County-Other	12	20	29	31	34	24
Manufacturing	141	147	152	158	163	169
Livestock	62	62	62	62	62	62
Irrigation	1,291	1,291	1,291	1,291	1,291	1,291
Bexar County / San Antonio Basin Total	**393,430**	**426,012**	**448,043**	**465,530**	**480,126**	**500,722**
Air Force Village II Inc	133	133	133	133	133	133

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DRAFT Region L Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Alamo Heights	2,099	2,094	2,094	2,094	2,094	2,094
Atascosa Rural WSC	1,544	1,790	2,017	2,215	2,442	2,701
Bexar County WCID 10	1,305	1,469	1,619	1,753	1,906	2,082
Converse	2,968	2,954	2,954	2,954	2,954	2,954
East Central SUD	6,233	7,018	7,747	8,395	9,137	9,987
Elmendorf	565	754	1,010	1,356	1,689	2,332
Fair Oaks Ranch	1,435	1,591	1,670	1,702	1,710	1,710
Fort Sam Houston	17,514	17,505	17,505	17,505	17,505	17,505
Green Valley SUD	197	239	277	310	348	391
Kirby	876	986	1,008	1,008	1,008	1,008
La Coste	2	2	2	2	2	3
Lackland Air Force Base	1,454	1,441	1,441	1,441	1,441	1,441
Leon Valley	1,779	2,145	2,145	2,145	2,145	2,145
Live Oak	1,700	1,691	1,691	1,691	1,691	1,691
Lytle	2	2	3	3	3	3
Oak Hills WSC	7	9	12	17	24	33
Randolph Air Force Base	86	86	86	86	86	86
San Antonio Water System	265,719	293,642	311,729	325,792	336,731	353,352
Schertz	1,518	2,142	2,707	3,177	3,717	4,340
Selma	1,687	2,172	2,612	2,983	3,409	3,900
Shavano Park	562	635	700	759	826	903
The Oaks WSC	217	245	270	293	319	348
Universal City	2,963	3,098	3,148	3,148	3,148	3,148
Water Services	570	643	709	769	837	915
County-Other	250	427	614	660	723	516
Manufacturing	8,732	9,054	9,389	9,736	10,097	10,471
Mining	7,634	8,366	9,072	9,724	10,322	10,851
Steam Electric Power	52,293	52,293	52,293	52,293	52,293	52,293
Livestock	926	926	926	926	926	926
Irrigation	10,460	10,460	10,460	10,460	10,460	10,460
Caldwell County Total	**10,019**	**11,820**	**13,646**	**15,439**	**17,439**	**18,967**
Caldwell County / Colorado Basin Total	**1,413**	**2,279**	**3,178**	**4,057**	**4,982**	**5,953**
Creedmoor-Maha WSC*	1,004	1,805	2,612	3,415	4,225	5,042
Polonia WSC*	332	391	463	549	650	769
County-Other	19	25	45	35	49	84
Livestock	39	39	39	39	39	39

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DRAFT Region L Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Irrigation	19	19	19	19	19	19
Caldwell County / Guadalupe Basin Total	**8,606**	**9,541**	**10,468**	**11,382**	**12,457**	**13,014**
Aqua WSC*	184	212	238	264	293	326
County Line SUD	227	338	417	535	604	642
Creedmoor-Maha WSC*	122	220	318	417	515	615
Goforth SUD*	84	100	115	129	146	165
Gonzales County WSC	39	38	38	38	39	39
Lockhart	2,967	3,225	3,494	3,764	4,034	4,303
Luling	774	790	810	837	866	897
Martindale WSC	400	523	566	613	665	723
Maxwell SUD	946	1,081	1,236	1,397	1,636	1,614
Polonia WSC*	703	829	982	1,162	1,376	1,630
San Marcos	112	110	107	106	105	105
Tri Community WSC	167	172	177	184	192	201
County-Other	62	83	149	114	163	280
Manufacturing	14	15	16	17	18	19
Mining	352	352	352	352	352	2
Livestock	792	792	792	792	792	792
Irrigation	661	661	661	661	661	661
Calhoun County Total	**67,994**	**69,880**	**71,830**	**73,857**	**75,954**	**78,125**
Calhoun County / Colorado-Lavaca Basin Total	**37,227**	**38,576**	**39,974**	**41,426**	**42,929**	**44,492**
Point Comfort	55	52	49	47	43	40
County-Other	62	63	64	65	66	69
Manufacturing	36,503	37,854	39,254	40,707	42,213	43,776
Steam Electric Power	37	37	37	37	37	37
Livestock	45	45	45	45	45	45
Irrigation	525	525	525	525	525	525
Calhoun County / Lavaca-Guadalupe Basin Total	**29,940**	**30,446**	**30,966**	**31,509**	**32,069**	**32,642**
Guadalupe-Blanco River Authority	582	526	468	412	348	276
Port Lavaca	1,569	1,500	1,424	1,347	1,266	1,180
Port Oconnor Improvement District	61	58	54	51	48	44
Seadrift	147	140	132	124	116	107
County-Other	147	149	153	153	157	163
Manufacturing	17,262	17,901	18,563	19,250	19,962	20,700

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DRAFT Region L Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Livestock	237	237	237	237	237	237
Irrigation	9,935	9,935	9,935	9,935	9,935	9,935
Calhoun County / San Antonio-Nueces Basin Total	**827**	**858**	**890**	**922**	**956**	**991**
County-Other	5	6	6	6	6	6
Manufacturing	822	852	884	916	950	985
Comal County Total	**58,372**	**76,280**	**96,597**	**124,502**	**157,042**	**193,961**
Comal County / Guadalupe Basin Total	**53,289**	**69,997**	**89,203**	**115,238**	**145,481**	**179,750**
3009 Water	387	494	638	821	1,031	1,271
Canyon Lake Water Service*	9,497	12,935	15,144	16,578	21,952	27,882
Clear Water Estates Water System	1,084	1,512	2,082	2,806	3,633	4,580
Crystal Clear SUD	2,122	2,661	2,661	2,661	2,661	2,661
Garden Ridge	1,186	1,464	1,745	2,068	2,451	2,906
Green Valley SUD	146	216	310	430	567	723
KT Water Development	892	1,379	2,030	2,854	3,797	4,877
New Braunfels	20,797	29,434	41,023	55,688	72,478	91,701
San Antonio Water System	165	174	184	193	199	196
Schertz	216	300	413	556	720	908
Wingert Water Systems	322	362	416	426	426	426
County-Other	2,794	3,236	4,558	10,001	13,327	17,460
Manufacturing	901	934	969	1,005	1,042	1,080
Mining	12,011	14,127	16,261	18,382	20,428	22,310
Livestock	236	236	236	236	236	236
Irrigation	533	533	533	533	533	533
Comal County / San Antonio Basin Total	**5,083**	**6,283**	**7,394**	**9,264**	**11,561**	**14,211**
3009 Water	13	17	22	28	35	43
Canyon Lake Water Service*	2,027	2,761	3,232	3,538	4,685	5,951
Fair Oaks Ranch	493	588	635	654	659	659
Garden Ridge	827	1,021	1,216	1,441	1,709	2,025
Guadalupe-Blanco River Authority	555	554	554	554	554	554
San Antonio Water System	109	115	123	128	132	130
Selma	102	176	276	401	545	710
Water Services	254	251	248	246	243	240
County-Other	608	704	992	2,177	2,902	3,802
Mining	2	3	3	4	4	4

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DRAFT Region L Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Livestock	35	35	35	35	35	35
Irrigation	58	58	58	58	58	58
DeWitt County Total	**8,151**	**8,140**	**8,125**	**8,118**	**8,108**	**6,412**
DeWitt County / Guadalupe Basin Total	**6,255**	**6,241**	**6,222**	**6,214**	**6,204**	**4,744**
Cuero	2,208	2,200	2,187	2,180	2,171	2,163
Gonzales County WSC	54	53	52	51	49	47
Yorktown	313	312	310	308	307	305
County-Other	688	684	681	682	684	686
Manufacturing	9	9	9	10	10	11
Mining	1,458	1,458	1,458	1,458	1,458	7
Livestock	1,319	1,319	1,319	1,319	1,319	1,319
Irrigation	206	206	206	206	206	206
DeWitt County / Lavaca Basin Total	**1,396**	**1,400**	**1,404**	**1,405**	**1,405**	**1,382**
Yoakum*	351	347	341	333	323	312
County-Other	181	180	180	180	180	181
Manufacturing	239	248	258	267	277	287
Mining	23	23	23	23	23	0
Livestock	265	265	265	265	265	265
Irrigation	337	337	337	337	337	337
DeWitt County / Lavaca-Guadalupe Basin Total	**33**	**33**	**33**	**33**	**33**	**33**
County-Other	3	3	3	3	3	3
Livestock	24	24	24	24	24	24
Irrigation	6	6	6	6	6	6
DeWitt County / San Antonio Basin Total	**467**	**466**	**466**	**466**	**466**	**253**
County-Other	84	83	83	83	83	83
Mining	214	214	214	214	214	1
Livestock	128	128	128	128	128	128
Irrigation	41	41	41	41	41	41
Dimmit County Total	**12,973**	**12,890**	**12,803**	**12,720**	**12,637**	**6,412**
Dimmit County / Nueces Basin Total	**11,796**	**11,713**	**11,627**	**11,544**	**11,462**	**5,891**
Asherton	136	129	122	115	107	99
Big Wells	65	61	58	54	51	46
Carrizo Hill WSC	113	127	145	166	204	284

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DRAFT Region L Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Carrizo Springs	1,203	1,145	1,080	1,018	953	881
County-Other	250	222	193	162	118	42
Mining	5,493	5,493	5,493	5,493	5,493	3
Livestock	344	344	344	344	344	344
Irrigation	4,192	4,192	4,192	4,192	4,192	4,192
Dimmit County / Rio Grande Basin Total	**1,177**	**1,177**	**1,176**	**1,176**	**1,175**	**521**
County-Other	4	4	3	3	2	1
Mining	653	653	653	653	653	0
Livestock	23	23	23	23	23	23
Irrigation	497	497	497	497	497	497
Frio County Total	**81,199**	**81,534**	**81,776**	**81,843**	**81,917**	**76,007**
Frio County / Nueces Basin Total	**81,199**	**81,534**	**81,776**	**81,843**	**81,917**	**76,007**
Benton City WSC	134	175	204	206	208	210
Dilley	1,224	1,517	1,722	1,740	1,760	1,782
Moore WSC	112	130	143	145	147	149
Pearsall	1,660	1,893	2,059	2,087	2,119	2,155
County-Other	482	231	60	76	94	116
Mining	6,002	6,003	6,003	6,004	6,004	10
Steam Electric Power	54	54	54	54	54	54
Livestock	964	964	964	964	964	964
Irrigation	70,567	70,567	70,567	70,567	70,567	70,567
Goliad County Total	**9,836**	**9,814**	**9,803**	**9,791**	**9,777**	**9,761**
Goliad County / Guadalupe Basin Total	**6,062**	**6,052**	**6,046**	**6,041**	**6,033**	**6,026**
County-Other	307	297	291	286	278	271
Mining	8	8	8	8	8	8
Steam Electric Power	4,994	4,994	4,994	4,994	4,994	4,994
Livestock	199	199	199	199	199	199
Irrigation	554	554	554	554	554	554
Goliad County / San Antonio Basin Total	**3,042**	**3,032**	**3,028**	**3,022**	**3,017**	**3,010**
Goliad	293	292	292	292	292	292
County-Other	266	257	253	247	242	235
Livestock	311	311	311	311	311	311
Irrigation	2,172	2,172	2,172	2,172	2,172	2,172

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DRAFT Region L Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Goliad County / San Antonio-Nueces Basin Total	**732**	**730**	**729**	**728**	**727**	**725**
County-Other	53	51	50	49	48	46
Livestock	279	279	279	279	279	279
Irrigation	400	400	400	400	400	400
Gonzales County Total	**22,035**	**22,136**	**22,196**	**22,250**	**22,302**	**16,183**
Gonzales County / Guadalupe Basin Total	**21,531**	**21,630**	**21,687**	**21,739**	**21,788**	**16,097**
Fayette WSC*	5	7	9	12	15	20
Gonzales	1,830	1,824	1,797	1,768	1,737	1,704
Gonzales County WSC	1,936	1,928	1,898	1,864	1,828	1,790
Luling	7	7	7	7	7	7
Nixon	342	340	335	329	322	315
Smiley	94	93	92	90	88	86
Waelder	170	169	167	163	160	157
County-Other	126	124	120	116	110	105
Manufacturing	2,311	2,397	2,486	2,578	2,673	2,772
Mining	6,133	6,164	6,199	6,235	6,271	564
Livestock	4,099	4,099	4,099	4,099	4,099	4,099
Irrigation	4,478	4,478	4,478	4,478	4,478	4,478
Gonzales County / Lavaca Basin Total	**504**	**506**	**509**	**511**	**514**	**86**
County-Other	6	6	6	6	6	5
Mining	459	461	464	466	469	42
Livestock	39	39	39	39	39	39
Guadalupe County Total	**56,349**	**69,418**	**80,346**	**91,858**	**104,977**	**119,161**
Guadalupe County / Guadalupe Basin Total	**41,739**	**52,108**	**59,951**	**68,202**	**77,596**	**87,520**
Crystal Clear SUD	4,956	9,068	10,693	12,700	15,011	17,668
Gonzales County WSC	34	43	53	64	77	92
Green Valley SUD	1,532	2,040	2,616	3,223	3,918	4,713
Martindale WSC	57	88	110	133	159	188
New Braunfels	7,314	10,502	14,093	17,877	22,204	27,157
Schertz	680	788	912	1,043	1,193	1,365
Seguin	7,605	8,929	9,580	9,963	10,357	10,761
Springs Hill WSC	4,983	5,876	6,894	7,966	9,182	10,564
Tri Community WSC	3	4	4	4	5	5
Water Services	31	28	25	22	20	18
County-Other	158	265	398	536	696	879

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DRAFT Region L Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Manufacturing	2,475	2,566	2,662	2,760	2,863	2,969
Mining	770	770	770	770	770	0
Steam Electric Power	9,392	9,392	9,392	9,392	9,392	9,392
Livestock	985	985	985	985	985	985
Irrigation	764	764	764	764	764	764
Guadalupe County / San Antonio Basin Total	**14,610**	**17,310**	**20,395**	**23,656**	**27,381**	**31,641**
Cibolo	2,572	3,101	3,711	4,356	5,094	5,939
East Central SUD	194	235	281	329	385	449
Green Valley SUD	3,277	4,362	5,594	6,893	8,379	10,080
Marion	179	187	197	208	221	235
Schertz	5,617	6,511	7,534	8,617	9,857	11,278
Selma	846	842	842	842	842	842
Springs Hill WSC	442	521	611	706	814	936
Universal City	29	37	45	55	65	77
County-Other	31	52	78	106	137	173
Manufacturing	1,051	1,090	1,130	1,172	1,215	1,260
Livestock	194	194	194	194	194	194
Irrigation	178	178	178	178	178	178
Hays County Total	**43,189**	**60,339**	**78,814**	**99,478**	**118,291**	**139,706**
Hays County / Guadalupe Basin Total	**43,189**	**60,339**	**78,814**	**99,478**	**118,291**	**139,706**
County Line SUD	3,008	6,130	9,934	12,831	14,486	15,397
Creedmoor-Maha WSC*	6	6	6	6	6	6
Crystal Clear SUD	1,224	2,162	2,325	2,325	2,325	2,325
Goforth SUD*	4,505	7,147	10,649	15,393	20,823	27,038
Kyle	5,929	8,798	11,982	13,432	13,910	14,261
Maxwell SUD	1,072	1,621	2,395	3,483	4,923	5,631
San Marcos	17,284	23,836	28,707	32,303	34,447	36,069
South Buda WCID 1	626	1,019	1,539	2,242	3,047	3,969
Texas State University	1,762	1,756	1,756	1,756	1,756	1,756
Wimberley WSC	585	845	1,189	1,657	2,193	2,806
County-Other*	2,310	2,132	3,437	9,145	15,458	25,519
Manufacturing*	57	59	61	63	65	67
Mining*	30	37	43	51	61	71
Steam Electric Power	1,949	1,949	1,949	1,949	1,949	1,949
Livestock*	2,712	2,712	2,712	2,712	2,712	2,712

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DRAFT Region L Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Irrigation*	130	130	130	130	130	130
Karnes County Total	**7,417**	**7,574**	**7,742**	**7,932**	**8,153**	**6,485**
Karnes County / Guadalupe Basin Total	**222**	**222**	**223**	**223**	**223**	**101**
El Oso WSC*	5	5	5	5	5	6
County-Other	6	6	7	7	7	8
Mining	124	124	124	124	124	0
Livestock	41	41	41	41	41	41
Irrigation	46	46	46	46	46	46
Karnes County / Nueces Basin Total	**340**	**342**	**344**	**345**	**347**	**207**
El Oso WSC*	39	40	42	43	45	46
Three Oaks WSC	4	5	5	5	5	6
County-Other	1	1	1	1	1	1
Mining	142	142	142	142	142	0
Livestock	76	76	76	76	76	76
Irrigation	78	78	78	78	78	78
Karnes County / San Antonio Basin Total	**6,756**	**6,910**	**7,075**	**7,264**	**7,481**	**6,075**
El Oso WSC*	1,128	1,158	1,192	1,233	1,279	1,332
Falls City	105	110	116	123	130	139
Karnes City	424	445	468	494	524	558
Kenedy	1,341	1,414	1,488	1,571	1,668	1,778
Runge	175	184	194	205	218	232
Sunko WSC	24	25	26	28	30	31
Three Oaks WSC	17	18	19	20	22	22
County-Other	274	285	298	313	330	350
Manufacturing	69	72	75	78	81	84
Mining	1,653	1,653	1,653	1,653	1,653	3
Livestock	787	787	787	787	787	787
Irrigation	759	759	759	759	759	759
Karnes County / San Antonio-Nueces Basin Total	**99**	**100**	**100**	**100**	**102**	**102**
El Oso WSC*	11	11	11	11	12	12
County-Other	6	7	7	7	8	8
Livestock	50	50	50	50	50	50
Irrigation	32	32	32	32	32	32

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DRAFT Region L Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Kendall County Total	**10,284**	**13,140**	**16,545**	**20,445**	**24,885**	**29,962**
Kendall County / Colorado Basin Total	**46**	**44**	**52**	**63**	**75**	**89**
County-Other	42	40	48	59	71	85
Livestock	4	4	4	4	4	4
Kendall County / Guadalupe Basin Total	**2,783**	**3,337**	**3,716**	**4,178**	**4,718**	**5,341**
Guadalupe-Blanco River Authority	268	856	856	856	856	856
Kendall County WCID 1	261	280	355	441	539	652
County-Other	1,495	1,440	1,742	2,116	2,556	3,064
Manufacturing	46	48	50	52	54	56
Livestock	343	343	343	343	343	343
Irrigation	370	370	370	370	370	370
Kendall County / San Antonio Basin Total	**7,455**	**9,759**	**12,777**	**16,204**	**20,092**	**24,532**
Boerne	5,384	7,392	9,997	13,020	16,482	20,444
Fair Oaks Ranch	656	895	1,015	1,063	1,075	1,075
Guadalupe-Blanco River Authority	5	14	14	14	14	14
Kendall West Utility	337	423	536	668	818	990
Water Services	34	30	27	24	21	19
County-Other	907	873	1,056	1,283	1,550	1,858
Livestock	41	41	41	41	41	41
Irrigation	91	91	91	91	91	91
La Salle County Total	**11,768**	**11,760**	**11,756**	**11,750**	**11,754**	**6,376**
La Salle County / Nueces Basin Total	**11,768**	**11,760**	**11,756**	**11,750**	**11,754**	**6,376**
Cotulla	1,050	1,030	1,028	1,035	1,056	1,096
Encinal WSC	214	222	234	249	269	296
County-Other	253	257	243	215	178	129
Mining	5,396	5,396	5,396	5,396	5,396	0
Livestock	394	394	394	394	394	394
Irrigation	4,461	4,461	4,461	4,461	4,461	4,461
Medina County Total	**68,856**	**71,174**	**71,959**	**72,637**	**73,273**	**73,731**
Medina County / Nueces Basin Total	**57,251**	**57,695**	**58,073**	**58,387**	**58,692**	**58,994**
Benton City WSC	614	649	677	695	715	739
Devine	616	621	629	640	653	666
East Medina County SUD	805	854	893	918	945	978
Hondo	2,111	2,020	1,972	1,983	1,995	2,006

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DRAFT Region L Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Lytle	118	127	134	138	143	148
Medina County WCID 2	86	83	81	82	82	83
Medina River West WSC	73	76	80	82	84	87
Natalia	190	184	193	198	199	194
Ville Dalsace Water Supply	57	62	66	68	70	73
West Medina WSC	202	217	220	225	233	220
Yancey WSC	51	54	56	58	60	62
County-Other	409	479	496	444	411	432
Manufacturing	15	16	17	18	19	20
Mining	3,825	4,174	4,480	4,759	5,004	5,207
Livestock	888	888	888	888	888	888
Irrigation	47,191	47,191	47,191	47,191	47,191	47,191
Medina County / San Antonio Basin Total	**11,605**	**13,479**	**13,886**	**14,250**	**14,581**	**14,737**
Canyon Lake Water Service*	48	68	76	79	80	81
Castroville	1,165	1,266	1,418	1,631	1,826	1,954
East Medina County SUD	66	70	73	75	78	80
La Coste	131	128	127	129	131	132
Medina River West WSC	38	41	42	43	45	46
San Antonio Water System	889	2,503	2,663	2,787	2,885	2,839
Ville Dalsace Water Supply	54	59	62	64	66	69
Yancey WSC	632	666	695	712	733	757
County-Other	295	346	357	321	296	312
Mining	499	544	585	621	653	679
Livestock	170	170	170	170	170	170
Irrigation	7,618	7,618	7,618	7,618	7,618	7,618
Refugio County Total	**2,311**	**2,272**	**2,240**	**2,216**	**2,193**	**2,175**
Refugio County / San Antonio Basin Total	**48**	**47**	**47**	**47**	**46**	**46**
County-Other	7	6	6	6	5	5
Livestock	41	41	41	41	41	41
Refugio County / San Antonio-Nueces Basin Total	**2,263**	**2,225**	**2,193**	**2,169**	**2,147**	**2,129**
Refugio	474	467	465	468	481	510
Woodsboro	204	191	178	165	149	131
County-Other	298	280	263	249	230	201
Livestock	420	420	420	420	420	420

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DRAFT Region L Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Irrigation	867	867	867	867	867	867
Uvalde County Total	**63,276**	**63,368**	**63,435**	**63,475**	**63,494**	**63,492**
Uvalde County / Nueces Basin Total	**63,276**	**63,368**	**63,435**	**63,475**	**63,494**	**63,492**
Concan WSC	79	77	74	71	68	64
Knippa WSC	101	99	95	92	87	82
Sabinal	304	296	286	275	262	248
Uvalde	3,876	3,794	3,689	3,570	3,447	3,323
Windmill WSC	327	298	269	240	207	169
County-Other	633	629	620	609	597	583
Mining	3,204	3,423	3,650	3,866	4,074	4,271
Livestock	2,049	2,049	2,049	2,049	2,049	2,049
Irrigation	52,703	52,703	52,703	52,703	52,703	52,703
Victoria County Total	**74,612**	**76,401**	**78,019**	**79,511**	**81,048**	**82,624**
Victoria County / Guadalupe Basin Total	**57,737**	**59,417**	**61,005**	**62,527**	**64,098**	**65,714**
Quail Creek MUD	148	152	153	153	152	151
Victoria	11,062	11,200	11,237	11,187	11,130	11,063
County-Other	1,721	1,781	1,801	1,791	1,781	1,769
Manufacturing	39,432	40,891	42,404	43,973	45,600	47,287
Mining	390	409	426	439	451	460
Steam Electric Power	3,198	3,198	3,198	3,198	3,198	3,198
Livestock	455	455	455	455	455	455
Irrigation	1,331	1,331	1,331	1,331	1,331	1,331
Victoria County / Lavaca Basin Total	**10**	**10**	**10**	**10**	**10**	**10**
County-Other	7	7	7	7	7	7
Livestock	3	3	3	3	3	3
Victoria County / Lavaca-Guadalupe Basin Total	**16,821**	**16,929**	**16,959**	**16,929**	**16,895**	**16,855**
Victoria	5,362	5,430	5,448	5,423	5,395	5,363
Victoria County WCID 1	179	183	184	184	184	184
County-Other	1,035	1,071	1,082	1,077	1,071	1,063
Livestock	484	484	484	484	484	484
Irrigation	9,761	9,761	9,761	9,761	9,761	9,761
Victoria County / San Antonio Basin Total	**44**	**45**	**45**	**45**	**45**	**45**
County-Other	7	8	8	8	8	8

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DRAFT Region L Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Livestock	37	37	37	37	37	37
Wilson County Total	**28,061**	**28,893**	**29,760**	**30,537**	**31,428**	**27,829**
Wilson County / Guadalupe Basin Total	**106**	**106**	**105**	**102**	**100**	**97**
Sunko WSC	3	4	4	4	5	5
County-Other	32	31	30	27	24	21
Livestock	71	71	71	71	71	71
Wilson County / Nueces Basin Total	**7,499**	**7,517**	**7,536**	**7,551**	**7,569**	**6,252**
McCoy WSC*	48	53	59	64	69	75
Picosa WSC	3	3	4	4	5	5
Three Oaks WSC	87	97	106	114	124	135
County-Other	2	2	2	2	2	1
Mining	1,353	1,356	1,359	1,361	1,363	30
Livestock	205	205	205	205	205	205
Irrigation	5,801	5,801	5,801	5,801	5,801	5,801
Wilson County / San Antonio Basin Total	**20,456**	**21,270**	**22,119**	**22,884**	**23,759**	**21,480**
C Willow Water	119	132	145	156	169	184
East Central SUD	188	208	228	246	259	259
El Oso WSC*	34	41	49	55	63	71
Floresville	1,367	1,435	1,509	1,574	1,649	1,734
La Vernia	650	718	788	849	920	1,001
Oak Hills WSC	977	1,122	1,295	1,494	1,723	1,988
Picosa WSC	327	375	424	467	516	574
Poth	241	237	234	231	228	225
S S WSC	2,356	2,706	3,060	3,373	3,737	4,168
Springs Hill WSC	26	38	50	60	72	85
Stockdale	301	303	307	310	313	317
Sunko WSC	631	697	765	826	895	974
Three Oaks WSC	247	273	300	323	350	381
County-Other	653	637	610	556	493	420
Manufacturing	62	64	66	68	71	74
Mining	3,327	3,334	3,339	3,346	3,351	75
Livestock	1,433	1,433	1,433	1,433	1,433	1,433
Irrigation	7,517	7,517	7,517	7,517	7,517	7,517

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DRAFT Region L Water User Group (WUG) Demand

	WUG Demand (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Zavala County Total	**51,091**	**51,061**	**51,010**	**50,957**	**50,902**	**45,912**
Zavala County / Nueces Basin Total	**51,091**	**51,061**	**51,010**	**50,957**	**50,902**	**45,912**
Batesville WSC	143	139	133	127	121	114
Crystal City	1,224	1,189	1,141	1,092	1,040	987
Loma Alta Chula Vista Water System	102	100	96	91	87	82
Zavala County WCID 1	343	333	319	305	290	274
County-Other	186	180	173	165	157	148
Manufacturing	732	759	787	816	846	877
Mining	4,932	4,932	4,932	4,932	4,932	1
Livestock	855	855	855	855	855	855
Irrigation	42,574	42,574	42,574	42,574	42,574	42,574
Region L Demand Total	**1,134,971**	**1,228,646**	**1,312,186**	**1,401,489**	**1,493,287**	**1,557,437**

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DRAFT Region L Major Water Provider (MWP) Existing Sales and Transfers

Major Water Providers are entities of particular significance to a region's water supply as defined by the Regional Water Planning Group (RWPG), and may be a Water User Group (WUG) entity, Wholesale Water Provider (WWP) entity , or both (WUG/WWP). Retail denotes WUG projected demands and existing water supplies used by the WUG. Wholesale denotes a WWP or WUG/WWP selling water to another entity.

Canyon Lake Water Service - WUG/WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	11,947	16,145	18,839	20,588	27,112	34,309
Projected Wholesale Contract Demands	600	600	600	600	600	600
Total Projected Wholesale Contract and Retail Demands	**12,547**	**16,745**	**19,439**	**21,188**	**27,712**	**34,909**
Groundwater Sales to Retail Customers	7,946	7,946	7,946	7,946	7,946	7,946
Reuse Sales to Retail Customers	98	267	267	267	267	267
Surface Water Sales to Retail Customers	7,602	7,602	7,602	7,602	7,602	7,602
Surface Water Sales to Wholesale Customers	600	600	600	600	600	600
Total Wholesale and Retail Sales to Customers	**16,246**	**16,415**	**16,415**	**16,415**	**16,415**	**16,415**

Guadalupe-Blanco River Authority - WUG/WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	1,410	1,950	1,892	1,836	1,772	1,700
Projected Wholesale Contract Demands	139,593	135,593	135,593	135,593	135,593	135,593
Total Projected Wholesale Contract and Retail Demands	**141,003**	**137,543**	**137,485**	**137,429**	**137,365**	**137,293**
Groundwater Sales to Retail Customers	3,000	3,000	3,000	3,000	3,000	3,000
Surface Water Sales to Retail Customers	6,879	10,733	10,589	10,445	10,300	10,155
Groundwater Sales to Wholesale Customers	20,757	20,757	20,757	20,757	20,757	20,757
Reuse Sales to Wholesale Customers	445	445	445	445	445	445
Surface Water Sales to Wholesale Customers	110,611	104,371	104,371	104,371	104,371	104,371
Total Wholesale and Retail Sales to Customers	**141,692**	**139,306**	**139,162**	**139,018**	**138,873**	**138,728**

New Braunfels - WUG/WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	28,111	39,936	55,116	73,565	94,682	118,858
Projected Wholesale Contract Demands	1,000	1,000	1,000	1,000	1,000	1,000
Total Projected Wholesale Contract and Retail Demands	**29,111**	**40,936**	**56,116**	**74,565**	**95,682**	**119,858**
Groundwater Sales to Retail Customers	16,575	16,575	16,575	16,575	16,575	16,575
Reuse Sales to Retail Customers	65	65	65	65	65	65
Surface Water Sales to Retail Customers	13,856	13,856	13,856	13,856	13,856	13,856

DRAFT Region L Major Water Provider (MWP) Existing Sales and Transfers

Groundwater Sales to Wholesale Customers	1,000	1,000	1,000	1,000	1,000	1,000
Total Wholesale and Retail Sales to Customers	**31,496**	**31,496**	**31,496**	**31,496**	**31,496**	**31,496**

San Antonio Water System - WUG/WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	268,649	298,339	316,699	330,991	342,110	358,791
Projected Wholesale Contract Demands	52,470	50,970	50,970	50,970	50,970	50,970
Total Projected Wholesale Contract and Retail Demands	**321,119**	**349,309**	**367,669**	**381,961**	**393,080**	**409,761**
Groundwater Sales to Retail Customers	283,201	281,201	281,201	278,401	278,401	278,401
Reuse Sales to Retail Customers	35,000	40,000	40,000	40,000	40,000	40,000
Surface Water Sales to Retail Customers	5,000	4,000	4,000	0	0	0
Groundwater Sales to Wholesale Customers	970	970	970	970	970	970
Reuse Sales to Wholesale Customers	45,000	45,000	45,000	45,000	45,000	45,000
Surface Water Sales to Wholesale Customers	1,500	0	0	0	0	0
Total Wholesale and Retail Sales to Customers	**370,671**	**371,171**	**371,171**	**364,371**	**364,371**	**364,371**

San Marcos - WUG/WWP	**Water Volumes (acre-feet per year)**					
Data Description	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Projected Retail WUG Demands	17,396	23,946	28,814	32,409	34,552	36,174
Total Projected Wholesale Contract and Retail Demands	**17,396**	**23,946**	**28,814**	**32,409**	**34,552**	**36,174**
Groundwater Sales to Retail Customers	8,481	8,481	8,481	8,481	8,481	8,481
Reuse Sales to Retail Customers	1,905	1,905	1,905	1,905	1,905	1,905
Surface Water Sales to Retail Customers	10,000	10,000	10,000	10,000	10,000	10,000
Total Wholesale and Retail Sales to Customers	**20,386**	**20,386**	**20,386**	**20,386**	**20,386**	**20,386**

Appendix 2B: Passive Conservation Water Savings by Decade

APPENDIX 2B: PASSIVE CONSERVATION WATER SAVINGS BY DECADE

		Per Capita Water Use (GPCD)						Plumbing Code Savings (GPCD)						Plumbing Code Savings (acft/yr)					
No.	WUG	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080
1	3009 Water	248	248	248	248	248	248	4.33	4.91	4.91	4.91	4.91	4.91	7	10	13	18	22	27
2	Air Force Village II Inc	227	227	227	227	227	227	5.71	6.28	6.28	6.28	6.28	6.28	3	4	4	4	4	4
3	Alamo Heights	245	245	245	245	245	245	4.94	5.47	5.47	5.47	5.47	5.47	43	48	48	48	48	48
4	Aqua WSC	148	148	148	148	148	148	4.23	4.68	4.68	4.68	4.68	4.68	5	7	8	9	10	11
5	Asherton	182	182	182	182	182	182	4.79	5.34	5.34	5.34	5.34	5.34	4	4	4	3	3	3
6	Atascosa Rural WSC	114	114	114	114	114	114	4.12	4.59	4.59	4.59	4.59	4.59	62	80	91	99	109	121
7	Batesville WSC	153	153	153	153	153	153	4.06	4.65	4.65	4.65	4.65	4.65	4	4	4	4	4	4
8	Benton City WSC	97	97	97	97	97	97	4.09	4.57	4.57	4.57	4.57	4.57	99	123	133	140	148	157
9	Bexar County WCID 10	193	193	193	193	193	193	5.13	5.70	5.70	5.70	5.70	5.70	36	45	49	53	58	63
10	Big Wells	143	143	143	143	143	143	4.55	5.10	5.10	5.10	5.10	5.10	2	2	2	2	2	2
11	Boerne	193	193	193	193	193	193	4.37	4.90	4.90	4.90	4.90	4.90	125	193	260	339	429	533
12	C Willow Water	165	165	165	165	165	165	4.89	5.41	5.41	5.41	5.41	5.41	4	4	5	5	6	6
13	Canyon Lake Water Service	113	113	113	113	113	113	4.03	4.43	4.43	4.43	4.43	4.43	428	644	753	823	1,090	1,384
14	Carrizo Hill WSC	156	156	156	156	156	156	4.07	4.75	4.75	4.75	4.75	4.75	3	4	5	5	6	9
15	Carrizo Springs	243	243	243	243	243	243	4.69	5.30	5.30	5.30	5.30	5.30	24	26	24	23	21	20
16	Castroville	165	165	165	165	165	165	4.84	5.38	5.38	5.38	5.38	5.38	35	43	48	55	62	66
17	Charlotte	155	155	155	155	155	155	4.69	5.19	5.19	5.19	5.19	5.19	6	7	6	6	6	7
18	Cibolo	93	93	93	93	93	93	4.30	4.90	4.90	4.90	4.90	4.90	125	172	206	242	283	330
19	Clear Water Estates Water System	1,083	1,083	1,083	1,083	1,083	1,083	5.04	5.57	5.57	5.57	5.57	5.57	5	8	11	15	19	24
20	Concan WSC	244	244	244	244	244	244	4.12	4.88	4.88	4.88	4.88	4.88	1	2	2	1	1	1
21	Converse	98	98	98	98	98	98	4.57	5.13	5.13	5.13	5.13	5.13	145	163	163	163	163	163
22	Cotulla	280	280	280	280	280	280	4.59	5.11	5.11	5.11	5.11	5.11	18	19	19	19	20	20
23	County Line SUD	80	80	80	80	80	80	3.00	3.00	3.00	3.00	3.00	3.00	126	252	403	521	588	625
24	County-Other, Atascosa	116	116	116	116	116	116	4.45	5.30	5.30	5.30	5.30	5.30	4	7	9	6	4	2
25	County-Other, Bexar	119	119	119	119	119	119	6.58	7.93	7.93	7.93	7.93	7.93	16	31	46	49	54	39
26	County-Other, Caldwell	107	107	107	107	107	107	3.72	4.09	4.09	4.09	4.09	4.09	3	4	8	6	8	14
27	County-Other, Calhoun	105	105	105	105	105	105	6.07	7.73	7.73	7.73	7.73	7.73	13	17	17	17	18	18
28	County-Other, Comal	152	152	152	152	152	152	4.91	5.47	5.47	5.47	5.47	5.47	113	147	207	454	606	794
29	County-Other, DeWitt	123	123	123	123	123	123	4.91	5.62	5.62	5.62	5.62	5.62	40	46	46	46	46	46
30	County-Other, Dimmit	124	124	124	124	124	124	4.77	6.04	6.04	6.04	6.04	6.04	10	11	10	8	6	2
31	County-Other, Frio	117	117	117	117	117	117	4.50	5.25	5.25	5.25	5.25	5.25	19	11	3	4	4	5
32	County-Other, Goliad	110	110	110	110	110	110	4.70	5.25	5.25	5.25	5.25	5.25	28	31	30	28	28	28
33	County-Other, Gonzales	108	108	108	108	108	108	5.43	6.26	6.26	6.26	6.26	6.26	7	8	7	7	7	6
34	County-Other, Guadalupe	105	105	105	105	105	105	6.61	7.22	7.22	7.22	7.22	7.22	13	24	35	48	61	78
35	County-Other, Hays	111	111	111	111	111	111	4.30	4.70	4.70	4.70	4.70	4.70	93	94	152	404	683	1,128
36	County-Other, Karnes	127	127	127	127	127	127	4.79	5.71	5.71	5.71	5.71	5.71	11	13	14	15	16	16

		Per Capita Water Use (GPCD)						Plumbing Code Savings (GPCD)						Plumbing Code Savings (acft/yr)					
No.	WUG	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080
37	County-Other, Kendall	110	110	110	110	110	110	4.47	5.00	5.00	5.00	5.00	5.00	103	113	135	165	199	238
38	County-Other, La Salle	104	104	104	104	104	104	4.81	5.65	5.65	5.65	5.65	5.65	12	15	14	12	10	7
39	County-Other, Medina	116	116	116	116	116	116	4.27	4.73	4.73	4.73	4.73	4.73	27	35	36	33	30	31
40	County-Other, Refugio	107	107	107	107	107	107	4.81	5.47	5.47	5.47	5.47	5.47	14	15	14	13	12	11
41	County-Other, Uvalde	128	128	128	128	128	128	5.36	6.10	6.10	6.10	6.10	6.10	28	31	31	30	30	29
42	County-Other, Victoria	105	105	105	105	105	105	4.60	5.22	5.22	5.22	5.22	5.22	126	149	151	150	149	149
43	County-Other, Wilson	107	107	107	107	107	107	4.66	5.26	5.26	5.26	5.26	5.26	31	35	34	30	27	23
44	County-Other, Zavala	149	149	149	149	149	149	4.93	5.61	5.61	5.61	5.61	5.61	6	7	7	6	6	6
45	Creedmoor-Maha WSC	100	100	100	100	100	100	4.93	5.62	5.62	5.62	5.62	5.62	58	120	175	228	283	337
46	Crystal City	189	189	189	189	189	189	4.64	5.18	5.18	5.18	5.18	5.18	31	33	32	31	29	28
47	Crystal Clear SUD	129	129	129	129	129	129	4.51	5.04	5.04	5.04	5.04	5.04	301	565	638	719	813	921
48	Cuero	238	238	238	238	238	238	4.57	5.14	5.14	5.14	5.14	5.14	43	49	48	48	48	48
49	Devine	132	132	132	132	132	132	4.67	5.19	5.19	5.19	5.19	5.19	23	25	26	26	27	27
50	Dilley	212	212	212	212	212	212	4.34	4.81	4.81	4.81	4.81	4.81	26	35	40	40	41	41
51	East Central SUD	127	127	127	127	127	127	4.60	5.16	5.16	5.16	5.16	5.16	248	316	350	380	414	453
52	East Medina County SUD	81	81	81	81	81	81	4.28	4.77	4.77	4.77	4.77	4.77	49	57	61	62	64	66
53	El Oso WSC	183	183	183	183	183	183	4.40	5.13	5.13	5.13	5.13	5.13	31	36	37	40	41	42
54	Elmendorf	130	130	130	130	130	130	4.38	4.99	4.99	4.99	4.99	4.99	20	30	40	54	67	93
55	Encinal WSC	187	187	187	187	187	187	4.01	4.61	4.61	4.61	4.61	4.61	5	6	6	6	7	7
56	Fair Oaks Ranch	237	237	237	237	237	237	4.37	4.78	4.78	4.78	4.78	4.78	48	63	68	70	71	71
57	Falls City	201	201	201	201	201	201	4.94	5.41	5.41	5.41	5.41	5.41	3	3	3	3	4	4
58	Fayette WSC	126	126	126	126	126	126	3.94	4.52	4.52	4.52	4.52	4.52	0	0	0	0	1	1
59	Floresville	213	213	213	213	213	213	4.64	5.17	5.17	5.17	5.17	5.17	30	36	38	39	41	43
60	Fort Sam Houston	1,895	1,895	1,895	1,895	1,895	1,895	4.41	5.35	5.35	5.35	5.35	5.35	41	50	50	50	50	50
61	Garden Ridge	315	315	315	315	315	315	4.40	4.82	4.82	4.82	4.82	4.82	29	39	46	54	65	76
62	Goforth SUD	101	101	101	101	101	101	3.88	4.25	4.25	4.25	4.25	4.25	183	318	473	682	921	1,195
63	Goliad	180	180	180	180	180	180	4.98	5.51	5.51	5.51	5.51	5.51	8	9	9	9	9	9
64	Gonzales	222	222	222	222	222	222	4.57	5.14	5.14	5.14	5.14	5.14	38	43	43	42	41	40
65	Gonzales County WSC	244	244	244	244	244	244	4.58	5.23	5.23	5.23	5.23	5.23	40	45	45	44	44	43
66	Green Valley SUD	103	103	103	103	103	103	3.99	4.42	4.42	4.42	4.42	4.42	208	308	394	487	593	713
67	Guadalupe-Blanco River Authority	146	146	146	146	146	146	4.32	4.76	4.76	4.76	4.76	4.76	43	66	64	62	60	57
68	Hondo	243	243	243	243	243	243	4.69	5.29	5.29	5.29	5.29	5.29	42	45	44	44	44	45
69	Jourdanton	190	190	190	190	190	190	4.54	5.08	5.08	5.08	5.08	5.08	25	30	32	33	35	37
70	Karnes City	168	168	168	168	168	168	4.57	5.14	5.14	5.14	5.14	5.14	12	14	15	16	17	18
71	Kendall County WCID 1	86	86	86	86	86	86	5.02	5.65	5.65	5.65	5.65	5.65	16	20	25	31	38	46
72	Kendall West Utility	111	111	111	111	111	111	4.42	5.01	5.01	5.01	5.01	5.01	14	20	25	32	39	47
73	Kenedy	352	352	352	352	352	352	4.80	5.27	5.27	5.27	5.27	5.27	19	21	23	24	25	27

		Per Capita Water Use (GPCD)						Plumbing Code Savings (GPCD)						Plumbing Code Savings (acft/yr)					
No.	WUG	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080
74	Kirby	92	92	92	92	92	92	4.73	5.21	5.21	5.21	5.21	5.21	47	59	60	60	60	60
75	Knippa WSC	187	187	187	187	187	187	4.74	5.36	5.36	5.36	5.36	5.36	3	3	3	3	3	2
76	KT Water Development	304	304	304	304	304	304	3.78	4.15	4.15	4.15	4.15	4.15	11	19	28	40	53	68
77	Kyle	91	91	91	91	91	91	4.30	4.82	4.82	4.82	4.82	4.82	294	492	670	751	778	798
78	La Coste	94	94	94	94	94	94	4.61	5.17	5.17	5.17	5.17	5.17	7	7	7	8	8	8
79	La Vernia	190	190	190	190	190	190	4.89	5.69	5.69	5.69	5.69	5.69	17	22	24	26	28	31
80	Lackland Air Force Base	96	96	96	96	96	96	3.59	4.41	4.41	4.41	4.41	4.41	56	69	69	69	69	69
81	Leon Valley	110	110	110	110	110	110	4.69	5.30	5.30	5.30	5.30	5.30	79	109	109	109	109	109
82	Live Oak	159	159	159	159	159	159	4.63	5.42	5.42	5.42	5.42	5.42	51	60	60	60	60	60
83	Lockhart	129	129	129	129	129	129	4.49	5.00	5.00	5.00	5.00	5.00	107	130	141	152	163	173
84	Loma Alta Chula Vista Water System	287	287	287	287	287	287	4.10	4.69	4.69	4.69	4.69	4.69	1	2	2	2	1	1
85	Luling	128	128	128	128	128	128	4.65	5.21	5.21	5.21	5.21	5.21	29	34	34	36	37	38
86	Lytle	174	174	174	174	174	174	4.68	5.21	5.21	5.21	5.21	5.21	18	22	23	24	25	28
87	Marion	113	113	113	113	113	113	4.56	5.09	5.09	5.09	5.09	5.09	8	9	9	10	10	11
88	Martindale WSC	96	96	96	96	96	96	4.38	4.81	4.81	4.81	4.81	4.81	22	33	36	39	43	48
89	Maxwell SUD	92	92	92	92	92	92	4.29	4.64	4.64	4.64	4.64	4.64	98	143	193	259	348	385
90	McCoy WSC	111	111	111	111	111	111	4.61	5.26	5.26	5.26	5.26	5.26	42	51	53	56	58	63
91	Medina County WCID 2	177	177	177	177	177	177	4.50	5.10	5.10	5.10	5.10	5.10	2	2	2	2	2	2
92	Medina River West WSC	91	91	91	91	91	91	3.66	4.30	4.30	4.30	4.30	4.30	5	6	6	6	6	6
93	Moore WSC	174	174	174	174	174	174	4.35	4.85	4.85	4.85	4.85	4.85	3	4	4	4	4	4
94	Natalia	154	154	154	154	154	154	4.50	5.00	5.00	5.00	5.00	5.00	6	6	6	7	7	7
95	New Braunfels	183	183	183	183	183	183	4.20	4.64	4.64	4.64	4.64	4.64	661	1,039	1,434	1,914	2,464	3,092
96	Nixon	140	140	140	140	140	140	4.38	4.91	4.91	4.91	4.91	4.91	11	12	12	12	12	11
97	Oak Hills WSC	150	150	150	150	150	150	4.38	4.92	4.92	4.92	4.92	4.92	29	38	44	52	59	68
98	Pearsall	178	178	178	178	178	178	4.70	5.26	5.26	5.26	5.26	5.26	45	58	63	64	65	66
99	Picosa WSC	86	86	86	86	86	86	4.05	4.48	4.48	4.48	4.48	4.48	16	21	23	26	28	32
100	Pleasanton	196	196	196	196	196	196	4.73	5.24	5.24	5.24	5.24	5.24	66	79	86	94	103	112
101	Point Comfort	94	94	94	94	94	94	5.07	5.87	5.87	5.87	5.87	5.87	3	3	3	3	3	3
102	Polonia WSC	112	112	112	112	112	112	3.85	4.35	4.35	4.35	4.35	4.35	37	49	59	69	82	97
103	Port Lavaca	126	126	126	126	126	126	4.65	5.23	5.23	5.23	5.23	5.23	60	65	62	58	55	51
104	Port Oconnor Improvement District	70	70	70	70	70	70	5.01	5.90	5.90	5.90	5.90	5.90	5	5	5	5	4	4
105	Poteet	111	111	111	111	111	111	4.49	5.01	5.01	5.01	5.01	5.01	14	14	13	13	13	13
106	Poth	144	144	144	144	144	144	4.94	5.51	5.51	5.51	5.51	5.51	9	9	9	9	9	9
107	Quail Creek MUD	105	105	105	105	105	105	4.82	5.56	5.56	5.56	5.56	5.56	7	9	9	9	8	8
108	Randolph Air Force Base	60	60	60	60	60	60	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
109	Refugio	171	171	171	171	171	171	4.83	5.45	5.45	5.45	5.45	5.45	14	15	15	15	16	17
110	Runge	183	183	183	183	183	183	4.80	5.23	5.23	5.23	5.23	5.23	5	5	6	6	6	7

		Per Capita Water Use (GPCD)						Plumbing Code Savings (GPCD)						Plumbing Code Savings (acft/yr)					
No.	WUG	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080
111	S S WSC	109	109	109	109	109	109	4.16	4.63	4.63	4.63	4.63	4.63	94	120	136	150	166	185
112	Sabinal	215	215	215	215	215	215	4.78	5.36	5.36	5.36	5.36	5.36	7	8	7	7	7	6
113	San Antonio Water System	106	106	106	106	106	106	4.00	8.70	11.50	14.40	17.20	18.60	10,534	26,676	38,539	52,034	66,266	76,356
114	San Marcos	119	119	119	119	119	119	9.50	12.00	14.50	15.80	17.00	17.00	1,510	2,685	3,998	4,962	5,758	6,029
115	Schertz	145	145	145	145	145	145	4.48	5.06	5.06	5.06	5.06	5.06	256	352	418	485	559	647
116	Seadrift	150	150	150	150	150	150	4.81	5.37	5.37	5.37	5.37	5.37	5	5	5	5	4	4
117	Seguin	139	139	139	139	139	139	4.60	5.18	5.18	5.18	5.18	5.18	260	346	371	386	401	417
118	Selma	148	148	148	148	148	148	4.22	4.83	4.83	4.83	4.83	4.83	78	107	125	143	161	184
119	Shavano Park	283	283	283	283	283	283	4.89	5.33	5.33	5.33	5.33	5.33	10	12	13	15	16	17
120	Smiley	181	181	181	181	181	181	4.75	5.32	5.32	5.32	5.32	5.32	3	3	3	3	3	3
121	South Buda WCID 1	142	142	142	142	142	142	4.45	4.83	4.83	4.83	4.83	4.83	20	36	54	79	107	140
122	Springs Hill WSC	101	101	101	101	101	101	4.37	4.85	4.85	4.85	4.85	4.85	246	324	382	441	508	584
123	Stockdale	189	189	189	189	189	189	4.56	5.11	5.11	5.11	5.11	5.11	7	8	9	9	9	9
124	Sunko WSC	146	146	146	146	146	146	4.41	4.89	4.89	4.89	4.89	4.89	21	25	28	30	32	35
125	Texas State University	171	171	171	171	171	171	3.68	4.22	4.22	4.22	4.22	4.22	39	44	44	44	44	44
126	The Oaks WSC	157	157	157	157	157	157	5.23	5.81	5.81	5.81	5.81	5.81	7	9	10	11	12	13
127	Three Oaks WSC	223	223	223	223	223	223	4.73	5.41	5.41	5.41	5.41	5.41	7	9	10	11	13	13
128	Tri Community WSC	113	113	113	113	113	113	4.24	4.79	4.79	4.79	4.79	4.79	6	8	8	8	9	9
129	Universal City	135	135	135	135	135	135	4.86	5.52	5.52	5.52	5.52	5.52	112	134	136	136	137	137
130	Uvalde	211	211	211	211	211	211	4.58	5.17	5.17	5.17	5.17	5.17	86	95	93	90	87	83
131	Victoria	226	226	226	226	226	226	4.83	5.45	5.45	5.45	5.45	5.45	359	411	413	410	408	406
132	Victoria County WCID 1	98	98	98	98	98	98	4.36	4.89	4.89	4.89	4.89	4.89	8	10	10	10	10	10
133	Ville Dalsace Water Supply	246	246	246	246	246	246	4.59	5.30	5.30	5.30	5.30	5.30	2	2	2	2	3	4
134	Waelder	154	154	154	154	154	154	4.62	5.20	5.20	5.20	5.20	5.20	5	6	6	6	6	5
135	Water Services	145	145	145	145	145	145	5.20	5.72	5.72	5.72	5.72	5.72	32	38	41	44	46	50
136	West Medina WSC	185	185	185	185	185	185	5.12	5.71	5.71	5.71	5.71	5.71	6	7	7	7	7	7
137	Wimberley WSC	104	104	104	104	104	104	4.90	5.30	5.30	5.30	5.30	5.30	29	45	64	89	118	151
138	Windmill WSC	197	197	197	197	197	197	4.17	4.71	4.71	4.71	4.71	4.71	7	7	7	6	5	4
139	Wingert Water Systems	180	180	180	180	180	180	4.67	5.20	5.20	5.20	5.20	5.20	9	11	12	13	13	13
140	Woodsboro	147	147	147	147	147	147	4.59	5.16	5.16	5.16	5.16	5.16	7	7	6	6	5	5
141	Yancey WSC	101	101	101	101	101	101	4.49	5.17	5.17	5.17	5.17	5.17	31	39	40	41	43	44
142	Yoakum	160	160	160	160	160	160	4.77	5.34	5.34	5.34	5.34	5.34	11	12	12	11	11	11
143	Yorktown	158	158	158	158	158	158	4.83	5.39	5.39	5.39	5.39	5.39	10	11	11	11	11	11
144	Zavala County WCID 1	256	256	256	256	256	256	4.45	5.03	5.03	5.03	5.03	5.03	6	7	6	6	6	5
TOTAL, REGION L														**19,379**	**39,432**	**54,525**	**71,267**	**88,828**	**102,085**

INITIALLY PREPARED PLAN

CHAPTER 3: WATER AVAILABILITY AND EXISTING WATER SUPPLIES

South Central Texas Regional Water Plan

B&V PROJECT NO. 411170

PREPARED FOR

South Central Texas Regional Water Planning Group

3 MARCH 2025

BLACK & VEATCH

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%	Percent
acft/yr	Acre-Feet per Year
ASR	Aquifer Storage and Recovery
BFZ	Balcones Fault Zone
BMA	Bexar-Medina-Atascosa Counties Water Control and Improvement District No. 1
CA	Certificate of Adjudication
DB27	2027 Regional and State Water Planning Database
DFC	Desired Future Condition
EAA	Edwards Aquifer Authority
EARM	Empirical Area-Reduction Method
EAHCP	Edwards Aquifer Habitat Conservation Plan
GAM	Groundwater Availability Model
GBRA	Guadalupe-Blanco River Authority
GCD	Groundwater Conservation District
GMA	Groundwater Management Area
MAG	Modeled Available Groundwater
MWP	Major Water Provider
PGMA	Priority Groundwater Management Area
Region J	Plateau Region
Region L	South Central Texas Region
Region N	Coastal Bend Region
RIP	Recovery Implementation Program
SAWS	San Antonio Water System
SB	Senate Bill
SCTRWPA	South Central Texas Regional Water Planning Area
SCTRWPG	South Central Texas Regional Water Planning Group
SV/SA	Storage Volume – Surface Area
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TWC	Texas Water Code
TWDB	Texas Water Development Board
WAM	Water Availability Model
WMS	Water Management Strategy

WUG	Water User Group
WWP	Wholesale Water Provider
WWTP	Wastewater Treatment Plant

3.0 Water Availability and Existing Water Supplies

3.1 Introduction

The South Central Texas Regional Water Planning Group (SCTRWPG) performed an evaluation to estimate the quantity of water that could meet water demands within the South Central Texas Region (Region L) Regional Water Planning Area (SCTRWPA). Available water quantities are estimated through a two-step process that examines both water availability and existing water supply. The evaluation estimated availabilities and supplies for water sources within the SCTRWPA, including groundwater, surface water, and reuse. This chapter reports results of the evaluation of the SCTRWPA's source water availability and existing supplies.

In regional water planning, there are two terms used that are similar but distinct: water availability and existing water supply. Water availability refers to the maximum amount of raw water that could be produced by or at a water source during a repeat of the drought of record. This estimate includes volumes of water that are not currently connected or being used, as they are potentially available for use currently or in the future. The determination of water availability is a source-based analysis, as described in the sections below. Generally, groundwater availability is derived from modeled available groundwater (MAG) estimates from the Texas Water Development Board (TWDB) Joint Groundwater Planning process, and surface water availability is derived from water availability modeling of water rights issued by the Texas Commission on Environmental Quality (TCEQ).

Existing water supply is the maximum amount of water that is physically and legally accessible from existing sources for immediate use by a water user group (WUG) or wholesale water provider (WWP) under drought of record conditions. This is a subset of the water availability volume that a WUG already has legal access to as well as the infrastructure in place to treat and deliver the water. Existing water supplies in the SCTRWPA were estimated by evaluating numerous sources of information, including but not limited to, the following:

- Responses from WUGs and WWPs to surveys or direct outreach from the SCTRWPG;
- Existing water rights from the TCEQ;
- Surface water availability modeling;
- Existing groundwater permits from groundwater conservation districts (GCDs);
- System and infrastructure capacities documented in the TCEQ Drinking Water Watch; and
- Supply estimates included in the 2021 Region L Regional Water Plan.

The following sections describe the water sources in the SCTRWPA, hydrologic assumptions used for the water availability and existing water supplies evaluation, and the evaluation results for WUGs, WWPs, and major water providers (MWPs). Water availabilities and water supplies within the SCTRWPA are also summarized in reports from the 2027 Regional and State Water Planning Database (DB27), which are available at https://www3.twdb.texas.gov/apps/SARA/reports/list. Relevant DB27 reports are included in Appendix 3A.

3.2 Water Sources

Water sources in the SCTRWPA include surface water within nine river and coastal basins and groundwater from 16 aquifers. Treated effluent from wastewater treatment plants (WWTPs), called reclaimed water or reuse, is also considered as a water supply source. The following summarizes each of these sources within the SCTRWPA.

3.2.1 Surface Water

Surface water sources in the SCTRWPA include run-of-river, major reservoirs, and local surface water. The SCTRWPA includes parts of nine river and coastal basins, including the Rio Grande, Nueces, San Antonio, Guadalupe, Colorado, and Lavaca River Basins, and parts of the Colorado-Lavaca, Lavaca-Guadalupe, and San Antonio-Nueces Coastal Basins. The Nueces, San Antonio, and Guadalupe are the major river basins of interest in considering surface water availabilities and existing surface water supplies in the SCTRWPA. A map of the river basins, stream segments, and major reservoirs is provided on Figure 3-1.

3.2.1.1 Run-of-River

The SCTRWPA includes the middle and lower portions of the San Antonio River Basin (Figure 3-1). The headwaters of the San Antonio River are located within the Plateau Regional Water Planning Area (Region J). Within the SCTRWPA, the San Antonio River Basin includes portions of 12 counties, including Atascosa, Bexar, Comal, DeWitt, Goliad, Guadalupe, Karnes, Kendall, Medina, Refugio, Victoria, and Wilson Counties.

Region L also includes the middle and lower portions of the Guadalupe River Basin (Figure 3-1); its headwaters are located in Region J. The Guadalupe Basin includes portions of 12 Region L counties, including Caldwell, Calhoun, Comal, DeWitt, Goliad, Gonzales, Guadalupe, Hays, Karnes, Kendall, Victoria, and Wilson Counties.

In the northern portions of the SCTRWPA, the Guadalupe and San Antonio River Basins are delineated as separate river basins. However, the San Antonio River confluences with the Guadalupe River in the lower basin at the corners of Victoria, Calhoun, and Refugio Counties before emptying into San Antonio Bay. In part because of the large concentration of senior water rights below the confluence of the two rivers, the two river basins are often referred to as the Guadalupe-San Antonio River Basin and are considered as one river basin when evaluating surface water supplies available under existing water rights.

The SCTRWPA includes the middle portions of the Nueces River Basin (Figure 3-1). The headwaters of the Nueces River are within Region J and the lower basin is within the Coastal Bend Regional Water Planning Area (Region N). Within the SCTRWPA, the Nueces River Basin includes portions of 10 counties, including Atascosa, Bexar, Dimmit, Frio, Karnes, La Salle, Medina, Uvalde, Wilson, and Zavala Counties.

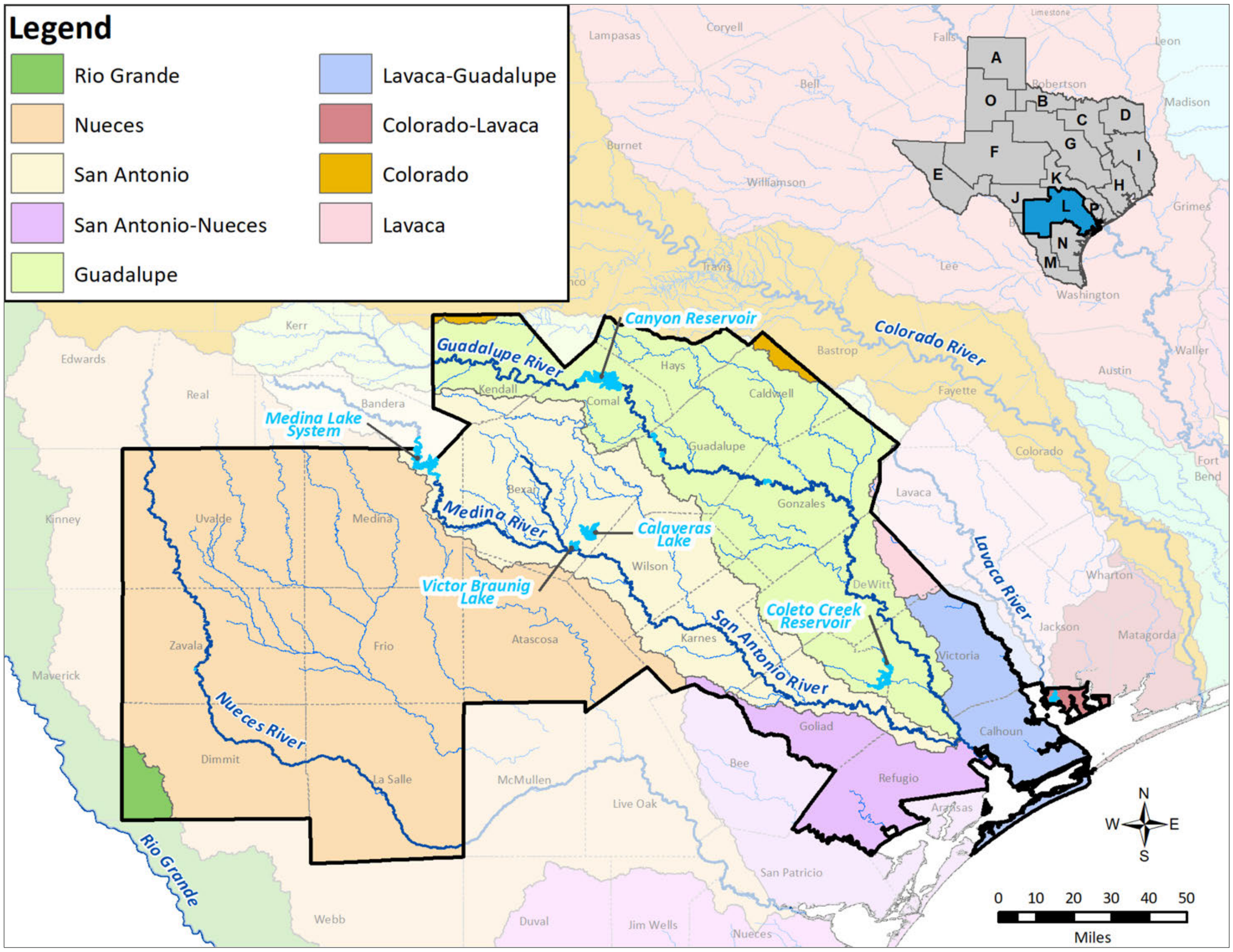

Figure 3-1 River Basins, Major Reservoirs, and Run-of-River Rights

3.2.1.2 Reservoirs

Major reservoirs in the SCTRWPA include Canyon Lake, the Medina Lake System, and three cooling lakes for power generation facilities, including Calaveras Lake, Coleto Creek Reservoir, and Victor Braunig Lake. All major reservoirs within Region L are located in the Guadalupe-San Antonio River Basin and are identified on Figure 3-1.

3.2.1.2.1 Calaveras Lake

CPS Energy owns Calaveras Lake, which is in the San Antonio River Basin in Bexar County to the southeast of San Antonio. The lake is used for steam-electric power plant cooling purposes. CPS Energy has water rights to divert up to 60,000 acre-feet per year (acft/yr) [1] of the unappropriated public waters of the San Antonio River including treated effluent to Calaveras Lake and to consume up to 36,900 acft/yr.

[1] One acft is approximately 325,851 gallons.

3.2.1.2.2 Canyon Reservoir

Constructed by the US Army Corps of Engineers, Canyon Reservoir is in the Guadalupe River Basin in Comal County on the mainstem of the Guadalupe River. Uses of the reservoir include water supply for municipal, industrial, steam-electric power generation, irrigation, and hydroelectric power generation, as well as flood protection and recreation. Diversions from Canyon Reservoir are currently authorized up to a maximum of 120,000 acft/yr and a 5-year rolling average of 90,000 acft/yr.

Water supplies from Canyon Reservoir are managed by the Guadalupe-Blanco River Authority (GBRA) and made available to customers both within their 10 county district and in adjacent counties and/or river basins. Because a portion of its watershed is in Region J, the TWDB has designated Canyon Reservoir as a special water resource.

3.2.1.2.3 Coleto Creek Reservoir

Coleto Creek Reservoir is a cooling reservoir for steam-electric power generation and is located at the border of Victoria and Goliad Counties in the lower Guadalupe River Basin. Sources of water include runoff from the Coleto Creek watershed and diversions from the Guadalupe River, backed by stored water from Canyon Reservoir, when needed. The reservoir supplies water for steam-electric power generation at the Coleto Creek Power Station located in Goliad County. Existing water rights authorize Coleto Creek Power, LP (now owned by Vistra), to divert up to 24,160 acft/yr from the Guadalupe River to Coleto Creek Reservoir and to consume up to 24,160 acft/yr.

3.2.1.2.4 Medina Lake System

The Medina Lake System is located on the Medina River, a tributary of the San Antonio River, in Medina and Bandera Counties. The Medina Lake System is owned by the Bexar-Medina-Atascosa Counties Water Control and Improvement District No. 1 (BMA) and has traditionally been used to supply irrigation water to farms in Bexar, Medina, and Atascosa Counties via the Medina Canal System. San Antonio Water System (SAWS) has contracts with BMA to obtain municipal water supplies from the Medina Lake System; these supplies are capable of being delivered via the bed and banks of the Medina River to a point of diversion near Von Ormy in southwestern Bexar County. The Medina Lake System is unique among the major reservoirs in the SCTRWPA because waters impounded therein contribute recharge. Because of its location on the boundary of Regions L and J, the TWDB has designated the Medina Lake System as a special water resource.

3.2.1.2.5 Victor Braunig Lake

CPS Energy owns Victor Braunig Lake or Braunig Lake, which is in Bexar County to the southeast of San Antonio, in the San Antonio River Basin. The lake is used for steam-electric power plant cooling purposes. CPS Energy has water rights to divert up to 12,000 acft/yr from the San Antonio River to Braunig Lake and to consume up to 12,000 acft/yr at Braunig Lake. Runoff from the watersheds above the reservoirs and diversions from the San Antonio River (including treated effluent discharged by SAWS) are used to maintain necessary lake levels to facilitate efficient power plant operations.

3.2.1.2.6 Other Reservoirs

There are several reservoirs within the SCTRWPA that are not considered major reservoirs because their storage capacity is less than 5,000 acft/yr. These reservoirs include Boerne Lake, Cox Lake, Lake Dunlap, Gonzales Lake, Lake McQueeney, and Upper Nueces Lake. Several of these lakes are owned and operated by GBRA and have hydroelectric power generation authorizations and/or capabilities. In addition to those owned by GBRA, other small reservoirs and associated priority and non-priority water rights for hydroelectric power generation are located along the Guadalupe River at Seguin, Gonzales, and Cuero.

3.2.1.3 Local Surface Water

Local surface water, also known as Livestock Local Supplies, are disbursed, limited, unnamed individual surface water supplies that, separately, are available only to particular WUGs, such as livestock and domestic users. These supplies are generally runoff collection, such as livestock and stock ponds, and are assumed to be fresh water. Local surface water supplies are considered withdrawals that do not require permits.

3.2.2 Groundwater

There are five major and five minor aquifers supplying groundwater to the SCTRWPA. The five major aquifers are the Edwards-Balcones Fault Zone (BFZ), Carrizo-Wilcox, Trinity, Gulf Coast, and Edwards-Trinity (Plateau) Aquifers (Figure 3-2). Minor aquifers include the Sparta, Queen City, Ellenburger-San Saba, Hickory, and Yegua-Jackson Aquifers (Figure 3-3). Additionally, several other aquifers not shown in the figures supply groundwater in the region, including the Austin Chalk, Buda Limestone, San Marcos River Alluvium, and Leona Gravel Aquifers. Chapter 1 includes more detailed descriptions of the aquifers, including water quality characteristics.

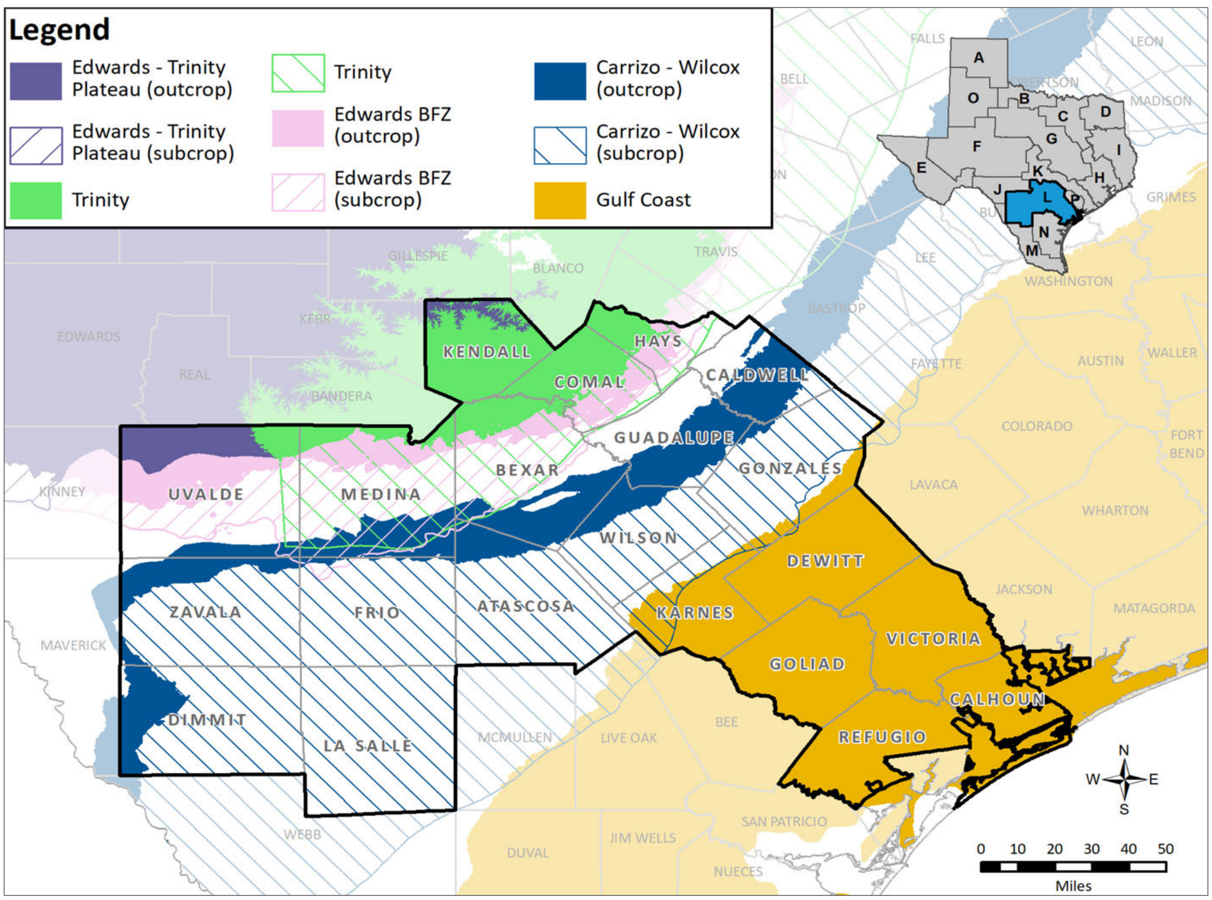

Figure 3-2 Major Aquifers

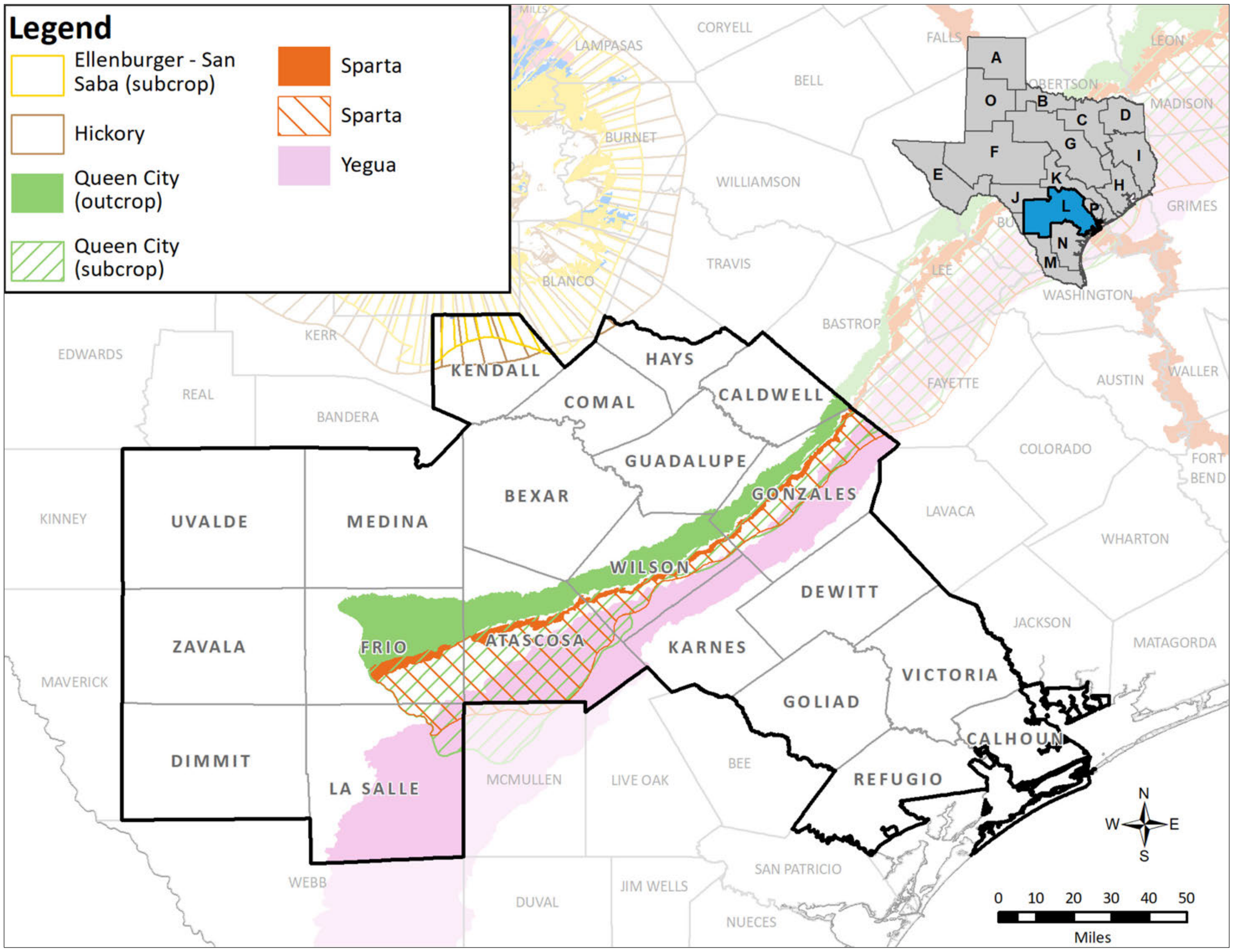

Figure 3-3 **Minor Aquifers**

3.2.3 Reuse

Reuse is the beneficial use of groundwater or surface water that has already been beneficially used. Reuse may be categorized as direct or indirect, and water can be used for potable and non-potable purposes. Reuse supplies that are most commonly used are reclaimed water sources, which is treated effluent from municipal or industrial WWTPs. Reclaimed water is treated to TCEQ-approved safe and suitable levels based on their purpose and location of use.

Water reuse is classified as direct or indirect and potable or non-potable. Direct reuse is defined as the use of reclaimed water that is piped directly from a WWTP to the place where it is utilized. Indirect reuse is defined as the use of reclaimed water by discharging to an intermediate water source, such as surface water or groundwater, where it blends with other water and may be further purified before being removed for non-potable or potable uses. Potable water is treated to drinking water standards and is suitable for direct consumption; whereas non-potable water is used to meet a range of other demands. For regional water planning purposes, this results in the following four classes of reuse:

1. Direct potable;
2. Direct non-potable;
3. Indirect potable; and
4. Indirect non-potable.

The most common class of reuse is direct non-potable for irrigation or industrial uses. Irrigation use may include turf irrigation, or in some cases, crop irrigation. Many forms of indirect reuse have been implemented through the years as discharges from one water user contribute to streamflow or groundwater recharge and are then diverted by a downstream water user. In unique cases involving groundwater-based return flows or interbasin transfers, a discharger may retain a right to its return flows. For planning purposes, indirect reuse is considered water that would require a permit to access it after discharged into surface waters in the state. This form of indirect reuse is limited by the legal complexity required to demonstrate that a discharge increases water availability.

The Title 30 of the Texas Administrative Code (TAC) Chapter 210 authorizes individual producers of reclaimed water to implement water reuse in Texas. Reclaimed water is partitioned into two types: Type I and Type II. Type I reclaimed water may be used where public contact is likely (e.g., irrigation for public facilities or fire protection). Type II reclaimed water may be used in remote, restricted, or controlled, or limited-access areas where human contact is unlikely (e.g., power plant cooling or supply to non-recreational water bodies).

3.3 Hydrologic Assumptions

The following describes the models and assumptions used to estimate the availability of water for surface water, groundwater, and reuse sources in the SCTRWPA. Hydrologic variance requests from the SCTRWPG and approvals by the TWDB are documented in Appendix 3B.

3.3.1 Surface Water

Surface water rights are issued by the TCEQ to permittees, such as individuals, cities, industries, water districts, and river authorities. Each water right includes a priority date, diversion location, maximum diversion rate, and annual quantity of diversion. Some rights may include off-channel storage authorization, ASR storage, instream flow restrictions, and various special conditions. The principle of prior appropriation or "first-in-time-first-in-right" is applied, which means that the most senior, or oldest, right has first call on flows, with the second, third, and more recent rights having second, third, and later priorities for diversions. This procedure gives senior right holders priority when streamflows are low, as in periods of drought, and renders junior rights less reliable during drought. The most junior water right holders may not be able to divert any water during severe drought, if directed by the TCEQ acting through the South Texas Watermaster.

It is important to note that many run-of-river rights are for irrigation purposes, where chances are taken at planting time upon whether water will be available for crop production during the growing season. In fact, when reviewing applications for irrigation rights, TCEQ staff have traditionally considered whether 75% of the proposed diversion would be available in 75% of the years. Municipal, industrial, and steam-electric power users, however, typically require more reliable supplies than are available from run-of-river flows. Hence, these types of users will often develop storage and/or alternative supplies to increase the reliability of their run-of-river rights.

Surface water availability was evaluated for the 2026 Regional Water Plan by applying models to estimate reservoir firm yields and run-of-river firm diversions. Firm yield, or reservoir availability, is the maximum water volume that a reservoir can provide each year under a repeat of the drought of record and includes anticipated sedimentation rates. Anticipated sedimentation is the projected decrease in a reservoir's area-capacity condition resulting in projected firm yield decreases each decade. Firm diversion, or run-of-river availability, is the minimum monthly diversion amount that is available 100% of the time during a repeat of the drought of record.

3.3.1.1 Water Availability Models and Associated Hydrologic Variances

For regional water planning purposes, the default model used to assess surface water availability is the TCEQ Water Availability Model (WAM) Run 3, which assumes that all senior water rights will be utilized, and all applicable permit conditions will be met. The SCTRWPG reviewed, considered, and approved hydrologic assumptions and needed hydrologic variances for submittal to the TWDB at the November 2, 2023, SCTRWPG meeting. On November 15, 2023, the SCTRWPG submitted to the TWDB a Hydrologic Variance Request letter, which included hydrologic variance checklists for the Guadalupe-San Antonio River Basin and the Nueces River Basin. The TWDB subsequently approved the variance requests on January 8, 2024. Appendix 3B includes the TWDB's approval letter of hydrologic variances with attachments that include the initial variance request submitted by Region L and a memorandum regarding hydrologic variance request recommendations.

As described in the hydrologic variance checklists that were approved by TWDB, the SCTRWPG used the TCEQ WAM Run 3 and an alternative surface water model, the "Region L WAM" to assess surface water availabilities. The Region L WAM was used to estimate surface water availabilities for certain reservoirs, including Canyon Reservoir, Victor Braunig Lake, Calaveras Lake, and Coleto-Creek Reservoir. The unmodified WAM Run 3 was used to evaluate firm yields for all other reservoirs in the SCTRWPA. Table 3-1 summarizes the hydrologic models used for the surface water availabilities and existing supplies analysis, including the model name, version date, model input/output files used, date model used and any relevant comments.

Table 3-1 Hydrologic Models Used for the Surface Water Availabilities and Existing Supplies Analysis

Model Name	Version Date	Input/Output Files Used	Date Model Used	Comments
TCEQ Full Authorization WAM for the Guadalupe-San Antonio River Basin	10/1/2023	WRAP SIM input file extensions: DAT, DIS, FLO, EVA, FAD, HIS WRAP SIM output file extensions: OUT WRAP TAB input file extensions: TIN WRAP TAB output file extensions: TOU	December 2023	N/A – None
Region L WAM	WRAP SIM: December 1999 DAT File: February 2004	WRAP SIM input file extensions: DAT, DIS, INF, EVA, FAD, BSP, DAY, HUE, RCH WRAP SIM output file extensions: OUT	December 2023	N/A – None
TCEQ Full Authorization WAM for the Nueces River Basin	10/1/2023	WRAP SIM input file extensions: DAT, DIS, FLO, EVA WRAP SIM output file extensions: OUT WRAP TAB input file extensions: TIN WRAP TAB output file extensions: TOU	December 2023	N/A – None

3.3.1.2 Sedimentation Methodology

Sedimentation is the anticipated decreases in a reservoir's area-capacity condition, resulting in projected firm yield decreases in each decade. Anticipated sedimentation was incorporated into WAM Run 3 models and the Region L WAM. The storage volume - surface area (SV/SA) tables for Canyon Reservoir, Victor Braunig Lake, Calaveras Lake, and Coleto-Creek Reservoir were adjusted to reflect sedimentation for the 2030 and 2080 planning decades. The program, SEDDIS2.exe, was used to execute the Empirical Area-Reduction Method (EARM). The EARM was developed by Borland and Miller (1960)[2] for the Bureau of Reclamation as a means to mathematically distribute a given sediment loading across the topology of a large reservoir. The EARM inputs include pre-sedimentation SV/SA tables and a projected sediment load. The modified SV/SA tables were computed for each reservoir for the 2030 and 2080 decades.

3.3.1.3 Local Surface Water

Local surface water availabilities, or livestock local supplies, were estimated for the 2026 Regional Water Plan using the most current accessible information. For all areas within the planning region, livestock water demand is generally assumed to be supplied 50 percent (%) from quantified groundwater sources and 50% from local surface water and unquantified groundwater sources such as stock tanks, streams, and windmills. This assumption is based on data from the TWDB historic water use estimates, which indicate that the counties within the SCTRWPA average approximately 60% groundwater supply to meet livestock use over the past ten years (2011-2021). Because the demands are based on a drought year scenario, it was assumed that ranchers will manage their livestock in such a way that populations will be maintained at a level that can be supported by a combination of local surface water supplies and known water or groundwater supplies. Livestock water supply is set equal to projected livestock demands due to the nature of livestock water use. Livestock demand tends to match the available supply. If the supply is not present, the livestock numbers are reduced until they match the available supply. Infrastructure is not a consideration for livestock supplies, and livestock pumpage is typically exempt from regulations; therefore, there are no regulatory considerations that might impact livestock groundwater supplies.

3.3.2 Groundwater

For the 2026 Regional Water Plan, groundwater availabilities generally fall into the following categories:

1. MAG Estimates Provided by the TWDB;
2. DFC-Compatible Estimates Provided by the TWDB; and
3. Regional Water Planning Group (RWPG) Estimates Developed by the SCTRWPG.

Groundwater availabilities were estimated using a combination of sources, including TWDB groundwater availabilities, published reports, and historical data and information. Groundwater availability estimates provided by TWDB were developed through a combination of aquifer characteristics and policy decisions, made primarily by GCDs and groundwater management areas (GMAs). GCDs and GMAs within the SCTRWPA are discussed in Chapter 1 of this plan and on the TWDB website at http://www.twdb.texas.gov/groundwater/index.asp.

Groundwater is regulated locally by GCDs except in locations that do not have a district. In areas that do not have a district, water availability may be set by a county commissioners' court pursuant to Texas Water Code (TWC) §35.019. There are 18 GCDs that serve all or a portion of a county within the

[2] Borland, W.M., Miller, C.R., 1960. Distribution of Sediment in Large Reservoirs. Transactions of the American Society of Civil Engineers. Vol. 125. Iss. 1. DOI: 10.1061/TACEAT.0007776

SCTRWPA (Figure 3-4). The responsibilities and authorities of these GCDs vary depending on legislation and governing law, and some districts are not responsible for all aquifers within the geographic boundaries of the district. GCDs may issue permits that regulate management of groundwater in their jurisdiction, such as groundwater pumping and spacing of wells.

GMAs are a different concept in that every county in the State is in one or more of sixteen GMAs. For the most part, the major aquifers are not split across multiple GMAs, and the goal is to manage entire aquifer systems across political subdivisions in a consistent way. Multiple GCDs within a single GMA coordinate to adopt the desired future conditions (DFCs) of relevant aquifers within that area. DFCs are the desired, quantified conditions of groundwater resources, such as water levels, water quality, spring flows, or volumes at a specified time or times in the future or in perpetuity. The TWDB uses the DFCs established by GMAs to determine a MAG value for an aquifer or portion of an aquifer.

There are five GMAs located wholly or partially within the SCTRWPA, including GMAs 7, 9, 10, 13, and 15. Figure 3-5 provides a map of the GMAs within the SCTRWPA. The TWDB develops MAG reports for each GMA, which show groundwater availability for discrete geographic-aquifer units. The following provides a list of the most-recent MAG reports for each GMA within the SCTRWPA:

- GR21-012 MAG (GMA 7);
- GR21-014 MAG (GMA 9);
- GR21-015 MAG (GMA 10);
- GR21-018 MAG (GMA 13); and
- GR21-020 MAG (GMA 15).

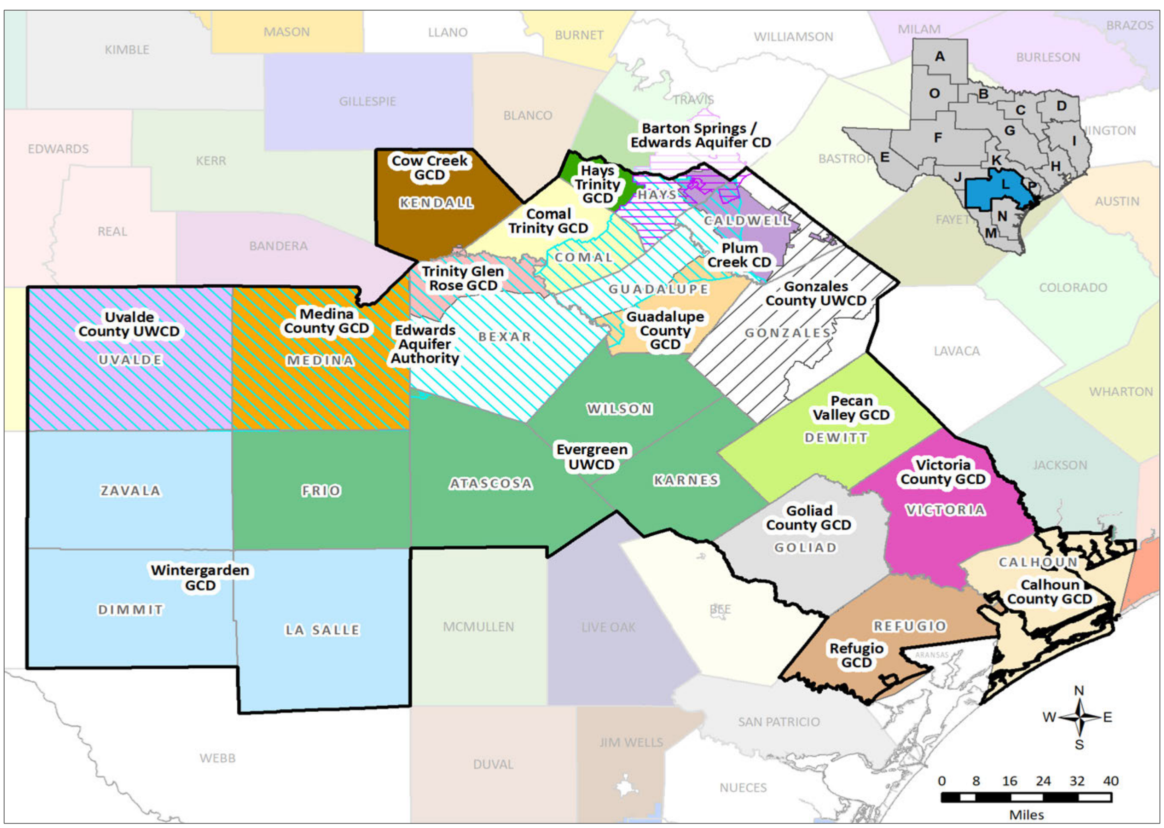

Figure 3-4 Groundwater Conservation Districts

There are several Priority Groundwater Management Areas (PGMAs) around the State, with portions of the Hill Country PGMA located within Region L. PGMAs are established to ensure management of groundwater in areas with critical groundwater problems and to consider the need for creating GCDs. PGMAs are designated or delineated by the TCEQ for areas that are experiencing or are expected to experience critical groundwater problems within 50 years, including shortages of surface water or groundwater, land subsidence resulting from groundwater withdrawal, or contamination of groundwater supplies. Each Region L county located within the Hill Country PGMA has a GCD: the Cow Creek GCD in Kendall County, the Comal Trinity GCD in Comal County, the Hays Trinity GCD in Hays County, and the Trinity Glen Rose GCD in Bexar County. These GCDs give notice to area residents that the declaration of the PGMA means that their water availability and quality will be at risk within the next 50 years. The Hays County Development Regulations have specific requirements listed for subdivisions served by individual water wells producing local groundwater within the PGMA. These requirements can be found in Chapter 715, Sub-Chapter 3, Section 3.05 of the Hays County Development Regulations.

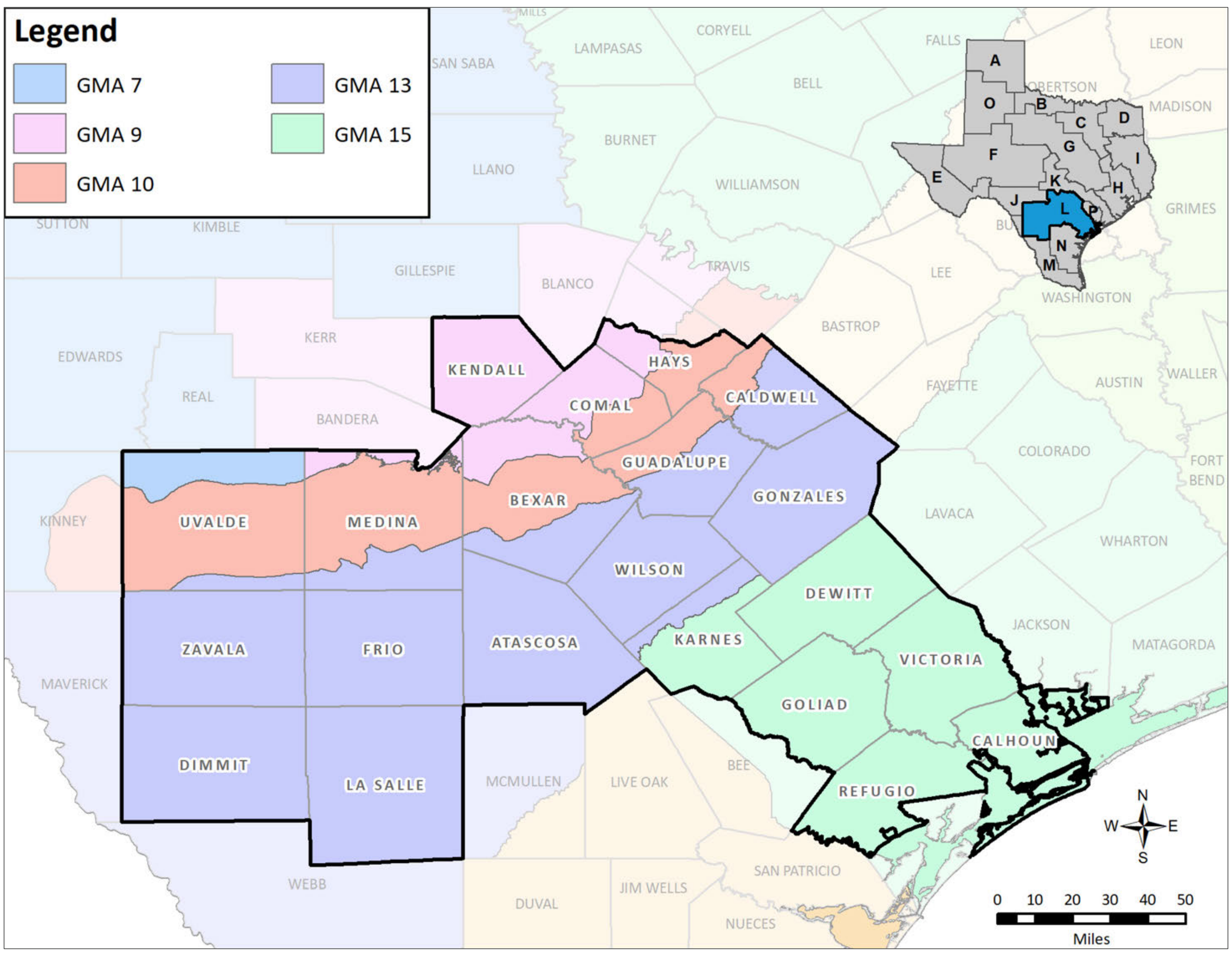

Figure 3-5 Groundwater Management Areas

3.3.2.1 Modeled Available Groundwater and DFC-Compatible Availability Estimates

TWDB staff translate DFCs from GMAs into MAG estimates using approved Groundwater Availability Models (GAMs) or other approaches, if a GAM is not applicable. A MAG estimate is the amount of groundwater production, on an annual basis, which will achieve a DFC. The DFC in a specific location may not be achieved if groundwater production exceeds the MAG volume over the long term. Therefore, for regional water planning purposes, the total anticipated groundwater production in any planning decade may not exceed the MAG volume in any county-aquifer-basin location (total groundwater production includes quantities associated with both existing supplies and any recommended water management strategies [WMSs]). This prevents RWPGs from recommending WMSs with supply volumes that would result in exceeding (i.e., "overdrafting") approved MAG volumes.

The SCTRWPG did not reallocate annual MAG volumes or use MAG Peak Factors in the 2026 Region L Regional Water Plan. In addition to the MAG estimates, the TWDB provided non-MAG availabilities that align with DFC pumping for non-relevant aquifers and local groundwater supply areas.

3.3.2.2 RWPG-Estimated Groundwater Availabilities

In addition to the TWDB-provided MAG and non-MAG availabilities, RWPGs may estimate groundwater availabilities for certain non-MAG aquifers or portions thereof. The SCTRWPG developed RWPG-estimated groundwater availabilities for the following geographic locations and aquifers:

- Carrizo-Wilcox Aquifer in Karnes County;
- Edwards-BFZ Aquifer in Portions of Counties Regulated by the Edwards Aquifer Authority (EAA);
- Edwards-BFZ Aquifer in Frio County;
- Leona Gravel Aquifer in Medina County; and
- San Marcos River Alluvium in Caldwell County.

The SCTRWPG developed groundwater availabilities by referencing published groundwater reports, maximum historic annual production volumes, contracts, permit limitations, and other limitations. More information about how these RWPG-estimated groundwater availabilities were developed is included in the Region L Technical Memorandum in Appendix 3C [3].

In the case of the Edwards-BFZ Aquifer, Senate Bill (SB) 3 of the 80th Texas Legislature requires the EAA to cooperatively develop a Recovery Implementation Program (RIP) through a facilitated, consensus-based process that involves input from the United States Fish and Wildlife Service, other appropriate federal agencies, and all interested stakeholders, including those listed under Section 1.26A(e)(1) of the EAA Act. In 2013, the Edwards Aquifer Habitat Conservation Plan (EAHCP) was approved, which included four components that affect water supply from the portions of the Edwards-BFZ Aquifer regulated by EAA, as follows:

- Voluntary Irrigation Suspension Program Option;
- Additional municipal conservation measures;
- SAWS Aquifer Storage and Recovery (ASR) tradeoff; and
- Emergency Stage V critical period reductions.

It should be noted that for long-term planning purposes, programs contained within the EAHCP and associated with its fifteen-year incidental take permit may be adjusted as the plan is resubmitted for approval upon expiration of the permit in 2028.

[3] For clarity and accuracy, appendices from the referenced 2024 Technical Memorandum in Appendix 3C are excluded from this Regional Water Plan. In some instances, the appendices of the Technical Memorandum are duplicates of those already contained here. In other instances, the data and information contained in the appendices have been superseded and may conflict with current data presented herein.

For portions of the Edwards-BFZ Aquifer that are regulated by EAA, the groundwater availabilities and existing supplies are based on the drought year reliable supply of EAA-issued permits. The EAA Act limits permitted withdrawals to 572,000 acre-feet per year (acft/yr) [4]; however, during a drought year, the reliable supply of these permits is reduced by 41% to 73%, depending on the pool and permitted use type. Therefore, the total reliable supply or total groundwater availabilities for the EAA-regulated portions of the Edwards-BFZ Aquifer is 296,553 acft/yr, including estimated exempt federal and domestic and livestock production.

3.3.3 Reuse

The SCTRWPG determined reuse/recycled water supplies based on the estimated amount of water returned to a utility's WWTP for each decade, less the amount of reuse water already being utilized as existing supply. The upper limit of source water available for reuse WMSs will be determined based on the amount of water returned to a utility's WWTP, estimated at 50% of the utility's projected water demands, adjusted for water conservation and drought management strategies, unless site specific information is available.

3.4 Water Availability and Existing Water Supplies Identification

The following sections present results of the evaluation of water availabilities and existing water supplies for surface water, groundwater, and reuse water sources within the SCTRWPA.

3.4.1 Surface Water

Surface water plays a crucial role in the overall water supply within the SCTRWPA. Surface water resources include run-of-river supplies from rivers and stored water from reservoirs or other impoundments.

3.4.1.1 Run-of-River

The firm run-of-river availability within the SCTRWPA is estimated to be 86,465 acft/yr, as summarized in Table 3-2. Run-of-river water availability was determined based upon the minimum monthly diversion amount, as calculated in the appropriate WAM. Firm diversion and firm yield amounts have been assigned to specific WUGs, county-aggregated WUGs, river basins, and sources, as appropriate. This assignment of firm diversion and yield amounts is representative of existing surface water supplies and is detailed by county, river basin, and WUG group in DB27 reports, included in Appendix 3A. Run-of-river reliability, including firm (or minimum monthly) diversions, for water rights in the Nueces, Guadalupe, and San Antonio River Basins is summarized in Appendix 3D.

Table 3-2 Run-of-River Availabilities by Source (acft/yr)

Source	2030	2040	2050	2060	2070	2080
Guadalupe Run-of-River	83,862	83,862	83,862	83,862	83,862	83,862
Nueces Run-of-River	1,405	1,405	1,405	1,405	1,405	1,405
San Antonio Run-of-River	1,198	1,198	1,198	1,198	1,198	1,198
Total	**86,465**	**86,465**	**86,465**	**86,465**	**86,465**	**86,465**

[4] One acft is approximately 325,851 gallons.

3.4.1.2 Reservoirs

The firm yield, or dependable supply of water available during a repeat of the drought of record, was estimated for each of the major reservoirs in the SCTRWPA. Firm yield takes into account potential supply reductions because of sedimentation.

The firm yield of reservoirs in the SCTRWPA is estimated to be 164,064 acft/yr in 2030, gradually decreasing to 162,846 acft/yr in 2080 because of sedimentation. A summary of the firm yields for major reservoirs and other reservoirs is included in Table 3-3. Information for major reservoirs, firm yields, and associated water rights within the SCTRWPA are summarized in Table 3-4.

Table 3-3 Reservoir Availabilities by Source (acft/yr)

Source	2030	2040	2050	2060	2070	2080
Boerne Lake/Reservoir	648	648	648	648	648	648
Calaveras Lake/Reservoir	36,900	36,900	36,900	36,900	36,900	36,900
Canyon Lake/Reservoir	86,138	85,992	85,848	85,704	85,559	85,414
Coleto Creek Lake/Reservoir	24,160	24,160	24,160	24,160	23,926	23,666
Cox Lake/Reservoir	3,992	3,992	3,992	3,992	3,992	3,992
Dunlap Lake/Reservoir	0	0	0	0	0	0
Gonzales (H-4) Lake/Reservoir	0	0	0	0	0	0
McQueeney Lake/Reservoir	0	0	0	0	0	0
Upper Nueces Lake/Reservoir	226	226	226	226	226	226
Victor Braunig Lake/Reservoir	12,000	12,000	12,000	12,000	12,000	12,000
Total	**164,064**	**163,918**	**163,774**	**163,630**	**163,251**	**162,846**

3.4.1.2.1 Calaveras Lake

The existing water right held by CPS Energy authorizes diversion of up to 60,000 acft/yr of the unappropriated public waters of the San Antonio River including treated effluent to Calaveras Lake and to consume up to 36,900 acft/yr. Firm yield estimates for Calaveras Lake using the Region L WAM are greater than the authorized diversion amounts in the water right. Therefore, the 2030-2080 firm yields included in DB27 are the authorized diversion amounts in the water rights. For Calaveras Lake, the DB27 firm yield is 36,900 acft/yr for all decades within the planning horizon. Based on sedimentation analyses performed using the Region L WAM, sedimentation is not expected to have an impact on firm yield for Calaveras Lake.

3.4.1.2.2 Canyon Reservoir

GBRA is authorized to divert a maximum of 120,000 acft/yr and a 5-year rolling average of 90,000 acft/yr. The firm yield of Canyon Reservoir is dependent upon a number of factors including points of diversion for contracted supplies, Edwards Aquifer springflow, term recreational flow agreements, and discharge of treated effluent throughout the Guadalupe - San Antonio River Basin. Subject to the hydrologic assumptions and operational procedures, firm yield estimates for Canyon Reservoir decrease over the planning horizon because of sedimentation impacts. For purposes of regional water planning (including DB27), the projected firm yield for Canyon Reservoir has been quantified as 86,138 acft/yr in 2030, decreasing to 85,414 acft/yr in 2080.

Table 3-4 Summary of Major Reservoirs in the South Central Texas Region

Reservoir	River Basin	Water Right Owner	Certificate of Adjudication Number	Authorized Diversion (acft/yr)	Firm Yield in 2030 (acft/yr)	Purposes
Calaveras Reservoir	San Antonio	City Public Service Board of San Antonio (CPS Energy)	19-2162	36,900	36,900 [1]	Steam-electric power generation
Canyon Reservoir	Guadalupe	GBRA	18-2074	120,000	86,138 [2]	Municipal, industrial, steam-electric, hydropower, irrigation, flood protection
Coleto Creek Reservoir	Guadalupe	Coleto Creek Power, LP	18-5486	24,160	24,160 [1]	Steam-electric power generation
Medina Lake System	San Antonio	Bexar-Medina-Atascosa Counties WCID 1	19-2130	70,750	0	Irrigation, municipal, domestic, livestock
Victor Braunig Lake	San Antonio	City Public Service Board of San Antonio (CPS Energy)	19-2161	12,000	12,000 [1]	Steam-electric power generation

Notes

1. Sedimentation is not expected to have an impact on firm yield for Victor Braunig Lake, Calaveras Lake, or Coleto Creek Reservoir.
2. The estimated firm yield of Canyon Reservoir decreases due to sedimentation. For regional water planning purposes, the projected firm yield for Canyon Reservoir is 86,138 acft/yr in 2030, decreasing to 85,414 acft/yr in 2080.

3.4.1.2.3 Coleto Creek Reservoir

Coleto Creek Power, LP, is authorized to divert up to 24,160 acft/yr from the Guadalupe River to Coleto Creek Reservoir and to consume up to 24,160 acft/yr. Firm yield estimates for Coleto Creek Reservoir using the Region L WAM are greater than the authorized diversion amount in the water right. Therefore, the 2030-2080 firm yields included in DB27 are the authorized diversion amounts in the water rights. For Coleto Creek Reservoir, the DB27 firm yield is 24,160 acft/yr for all decades within the planning horizon. Based on sedimentation analyses performed using the Region L WAM, sedimentation is not expected to have an impact on firm yield for Coleto Creek Reservoir.

3.4.1.2.4 Medina Lake System

Because of the extensive recharge and special conditions within Certificate of Adjudication (CA) No. 19-2130, as amended, the firm yield of the Medina Lake System during a repeat of the drought of record is estimated to be essentially zero. Hence, the Medina Lake System cannot be included as an existing source of surface water supply in Region L because there is no firm yield. Sedimentation is not expected to have an impact on firm yield.

Region L does not identify the Medina Lake System as a firm source of supply during drought; therefore, it is assumed that there are no conflicts with any water supply contracts or option agreements held by entities in Region J. It is further assumed that interests upstream of Medina Lake will obtain the necessary water rights permit(s) for diversion from the Medina River and/or its tributaries and will mitigate any associated impacts upon recharge of the Edwards Aquifer within Region L.

3.4.1.2.5 Victor Braunig Lake

CPS Energy is authorized under its existing water rights to divert and consume up to 12,000 acft/yr from the San Antonio River. The reservoir and supplemental authorized diversions from the adjacent river could support a firm yield greater than the authorized consumptive use; however, operations of steam-electric power generation facilities could be affected. Firm yield estimates for Braunig Lake using the Region L WAM are greater than the authorized diversion amount in the water right. Therefore, the 2030-2080 firm yields included in DB27 are the authorized diversion amounts in the water rights. For Braunig Lake, the DB27 firm yield is 12,000 acft/yr for all decades within the planning horizon. Based on sedimentation analyses performed using the Region L WAM, sedimentation is not expected to have an impact on firm yield for Braunig Lake.

3.4.1.2.6 Other Reservoirs

The majority of the reservoirs within the SCTRWPA that are not considered major reservoirs are hydroelectric power generation lakes. Because hydroelectric power generation is typically a non-consumptive use of water, water available to these rights is not listed in Table 3-4. All water rights are, however, included on a priority basis in the assessment of surface water supply using the WAMs and are summarized in Appendix 3D.

3.4.1.3 Local Surface Water

Local surface water availabilities and supplies within the SCTRWPA is estimated to be 11,118 acft/yr, as summarized in Table 3-5. For the 2026 South Central Texas Regional Water Plan, local surface water availabilities and supplies were assumed for all counties with livestock demands. Due to the nature of livestock water use, local surface water supplies are equal to projected livestock demands.

Table 3-5 Local Surface Water Availabilities by County and Basin (acft/yr)

Source County	Source Basin	2030	2040	2050	2060	2070	2080
Atascosa	Nueces	767	767	767	767	767	767
Atascosa	San Antonio	2	2	2	2	2	2
Bexar	Nueces	31	31	31	31	31	31
Bexar	San Antonio	463	463	463	463	463	463
Caldwell	Colorado	20	20	20	20	20	20
Caldwell	Guadalupe	396	396	396	396	396	396
Calhoun	Colorado-Lavaca	23	23	23	23	23	23
Calhoun	Lavaca-Guadalupe	119	119	119	119	119	119
Calhoun	San Antonio-Nueces	0	0	0	0	0	0
Comal	Guadalupe	118	118	118	118	118	118
Comal	San Antonio	18	18	18	18	18	18
DeWitt	Guadalupe	660	660	660	660	660	660
DeWitt	Lavaca	133	133	133	133	133	133
DeWitt	Lavaca-Guadalupe	12	12	12	12	12	12
DeWitt	San Antonio	64	64	64	64	64	64
Dimmit	Nueces	172	172	172	172	172	172
Dimmit	Rio Grande	12	12	12	12	12	12
Frio	Nueces	482	482	482	482	482	482
Goliad	Guadalupe	100	100	100	100	100	100
Goliad	San Antonio	156	156	156	156	156	156
Goliad	San Antonio-Nueces	140	140	140	140	140	140
Gonzales	Guadalupe	2,050	2,050	2,050	2,050	2,050	2,050
Gonzales	Lavaca	20	20	20	20	20	20
Guadalupe	Guadalupe	493	493	493	493	493	493
Guadalupe	San Antonio	97	97	97	97	97	97
Hays	Guadalupe	140	140	140	140	140	140
Karnes	Guadalupe	21	21	21	21	21	21
Karnes	Nueces	38	38	38	38	38	38
Karnes	San Antonio	394	394	394	394	394	394
Karnes	San Antonio-Nueces	25	25	25	25	25	25

Source County	Source Basin	2030	2040	2050	2060	2070	2080
Kendall	Colorado	2	2	2	2	2	2
Kendall	Guadalupe	172	172	172	172	172	172
Kendall	San Antonio	21	21	21	21	21	21
La Salle	Nueces	197	197	197	197	197	197
Medina	Nueces	444	444	444	444	444	444
Medina	San Antonio	85	85	85	85	85	85
Refugio	San Antonio	21	21	21	21	21	21
Refugio	San Antonio-Nueces	210	210	210	210	210	210
Uvalde	Nueces	1,025	1,025	1,025	1,025	1,025	1,025
Victoria	Guadalupe	228	228	228	228	228	228
Victoria	Lavaca	2	2	2	2	2	2
Victoria	Lavaca-Guadalupe	242	242	242	242	242	242
Victoria	San Antonio	19	19	19	19	19	19
Wilson	Guadalupe	36	36	36	36	36	36
Wilson	Nueces	103	103	103	103	103	103
Wilson	San Antonio	717	717	717	717	717	717
Zavala	Nueces	428	428	428	428	428	428
Total	**All**	**11,118**	**11,118**	**11,118**	**11,118**	**11,118**	**11,118**

3.4.2 Groundwater

As described in Section 3.3.2 above, groundwater availability estimates are subdivided into discrete geographic-aquifer units (i.e., aquifer/county/river basin), as supplied by the TWDB. Groundwater availabilities consist of MAG estimates, as calculated by TWDB on or before April 12, 2023, DFC-compatible availability estimates, as calculated by TWDB, and RWPG-estimated groundwater estimates. Table 3-6 provides a summary of groundwater availabilities by county and aquifer, along with the methodology or reference used to estimate the availabilities.

Table 3-6 Groundwater Availabilities by County and Aquifer (acft/yr)

County	Aquifer	Availability Methodology	2030	2040	2050	2060	2070	2080
Atascosa	Carrizo-Wilcox	A	54,397	55,329	56,828	58,406	59,982	59,982
Atascosa	Edwards-BFZ	E	667	667	667	667	667	667
Atascosa	Queen City	A	4,525	4,537	4,495	4,390	4,285	4,285
Atascosa	Sparta	A	1,187	1,043	998	961	932	932
Atascosa	Trinity	C	0	0	0	0	0	0
Atascosa	Yegua-Jackson	C, D	856	856	856	856	856	856
Bexar	Carrizo-Aquifer ASR	J	200,000	200,000	200,000	200,000	200,000	200,000
Bexar	Carrizo-Wilcox	A	68,451	68,928	68,739	67,653	67,849	67,849
Bexar	Edwards-BFZ	E	212,241	212,241	212,241	212,241	212,241	212,241
Bexar	Trinity	A, B, C	24,856	24,856	24,856	24,856	24,856	24,856
Caldwell	Carrizo-Wilcox	A	24,877	32,775	42,514	45,688	49,635	49,594
Caldwell	Edwards-BFZ (Saline)	A, B	1,410	1,410	1,410	1,410	1,410	1,410
Caldwell	Queen City	A	4,829	4,557	4,545	4,545	3,977	3,977
Caldwell	San Marcos River Alluvium	I	271	271	271	271	271	271
Caldwell	Trinity	A, B	10	10	10	10	10	10
Calhoun	Gulf Coast	A	7,611	7,611	7,611	7,611	7,611	7,611
Comal	Edwards-BFZ	E	13,728	13,728	13,728	13,728	13,728	13,728
Comal	Trinity	A, B	43,088	43,088	43,088	43,088	43,088	43,088
DeWitt	Carrizo-Wilcox	C	0	0	0	0	0	0
DeWitt	Gulf Coast	A	17,958	17,912	17,827	17,806	17,784	17,772
Dimmit	Carrizo-Wilcox	A	3,885	3,895	3,885	3,885	3,885	3,885
Frio	Carrizo-Wilcox	A	86,995	85,143	82,950	81,018	79,131	79,131
Frio	Edwards-BFZ	G	23,213	23,213	23,213	23,213	23,213	23,213
Frio	Queen City	A	4,533	4,380	4,231	4,066	3,927	3,927
Frio	Sparta	A	623	603	576	557	534	534
Frio	Yegua-Jackson	C, D	0	0	0	0	0	0
Goliad	Gulf Coast	A	6,254	6,436	6,615	6,791	6,972	6,972
Gonzales	Carrizo-Wilcox	A	76,265	90,788	102,373	102,747	103,707	96,161
Gonzales	Gulf Coast	C	0	0	0	0	0	0

County	Aquifer	Availability Methodology	2030	2040	2050	2060	2070	2080
Gonzales	Queen City	A, C	4,960	4,973	4,960	4,960	4,500	4,500
Gonzales	Sparta	A, C	2,451	2,457	2,451	2,451	2,451	2,451
Gonzales	Yegua-Jackson	A	4,728	4,728	4,728	4,728	4,728	4,728
Guadalupe	Carrizo-Wilcox	A	39,563	41,668	43,315	42,118	42,199	41,659
Guadalupe	Edwards-BFZ	E	293	293	293	293	293	293
Guadalupe	Queen City	A	0	0	0	0	0	0
Guadalupe	Trinity	A, B	660	660	660	660	660	660
Hays	Edwards-BFZ (Fresh and Saline)	A, B, C, E	9,990	9,990	9,990	9,990	9,990	9,990
Hays	Hickory	C, D	0	0	0	0	0	0
Hays	Trinity	A, B, C	7,111	7,111	7,111	7,111	7,111	7,111
Karnes	Carrizo-Wilcox	F	1,212	1,212	1,212	1,212	1,212	1,212
Karnes	Gulf Coast	A	10,525	3,404	3,399	3,227	2,952	2,949
Karnes	Yegua-Jackson	A, C	2,013	2,013	2,013	2,013	2,013	2,013
Kendall	Edwards-Trinity-Plateau	A	199	199	199	199	199	199
Kendall	Ellenburger-San Saba	A	62	63	62	63	62	63
Kendall	Hickory	A	140	140	140	140	140	140
Kendall	Trinity	A, B	11,139	11,139	11,139	11,139	11,139	11,139
La Salle	Carrizo-Wilcox	A	6,536	6,554	6,536	6,536	6,536	6,536
La Salle	Queen City	A	1	1	1	1	1	1
La Salle	Sparta	A	0	0	0	0	0	0
La Salle	Yegua-Jackson	C, D	92	92	92	92	92	92
Medina	Carrizo-Wilcox	A	2,628	2,635	2,628	2,628	2,628	2,628
Medina	Edwards-BFZ	E	32,428	32,428	32,428	32,428	32,428	32,428
Medina	Leona Gravel	H	7,245	7,245	7,245	7,245	7,245	7,245
Medina	Trinity	A, B, C	9,002	9,002	9,002	9,002	9,002	9,002
Refugio	Gulf Coast	A	5,866	5,866	5,866	5,866	5,866	5,866
Uvalde	Austin Chalk	A, B	2,935	2,935	2,935	2,935	2,935	2,935
Uvalde	Buda Limestone	A, B	758	758	758	758	758	758

County	Aquifer	Availability Methodology	2030	2040	2050	2060	2070	2080
Uvalde	Carrizo-Wilcox	A	0	0	0	0	0	0
Uvalde	Edwards-BFZ	E	29,855	29,855	29,855	29,855	29,855	29,855
Uvalde	Edwards-Trinity-Plateau, Pecos Valley, and Trinity	A, B	1,993	1,993	1,993	1,993	1,993	1,993
Uvalde	Leona Gravel	A, B	9,385	9,385	9,385	9,385	9,385	9,385
Uvalde	Trinity	A, B, C	791	791	791	791	791	791
Victoria	Gulf Coast	A	59,948	59,948	59,948	59,948	59,948	59,948
Wilson	Carrizo-Wilcox	A	38,284	43,604	68,609	105,947	125,670	125,670
Wilson	Queen City	A	1,423	1,267	1,123	1,000	892	892
Wilson	Sparta	A	182	163	144	128	114	114
Wilson	Yegua-Jackson	C, D	859	859	859	859	859	859
Zavala	Carrizo-Wilcox	A	36,675	35,399	35,204	35,006	34,831	34,540
Zavala	Edwards-BFZ	C	0	0	0	0	0	0
Total	**All**	**All**	**1,224,662**	**1,245,107**	**1,291,601**	**1,329,171**	**1,352,029**	**1,343,597**

A = MAG

B = MAG values valid for portion of planning horizon; values from earlier decades are carried forward through 2080.

C = All or portions are considered non-relevant and not modeled.

D = TWDB-modeled, DFC-compatible availabilities.

E = Permitted Amount: Contracts, permits, and limitations consistent with EAHCP and EAA Act.

F = Published Reports/Data: Maximum Historic TWDB Water Use Survey Detailed Groundwater Pumpage by County (2019-2021).

G = Published Reports/Data: TWDB GTA Aquifer Assessment 10-40 MAG: Analytical Model Estimates of Modeled Available Groundwater for the Edwards Aquifer within Frio County in GMA 13 (2012).

H = Published Reports/Data: Average Historic Leona Gravel Aquifer Groundwater Pumpage (2010-2019).

I = Published Reports/Data: TWDB "Report 12, Groundwater Resources of Caldwell County, Texas" (1966).

J = SAWS ASR Availability

Projected groundwater supplies available in the SCTRWPA under drought of record conditions are 1,224,662 acft/yr in 2030 and 1,343,597 acft/yr in 2080 (Table 3-7). Supplies from most aquifers are projected to hold steady on an annual basis throughout the 2030 to 2080 projection period. The supply available from the Carrizo-Wilcox Aquifer is projected to increase from 439,768 acft/yr in 2030 to 568,847 acft/yr in 2080. The supplies available from the Gulf Coast Aquifer are projected to generally decrease from 2030 to 2080, while the supplies available from the Sparta and Queen City Aquifers are projected to decline slightly over the same projection period.

Table 3-7 Groundwater Availability by Source (acft/yr)

Source/Aquifer	2030	2040	2050	2060	2070	2080
Austin Chalk Aquifer	2,935	2,935	2,935	2,935	2,935	2,935
Buda Limestone Aquifer	758	758	758	758	758	758
Carrizo-Aquifer ASR	200,000	200,000	200,000	200,000	200,000	200,000
Carrizo-Wilcox Aquifer	439,768	467,930	514,793	552,844	577,265	568,847
Edwards-BFZ Aquifer	323,825	323,825	323,825	323,825	323,825	323,825
Edwards-Trinity-Plateau Aquifer	199	199	199	199	199	199
Edwards-Trinity-Plateau, Pecos Valley, and Trinity Aquifers	1,993	1,993	1,993	1,993	1,993	1,993
Ellenburger-San Saba Aquifer	62	63	62	63	62	63
Gulf Coast Aquifer System	108,162	101,177	101,266	101,249	101,133	101,118
Hickory Aquifer	140	140	140	140	140	140
Leona Gravel Aquifer	16,630	16,630	16,630	16,630	16,630	16,630
Queen City Aquifer	20,271	19,715	19,355	18,962	17,582	17,582
San Marcos River Alluvium Aquifer	271	271	271	271	271	271
Sparta Aquifer	4,443	4,266	4,169	4,097	4,031	4,031
Trinity Aquifer	96,657	96,657	96,657	96,657	96,657	96,657
Yegua-Jackson Aquifer	8,548	8,548	8,548	8,548	8,548	8,548
Total	**1,224,662**	**1,245,107**	**1,291,601**	**1,329,171**	**1,352,029**	**1,343,597**

3.4.2.1 Assumptions for Assessment of Existing Groundwater Supplies

Results of the evaluation of water supply results by WUG is included in Appendix 3A. Assumptions regarding allocation of groundwater supplies are detailed below:

1. Groundwater supplies are subdivided into geographic-aquifer units (Aquifer/County/Basin). Supplies within a geographic-aquifer unit cannot exceed groundwater availability.
2. Municipal supplies from all aquifers except the EAA portion of the Edwards Aquifer were estimated according to the following process:
    a. With respect to municipal utilities, it is important to note that the existing supplies, after generally accounting for the ratio of peak to average day water demands, are equal to the lesser of the tested well capacities as reported to the TCEQ or the MAG as calculated by the TWDB. Existing supplies are not necessarily representative of current or projected groundwater use.
    b. For entities using groundwater, supplies were estimated using a variety of sources of information, including responses from the WUG or WWP to the Region L Supplies &

Strategies Survey, direct coordination with the WUG or WWP, well capacities as reported by the TCEQ Drinking Water Watch (DWW) with adjustments to account for a peak to average day water demand ratio of 2:1, Historic TWDB Groundwater Pumpage Data, TWDB water use surveys, permit information provided by GCDs, and data reported in the 2021 Region L Regional Water Plan. In cases in which the total demand on that portion (i.e., county and river basin) of the aquifer exceeds the total availability, supply is prorated downward for every entity using that particular geographic-aquifer unit.

3. Industrial supply from groundwater (except for the EAA portion of the Edwards Aquifer) is associated with aquifers underlying the river basin portion of the county. Using best available data from the TWDB Water Use Survey or historical groundwater pumpage, the industrial supply is generally set equal to the maximum or average industrial groundwater pumpage within the 2000 to 2021 time period. In cases in which the total demand on that portion (i.e., county and river basin) of the aquifer exceeds the total availability, supply is prorated downward for every entity using that particular geographic-aquifer unit.

4. Steam-electric supply from groundwater (except for the EAA portion of the Edwards Aquifer) is associated with aquifers underlying the river basin portion of the county. Using best available data from the TWDB Water Use Survey or historical groundwater pumpage, the steam-electric supply is generally set equal to the maximum steam-electric groundwater pumpage within the 2000 to 2021 time period. In cases in which the total demand on that portion (i.e., county and river basin) of the aquifer exceeds the total availability, supply is prorated downward for every entity using that particular geographic-aquifer unit.

5. TWDB historic water use data indicate that the majority of irrigation demands in the SCTRWPA are supplied by groundwater. Irrigation supply from groundwater (except for the EAA portion of the Edwards Aquifer) is associated with aquifers underlying the river basin portion of the county. Using best available data from the TWDB Water Use Survey, historical groundwater pumpage, or permit information from GCDs, the irrigation supply is generally estimated to be the average irrigation groundwater pumpage within the 2000 to 2021 time period. In cases in which the total demand on that portion (i.e., county and river basin) of the aquifer exceeds the total availability, supply is prorated downward for every entity using that particular geographic-aquifer unit.

6. TWDB historic water use data indicates that the majority of mining demands are supplied by groundwater. Mining supply from groundwater (except from the EAA portion of the Edwards Aquifer) is associated with aquifers underlying the river basin portion of the county. Using best available data from the TWDB Water Use Survey, historical groundwater pumpage, or permit data from GCDs, the mining supply is generally set equal to the average or maximum mining groundwater pumpage within the 2000 to 2021 time period. In cases in which the total demand on that portion (i.e., county and river basin) of the aquifer exceeds the total availability, supply is prorated downward for every entity using that particular geographic-aquifer unit.

7. Livestock water demands in the SCTRWPA are generally assumed to be supplied 50% from quantified groundwater sources and 50% from local surface water and unquantified groundwater sources such as stock tanks, streams, and windmills. This assumption is based on data from the TWDB historic water use estimates, which indicate that the counties within the planning area average approximately 60% groundwater supply to meet livestock use over the past ten years (2011-2021). Because the demands are based on a drought year scenario, it was assumed that ranchers will manage their livestock in such a way that populations will be

maintained at a level that can be supported by a combination of local surface water supplies and known water or groundwater supplies. Livestock water supply is set equal to projected livestock demands due to the nature of livestock water use. Livestock demand tends to match the available supply. If the supply is not present, the livestock numbers are reduced until they match the available supply. Infrastructure is not a consideration for livestock supplies, and livestock pumpage is typically exempt from regulations; therefore, there are no regulatory considerations that might impact livestock groundwater supplies.

8. The EAA manages withdrawals and points of withdrawal from the aquifer by granting permits. EAA has issued permits for municipal, industrial, and irrigation water use totaling 571,600 acft/yr. The reliable supply of the total permitted amounts and exempt use is estimated to be 296,553 acft/yr, which assumes full implementation of EAHCP during a repeat of the drought of record. Supplies for portions of the Edwards-BFZ Aquifer within the EAA were allocated to WUGs according to the reliable supply of permits issued by the EAA.

3.4.3 Reuse

Reuse availabilities within the SCTRWPA are estimated to be 142,359 acft/yr in 2030, increasing to 166,581 acft/yr in 2080. Reuse availabilities in the SCTRWPA are summarized by county and type of reuse in Table 3-8. Please note that these sources and availabilities are for existing water sources; they do not reflect availabilities for future sources of supply, such as availabilities that would enable a WUG to implement a reuse WMS. Currently, all availabilities in the SCTRWPA are for non-potable reuse, except for water recycling in Hays County. This availability reflects the Texas Parks and Wildlife Department A.E. Wood Fish Hatchery, which has on-site treatment facilities that enable water recycling.

Table 3-8 Reuse Availability by County and Type (acft/yr)

Source County	Reuse Type	2030	2040	2050	2060	2070	2080
Bexar	Direct, Non-Potable	66,477	76,463	76,463	76,463	76,463	76,463
Bexar	Indirect, Non-Potable	50,000	50,000	50,000	50,000	50,000	50,000
Comal	Direct, Non-Potable	5,231	14,610	14,610	14,610	14,610	14,610
Guadalupe	Direct, Non-Potable	4,584	7,480	7,480	7,480	7,480	7,480
Hays	Direct, Non-Potable	10,082	11,763	11,763	11,763	11,763	11,763
Hays	Water Recycling	2,420	2,420	2,420	2,420	2,420	2,420
Karnes	Direct, Non-Potable	1,290	1,570	1,570	1,570	1,570	1,570
Kendall	Direct, Non-Potable	2,275	2,275	2,275	2,275	2,275	2,275
Total	**All**	**142,359**	**166,581**	**166,581**	**166,581**	**166,581**	**166,581**

3.5 Water User Groups

Existing water supplies for WUGs are provided in DB27 reports, which are available at https://www3.twdb.texas.gov/apps/SARA/reports/list. Relevant DB27 reports are also included in Appendix 3A.

3.6 Major Water Providers

A MWP is defined, as a WUG or WWP of particular significance to the region's water supply as determined by the RWPG. This may include public or private entities that provide water for any water use category. At the August 1, 2024, RWPG meeting, the SCTRWPG defined the following entities as MWPs for the sixth cycle of regional water planning:

- Canyon Lake Water Service (Texas Water Company)
- GBRA;
- New Braunfels;
- SAWS; and
- San Marcos.

A summary of existing supplies for MWPs by decade and category of use is included in Table 3-9. MWP supplies are based on what is available for use in terms of water availability and infrastructure capacity or treatment limitations.

Table 3-9 provides a summary of the existing water supplies for MWPs. Supplies include self-supplied sources and sources sold from other entities. MWP supplies are based on what is available for use in terms of water availability and infrastructure capacity or treatment limitations. Table 3-10 summarizes the existing water supplies for MWPs by use type. WUG volumes represent water supplies for portions of that entity within Region L. For Canyon Lake Water Service (Texas Water Company) and GBRA, contract supplies represent existing water supplies sold to entities in any region.

Table 3-9 Existing Water Supplies for Major Water Providers (acft/yr)

Major Water Provider	Provider Type	2030	2040	2050	2060	2070	2080
Canyon Lake Water Service (Texas Water Company)	WUG/WWP [1]	15,493	15,664	15,665	15,666	15,668	15,673
GBRA	WUG/WWP	124,126	123,322	123,225	123,046	122,646	122,214
New Braunfels	WUG/WWP	31,496	31,496	31,496	31,496	31,496	31,496
San Marcos	WUG/WWP	20,386	20,386	20,386	20,386	20,386	20,386
SAWS	WUG/WWP	370,671	371,171	371,171	364,371	364,371	364,371

1. Canyon Lake Water Service (Texas Water Company) is split between Region K and Region L; existing water supplies shown above are for Region L only.

Table 3-10 Existing Water Supplies for Major Water Providers by Use Type (acft/yr)

Major Water Provider	Need Type	Use Type	2030	2040	2050	2060	2070	2080
Canyon Lake Water Service (Texas Water Company)	WUG	Municipal	15,493	15,664	15,665	15,666	15,668	15,673
Canyon Lake Water Service (Texas Water Company)	Contract	Municipal	545	545	545	545	545	545
GBRA	WUG	Municipal	9,879	13,733	13,589	13,445	13,300	13,155
GBRA	Contract	Irrigation	464	464	464	464	464	464
GBRA	Contract	Manufacturing	29,584	29,584	29,584	29,584	29,584	29,584
GBRA	Contract	Municipal	80,283	75,543	75,543	75,543	75,543	75,543
GBRA	Contract	Steam-Electric	6,429	6,429	6,429	6,429	6,429	6,429
New Braunfels	WUG	Municipal	30,496	30,496	30,496	30,496	30,496	30,496
New Braunfels	Contract	Municipal	1,000	1,000	1,000	1,000	1,000	1,000
San Marcos	WUG	Municipal	20,386	20,386	20,386	20,386	20,386	20,386
San Marcos	Contract	--	0	0	0	0	0	0
SAWS	WUG	Municipal	323,201	325,201	325,201	318,401	318,401	318,401
SAWS	Contract	Municipal	2,470	970	970	970	970	970
SAWS	Contract	Steam-Electric	45,000	45,000	45,000	45,000	45,000	45,000

1. Canyon Lake Water Service (Texas Water Company) is split between Region K and Region L; existing water supplies shown above are for Region L only. Contract supplies are representative of contracts with entities in any region.
2. GBRA WUG supplies are all located within Region L; however, contract supplies are representative of contracts with entities in any region.

Appendix 3A: Relevant Reports from the 2027 Regional and State Water Planning Database (DB27)

DRAFT Region L Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	**County**	**Basin**	**Salinity***	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Groundwater Source Availability Total				**1,224,662**	**1,245,107**	**1,291,601**	**1,329,171**	**1,352,029**	**1,343,597**
Austin Chalk Aquifer	Uvalde	Nueces	Fresh	2,935	2,935	2,935	2,935	2,935	2,935
Buda Limestone Aquifer	Uvalde	Nueces	Fresh	758	758	758	758	758	758
Carrizo-Aquifer ASR	Bexar	San Antonio	Fresh/ Brackish	200,000	200,000	200,000	200,000	200,000	200,000
Carrizo-Wilcox Aquifer	Atascosa	Nueces	Fresh	54,310	55,241	56,739	58,316	59,890	59,890
Carrizo-Wilcox Aquifer	Atascosa	San Antonio	Fresh	87	88	89	90	92	92
Carrizo-Wilcox Aquifer	Bexar	Nueces	Fresh/ Brackish	38,762	38,993	39,134	39,134	39,287	39,287
Carrizo-Wilcox Aquifer	Bexar	San Antonio	Fresh	29,689	29,935	29,605	28,519	28,562	28,562
Carrizo-Wilcox Aquifer	Caldwell	Colorado	Fresh	0	0	0	0	0	0
Carrizo-Wilcox Aquifer	Caldwell	Guadalupe	Fresh	24,877	32,775	42,514	45,688	49,635	49,594
Carrizo-Wilcox Aquifer	DeWitt	Guadalupe	Fresh	0	0	0	0	0	0
Carrizo-Wilcox Aquifer	Dimmit	Nueces	Fresh	3,765	3,775	3,765	3,765	3,765	3,765
Carrizo-Wilcox Aquifer	Dimmit	Rio Grande	Fresh	120	120	120	120	120	120
Carrizo-Wilcox Aquifer	Frio	Nueces	Fresh	86,995	85,143	82,950	81,018	79,131	79,131
Carrizo-Wilcox Aquifer	Gonzales	Guadalupe	Fresh/ Brackish	76,265	90,788	102,373	102,747	103,707	96,161
Carrizo-Wilcox Aquifer	Gonzales	Lavaca	Fresh	0	0	0	0	0	0
Carrizo-Wilcox Aquifer	Guadalupe	Guadalupe	Fresh	32,400	34,200	35,631	34,655	34,736	34,345
Carrizo-Wilcox Aquifer	Guadalupe	San Antonio	Fresh	7,163	7,468	7,684	7,463	7,463	7,314
Carrizo-Wilcox Aquifer	Karnes	Guadalupe	Fresh	50	50	50	50	50	50
Carrizo-Wilcox Aquifer	Karnes	Nueces	Fresh	84	84	84	84	84	84
Carrizo-Wilcox Aquifer	Karnes	San Antonio	Fresh	1,078	1,078	1,078	1,078	1,078	1,078

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

DRAFT Region L Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	County	Basin	Salinity*	2030	2040	2050	2060	2070	2080
Carrizo-Wilcox Aquifer	La Salle	Nueces	Fresh	6,536	6,554	6,536	6,536	6,536	6,536
Carrizo-Wilcox Aquifer	Medina	Nueces	Fresh	2,623	2,630	2,623	2,623	2,623	2,623
Carrizo-Wilcox Aquifer	Medina	San Antonio	Fresh	5	5	5	5	5	5
Carrizo-Wilcox Aquifer	Uvalde	Nueces	Fresh	0	0	0	0	0	0
Carrizo-Wilcox Aquifer	Wilson	Guadalupe	Fresh	443	653	762	3,870	3,982	3,982
Carrizo-Wilcox Aquifer	Wilson	Nueces	Fresh	10,774	11,171	11,578	12,027	12,546	12,546
Carrizo-Wilcox Aquifer	Wilson	San Antonio	Fresh/ Brackish	27,067	31,780	56,269	90,050	109,142	109,142
Carrizo-Wilcox Aquifer	Zavala	Nueces	Fresh	36,675	35,399	35,204	35,006	34,831	34,540
Edwards-BFZ Aquifer	Atascosa	Nueces	Fresh	522	522	522	522	522	522
Edwards-BFZ Aquifer	Atascosa	San Antonio	Fresh	145	145	145	145	145	145
Edwards-BFZ Aquifer	Bexar	Nueces	Fresh	446	446	446	446	446	446
Edwards-BFZ Aquifer	Bexar	San Antonio	Fresh	211,795	211,795	211,795	211,795	211,795	211,795
Edwards-BFZ Aquifer	Caldwell	Colorado	Saline	455	455	455	455	455	455
Edwards-BFZ Aquifer	Caldwell	Guadalupe	Saline	955	955	955	955	955	955
Edwards-BFZ Aquifer	Comal	Guadalupe	Fresh	13,179	13,179	13,179	13,179	13,179	13,179
Edwards-BFZ Aquifer	Comal	San Antonio	Fresh	549	549	549	549	549	549
Edwards-BFZ Aquifer	Frio	Nueces	Fresh	23,213	23,213	23,213	23,213	23,213	23,213
Edwards-BFZ Aquifer	Guadalupe	Guadalupe	Fresh	293	293	293	293	293	293
Edwards-BFZ Aquifer	Hays	Guadalupe	Fresh	8,283	8,283	8,283	8,283	8,283	8,283
Edwards-BFZ Aquifer	Hays	Guadalupe	Saline	1,707	1,707	1,707	1,707	1,707	1,707
Edwards-BFZ Aquifer	Medina	Nueces	Fresh	25,419	25,419	25,419	25,419	25,419	25,419

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

DRAFT Region L Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	**County**	**Basin**	**Salinity***	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Edwards-BFZ Aquifer	Medina	San Antonio	Fresh	7,009	7,009	7,009	7,009	7,009	7,009
Edwards-BFZ Aquifer	Uvalde	Nueces	Fresh	29,855	29,855	29,855	29,855	29,855	29,855
Edwards-BFZ Aquifer	Zavala	Nueces	Fresh	0	0	0	0	0	0
Edwards-Trinity-Plateau Aquifer	Kendall	Colorado	Fresh	69	69	69	69	69	69
Edwards-Trinity-Plateau Aquifer	Kendall	Guadalupe	Fresh	130	130	130	130	130	130
Edwards-Trinity-Plateau, Pecos Valley, and Trinity Aquifers	Uvalde	Nueces	Fresh	1,993	1,993	1,993	1,993	1,993	1,993
Ellenburger-San Saba Aquifer	Kendall	Colorado	Fresh	9	9	9	9	9	9
Ellenburger-San Saba Aquifer	Kendall	Guadalupe	Fresh	53	54	53	54	53	54
Gulf Coast Aquifer System	Calhoun	Colorado-Lavaca	Fresh	5,221	5,221	5,221	5,221	5,221	5,221
Gulf Coast Aquifer System	Calhoun	Guadalupe	Fresh	18	18	18	18	18	18
Gulf Coast Aquifer System	Calhoun	Lavaca-Guadalupe	Fresh	2,365	2,365	2,365	2,365	2,365	2,365
Gulf Coast Aquifer System	Calhoun	San Antonio-Nueces	Fresh	7	7	7	7	7	7
Gulf Coast Aquifer System	DeWitt	Guadalupe	Fresh	14,055	14,042	13,966	13,946	13,927	13,917
Gulf Coast Aquifer System	DeWitt	Lavaca	Fresh	2,638	2,626	2,620	2,620	2,620	2,620
Gulf Coast Aquifer System	DeWitt	Lavaca-Guadalupe	Fresh	298	298	298	298	298	298
Gulf Coast Aquifer System	DeWitt	San Antonio	Fresh	967	946	943	942	939	937
Gulf Coast Aquifer System	Goliad	Guadalupe	Fresh	2,066	2,093	2,117	2,141	2,167	2,167
Gulf Coast Aquifer System	Goliad	San Antonio	Fresh	3,585	3,733	3,882	4,028	4,177	4,177
Gulf Coast Aquifer System	Goliad	San Antonio-Nueces	Fresh	603	610	616	622	628	628

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

DRAFT Region L Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	**County**	**Basin**	**Salinity***	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Gulf Coast Aquifer System	Gonzales	Guadalupe	Fresh	0	0	0	0	0	0
Gulf Coast Aquifer System	Gonzales	Lavaca	Fresh	0	0	0	0	0	0
Gulf Coast Aquifer System	Karnes	Guadalupe	Fresh	18	18	18	18	18	18
Gulf Coast Aquifer System	Karnes	Nueces	Fresh	1,059	79	79	79	79	79
Gulf Coast Aquifer System	Karnes	San Antonio	Fresh	9,362	3,221	3,217	3,050	2,781	2,780
Gulf Coast Aquifer System	Karnes	San Antonio-Nueces	Fresh	86	86	85	80	74	72
Gulf Coast Aquifer System	Refugio	San Antonio	Fresh	329	329	329	329	329	329
Gulf Coast Aquifer System	Refugio	San Antonio-Nueces	Fresh	5,537	5,537	5,537	5,537	5,537	5,537
Gulf Coast Aquifer System	Victoria	Guadalupe	Fresh	27,611	27,611	27,611	27,611	27,611	27,611
Gulf Coast Aquifer System	Victoria	Lavaca	Fresh	234	234	234	234	234	234
Gulf Coast Aquifer System	Victoria	Lavaca-Guadalupe	Fresh	30,421	30,421	30,421	30,421	30,421	30,421
Gulf Coast Aquifer System	Victoria	San Antonio	Fresh	1,682	1,682	1,682	1,682	1,682	1,682
Hickory Aquifer	Hays	Guadalupe	Fresh	0	0	0	0	0	0
Hickory Aquifer	Kendall	Colorado	Fresh	12	12	12	12	12	12
Hickory Aquifer	Kendall	Guadalupe	Fresh	128	128	128	128	128	128
Leona Gravel Aquifer	Medina	Nueces	Fresh	5,908	5,908	5,908	5,908	5,908	5,908
Leona Gravel Aquifer	Medina	San Antonio	Fresh	1,337	1,337	1,337	1,337	1,337	1,337
Leona Gravel Aquifer	Uvalde	Nueces	Fresh	9,385	9,385	9,385	9,385	9,385	9,385
Queen City Aquifer	Atascosa	Nueces	Fresh	4,525	4,537	4,495	4,390	4,285	4,285
Queen City Aquifer	Caldwell	Guadalupe	Fresh	4,829	4,557	4,545	4,545	3,977	3,977

* Salinity field indicates whether the source availability is considered ‘fresh’ (less than 1,000 mg/L), ‘brackish’ (1,000 to 10,000 mg/L), ‘saline’ (10,001 mg/L to 34,999 mg/L), or ‘seawater’ (35,000 mg/L or greater). Sources can also be labeled as ‘fresh/brackish’ or ‘brackish/saline’, if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, ‘reservoir’ is applied to all reservoir sources.

DRAFT Region L Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	**County**	**Basin**	**Salinity***	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Queen City Aquifer	Frio	Nueces	Fresh	4,533	4,380	4,231	4,066	3,927	3,927
Queen City Aquifer	Gonzales	Guadalupe	Fresh	4,960	4,973	4,960	4,960	4,500	4,500
Queen City Aquifer	Gonzales	Lavaca	Brackish	0	0	0	0	0	0
Queen City Aquifer	Guadalupe	Guadalupe	Fresh	0	0	0	0	0	0
Queen City Aquifer	La Salle	Nueces	Fresh	1	1	1	1	1	1
Queen City Aquifer	Wilson	Guadalupe	Fresh	106	95	84	75	67	67
Queen City Aquifer	Wilson	Nueces	Fresh	181	161	143	127	114	114
Queen City Aquifer	Wilson	San Antonio	Fresh	1,136	1,011	896	798	711	711
San Marcos River Alluvium Aquifer	Caldwell	Guadalupe	Fresh	271	271	271	271	271	271
Sparta Aquifer	Atascosa	Nueces	Fresh	1,187	1,043	998	961	932	932
Sparta Aquifer	Frio	Nueces	Fresh	623	603	576	557	534	534
Sparta Aquifer	Gonzales	Guadalupe	Fresh	2,451	2,457	2,451	2,451	2,451	2,451
Sparta Aquifer	Gonzales	Lavaca	Brackish	0	0	0	0	0	0
Sparta Aquifer	La Salle	Nueces	Fresh	0	0	0	0	0	0
Sparta Aquifer	Wilson	Guadalupe	Fresh	12	11	10	9	8	8
Sparta Aquifer	Wilson	Nueces	Fresh	19	17	15	13	12	12
Sparta Aquifer	Wilson	San Antonio	Fresh	151	135	119	106	94	94
Trinity Aquifer	Atascosa	Nueces	Fresh	0	0	0	0	0	0
Trinity Aquifer	Bexar	Nueces	Fresh	0	0	0	0	0	0
Trinity Aquifer	Bexar	San Antonio	Fresh	24,856	24,856	24,856	24,856	24,856	24,856
Trinity Aquifer	Caldwell	Guadalupe	Fresh	10	10	10	10	10	10
Trinity Aquifer	Comal	Guadalupe	Fresh	37,430	37,430	37,430	37,430	37,430	37,430

* Salinity field indicates whether the source availability is considered ‘fresh’ (less than 1,000 mg/L), ‘brackish’ (1,000 to 10,000 mg/L), ‘saline’ (10,001 mg/L to 34,999 mg/L), or ‘seawater’ (35,000 mg/L or greater). Sources can also be labeled as ‘fresh/brackish’ or ‘brackish/saline’, if a combination of the salinity types is appropriate.

** Since reservoir sources can exist across multiple counties, the county field value, ‘reservoir’ is applied to all reservoir sources.

DRAFT Region L Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	**County**	**Basin**	**Salinity***	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Trinity Aquifer	Comal	San Antonio	Fresh	5,658	5,658	5,658	5,658	5,658	5,658
Trinity Aquifer	Guadalupe	Guadalupe	Fresh	75	75	75	75	75	75
Trinity Aquifer	Guadalupe	San Antonio	Fresh	585	585	585	585	585	585
Trinity Aquifer	Hays	Guadalupe	Fresh	7,111	7,111	7,111	7,111	7,111	7,111
Trinity Aquifer	Kendall	Colorado	Fresh	135	135	135	135	135	135
Trinity Aquifer	Kendall	Guadalupe	Fresh	6,028	6,028	6,028	6,028	6,028	6,028
Trinity Aquifer	Kendall	San Antonio	Fresh	4,976	4,976	4,976	4,976	4,976	4,976
Trinity Aquifer	Medina	Nueces	Fresh	7,008	7,008	7,008	7,008	7,008	7,008
Trinity Aquifer	Medina	San Antonio	Fresh	1,994	1,994	1,994	1,994	1,994	1,994
Trinity Aquifer	Uvalde	Nueces	Fresh	791	791	791	791	791	791
Yegua-Jackson Aquifer	Atascosa	Nueces	Fresh	856	856	856	856	856	856
Yegua-Jackson Aquifer	Frio	Nueces	Fresh	0	0	0	0	0	0
Yegua-Jackson Aquifer	Gonzales	Guadalupe	Fresh	4,709	4,709	4,709	4,709	4,709	4,709
Yegua-Jackson Aquifer	Gonzales	Lavaca	Fresh	19	19	19	19	19	19
Yegua-Jackson Aquifer	Karnes	Guadalupe	Fresh	292	292	292	292	292	292
Yegua-Jackson Aquifer	Karnes	Nueces	Fresh	91	91	91	91	91	91
Yegua-Jackson Aquifer	Karnes	San Antonio	Fresh	1,630	1,630	1,630	1,630	1,630	1,630
Yegua-Jackson Aquifer	La Salle	Nueces	Fresh	92	92	92	92	92	92
Yegua-Jackson Aquifer	Wilson	Guadalupe	Fresh	62	62	62	62	62	62
Yegua-Jackson Aquifer	Wilson	Nueces	Fresh	184	184	184	184	184	184
Yegua-Jackson Aquifer	Wilson	San Antonio	Fresh	613	613	613	613	613	613

* Salinity field indicates whether the source availability is considered ‘fresh’ (less than 1,000 mg/L), ‘brackish’ (1,000 to 10,000 mg/L), ‘saline’ (10,001 mg/L to 34,999 mg/L), or ‘seawater’ (35,000 mg/L or greater). Sources can also be labeled as ‘fresh/brackish’ or ‘brackish/saline’, if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, ‘reservoir’ is applied to all reservoir sources.

DRAFT Region L Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	**County**	**Basin**	**Salinity***	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Reuse Source Availability Total				**142,359**	**166,581**	**166,581**	**166,581**	**166,581**	**166,581**
Direct Reuse	Bexar	San Antonio	Fresh	66,477	76,463	76,463	76,463	76,463	76,463
Direct Reuse	Comal	Guadalupe	Fresh	5,231	14,610	14,610	14,610	14,610	14,610
Direct Reuse	Guadalupe	Guadalupe	Fresh	4,584	7,480	7,480	7,480	7,480	7,480
Direct Reuse	Hays	Guadalupe	Fresh	10,082	11,763	11,763	11,763	11,763	11,763
Direct Reuse	Karnes	San Antonio	Fresh	1,290	1,570	1,570	1,570	1,570	1,570
Direct Reuse	Kendall	Guadalupe	Fresh	1,752	1,752	1,752	1,752	1,752	1,752
Direct Reuse	Kendall	San Antonio	Fresh	523	523	523	523	523	523
Indirect Reuse	Bexar	San Antonio	Fresh	50,000	50,000	50,000	50,000	50,000	50,000
Water Recycling	Hays	Guadalupe	Fresh	2,420	2,420	2,420	2,420	2,420	2,420

Surface Water Source Availability Total				**261,647**	**261,501**	**261,357**	**261,213**	**260,834**	**260,429**
Boerne Lake/Reservoir	Reservoir**	San Antonio	Fresh	648	648	648	648	648	648
Calaveras Lake/Reservoir	Reservoir**	San Antonio	Fresh	36,900	36,900	36,900	36,900	36,900	36,900
Canyon Lake/Reservoir	Reservoir**	Guadalupe	Fresh	86,138	85,992	85,848	85,704	85,559	85,414
Coleto Creek Lake/Reservoir	Reservoir**	Guadalupe	Fresh	24,160	24,160	24,160	24,160	23,926	23,666
Colorado Livestock Local Supply	Caldwell	Colorado	Fresh	20	20	20	20	20	20
Colorado Livestock Local Supply	Kendall	Colorado	Fresh	2	2	2	2	2	2
Colorado-Lavaca Livestock Local Supply	Calhoun	Colorado-Lavaca	Fresh	23	23	23	23	23	23
Cox Lake/Reservoir	Reservoir**	Colorado-Lavaca	Fresh	3,992	3,992	3,992	3,992	3,992	3,992
Dunlap Lake/Reservoir	Reservoir**	Guadalupe	Fresh	0	0	0	0	0	0
Gonzales (H-4) Lake/Reservoir	Reservoir**	Guadalupe	Fresh	0	0	0	0	0	0

* Salinity field indicates whether the source availability is considered ‘fresh’ (less than 1,000 mg/L), ‘brackish’ (1,000 to 10,000 mg/L), ‘saline’ (10,001 mg/L to 34,999 mg/L), or ‘seawater’ (35,000 mg/L or greater). Sources can also be labeled as ‘fresh/brackish’ or ‘brackish/saline’, if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, ‘reservoir’ is applied to all reservoir sources.

DRAFT Region L Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	**County**	**Basin**	**Salinity***	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Guadalupe Livestock Local Supply	Caldwell	Guadalupe	Fresh	396	396	396	396	396	396
Guadalupe Livestock Local Supply	Comal	Guadalupe	Fresh	118	118	118	118	118	118
Guadalupe Livestock Local Supply	DeWitt	Guadalupe	Fresh	660	660	660	660	660	660
Guadalupe Livestock Local Supply	Goliad	Guadalupe	Fresh	100	100	100	100	100	100
Guadalupe Livestock Local Supply	Gonzales	Guadalupe	Fresh	2,050	2,050	2,050	2,050	2,050	2,050
Guadalupe Livestock Local Supply	Guadalupe	Guadalupe	Fresh	493	493	493	493	493	493
Guadalupe Livestock Local Supply	Hays	Guadalupe	Fresh	140	140	140	140	140	140
Guadalupe Livestock Local Supply	Karnes	Guadalupe	Fresh	21	21	21	21	21	21
Guadalupe Livestock Local Supply	Kendall	Guadalupe	Fresh	172	172	172	172	172	172
Guadalupe Livestock Local Supply	Victoria	Guadalupe	Fresh	228	228	228	228	228	228
Guadalupe Livestock Local Supply	Wilson	Guadalupe	Fresh	36	36	36	36	36	36
Guadalupe Run-of-River	Caldwell	Guadalupe	Fresh	524	524	524	524	524	524
Guadalupe Run-of-River	Calhoun	Guadalupe	Fresh	33,557	33,557	33,557	33,557	33,557	33,557
Guadalupe Run-of-River	Comal	Guadalupe	Fresh	612	612	612	612	612	612
Guadalupe Run-of-River	Gonzales	Guadalupe	Fresh	2,240	2,240	2,240	2,240	2,240	2,240
Guadalupe Run-of-River	Guadalupe	Guadalupe	Fresh	8,089	8,089	8,089	8,089	8,089	8,089
Guadalupe Run-of-River	Hays	Guadalupe	Fresh	38,812	38,812	38,812	38,812	38,812	38,812
Guadalupe Run-of-River	Kendall	Guadalupe	Fresh	26	26	26	26	26	26
Guadalupe Run-of-River	Victoria	Guadalupe	Fresh	2	2	2	2	2	2
Lavaca Livestock Local Supply	DeWitt	Lavaca	Fresh	133	133	133	133	133	133

* Salinity field indicates whether the source availability is considered ‘fresh’ (less than 1,000 mg/L), ‘brackish’ (1,000 to 10,000 mg/L), ‘saline’ (10,001 mg/L to 34,999 mg/L), or ‘seawater’ (35,000 mg/L or greater). Sources can also be labeled as ‘fresh/brackish’ or ‘brackish/saline’, if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, ‘reservoir’ is applied to all reservoir sources.

DRAFT Region L Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	**County**	**Basin**	**Salinity***	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Lavaca Livestock Local Supply	Gonzales	Lavaca	Fresh	20	20	20	20	20	20
Lavaca Livestock Local Supply	Victoria	Lavaca	Fresh	2	2	2	2	2	2
Lavaca-Guadalupe Livestock Local Supply	Calhoun	Lavaca-Guadalupe	Fresh	119	119	119	119	119	119
Lavaca-Guadalupe Livestock Local Supply	DeWitt	Lavaca-Guadalupe	Fresh	12	12	12	12	12	12
Lavaca-Guadalupe Livestock Local Supply	Victoria	Lavaca-Guadalupe	Fresh	242	242	242	242	242	242
McQueeney Lake/Reservoir	Reservoir**	Guadalupe	Fresh	0	0	0	0	0	0
Nueces Livestock Local Supply	Atascosa	Nueces	Fresh	767	767	767	767	767	767
Nueces Livestock Local Supply	Bexar	Nueces	Fresh	31	31	31	31	31	31
Nueces Livestock Local Supply	Dimmit	Nueces	Fresh	172	172	172	172	172	172
Nueces Livestock Local Supply	Frio	Nueces	Fresh	482	482	482	482	482	482
Nueces Livestock Local Supply	Karnes	Nueces	Fresh/ Brackish	38	38	38	38	38	38
Nueces Livestock Local Supply	La Salle	Nueces	Fresh	197	197	197	197	197	197
Nueces Livestock Local Supply	Medina	Nueces	Fresh	444	444	444	444	444	444
Nueces Livestock Local Supply	Uvalde	Nueces	Fresh	1,025	1,025	1,025	1,025	1,025	1,025
Nueces Livestock Local Supply	Wilson	Nueces	Fresh	103	103	103	103	103	103
Nueces Livestock Local Supply	Zavala	Nueces	Fresh	428	428	428	428	428	428
Nueces Run-of-River	Dimmit	Nueces	Fresh	211	211	211	211	211	211
Nueces Run-of-River	La Salle	Nueces	Fresh	474	474	474	474	474	474
Nueces Run-of-River	Uvalde	Nueces	Fresh	720	720	720	720	720	720
Rio Grande Livestock Local Supply	Dimmit	Rio Grande	Fresh	12	12	12	12	12	12

* Salinity field indicates whether the source availability is considered ‘fresh’ (less than 1,000 mg/L), ‘brackish’ (1,000 to 10,000 mg/L), ‘saline’ (10,001 mg/L to 34,999 mg/L), or ‘seawater’ (35,000 mg/L or greater). Sources can also be labeled as ‘fresh/brackish’ or ‘brackish/saline’, if a combination of the salinity types is appropriate.

** Since reservoir sources can exist across multiple counties, the county field value, ‘reservoir’ is applied to all reservoir sources.

DRAFT Region L Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	**County**	**Basin**	**Salinity***	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
San Antonio Livestock Local Supply	Atascosa	San Antonio	Fresh	2	2	2	2	2	2
San Antonio Livestock Local Supply	Bexar	San Antonio	Fresh	463	463	463	463	463	463
San Antonio Livestock Local Supply	Comal	San Antonio	Fresh	18	18	18	18	18	18
San Antonio Livestock Local Supply	DeWitt	San Antonio	Fresh	64	64	64	64	64	64
San Antonio Livestock Local Supply	Goliad	San Antonio	Fresh	156	156	156	156	156	156
San Antonio Livestock Local Supply	Guadalupe	San Antonio	Fresh	97	97	97	97	97	97
San Antonio Livestock Local Supply	Karnes	San Antonio	Fresh	394	394	394	394	394	394
San Antonio Livestock Local Supply	Kendall	San Antonio	Fresh	21	21	21	21	21	21
San Antonio Livestock Local Supply	Medina	San Antonio	Fresh	85	85	85	85	85	85
San Antonio Livestock Local Supply	Refugio	San Antonio	Fresh	21	21	21	21	21	21
San Antonio Livestock Local Supply	Victoria	San Antonio	Fresh	19	19	19	19	19	19
San Antonio Livestock Local Supply	Wilson	San Antonio	Fresh	717	717	717	717	717	717
San Antonio Run-of-River	Bexar	San Antonio	Fresh	4	4	4	4	4	4
San Antonio Run-of-River	Karnes	San Antonio	Fresh	100	100	100	100	100	100
San Antonio Run-of-River	Wilson	San Antonio	Fresh	1,094	1,094	1,094	1,094	1,094	1,094
San Antonio-Nueces Livestock Local Supply	Calhoun	San Antonio-Nueces	Fresh	0	0	0	0	0	0
San Antonio-Nueces Livestock Local Supply	Goliad	San Antonio-Nueces	Fresh	140	140	140	140	140	140
San Antonio-Nueces Livestock Local Supply	Karnes	San Antonio-Nueces	Fresh	25	25	25	25	25	25

* Salinity field indicates whether the source availability is considered ‘fresh’ (less than 1,000 mg/L), ‘brackish’ (1,000 to 10,000 mg/L), ‘saline’ (10,001 mg/L to 34,999 mg/L), or ‘seawater’ (35,000 mg/L or greater). Sources can also be labeled as ‘fresh/brackish’ or ‘brackish/saline’, if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, ‘reservoir’ is applied to all reservoir sources.

DRAFT Region L Source Total Availability

				Source Availability (acre-feet per year)					
Source Name	**County**	**Basin**	**Salinity***	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
San Antonio-Nueces Livestock Local Supply	Refugio	San Antonio-Nueces	Fresh	210	210	210	210	210	210
Upper Nueces Lake/Reservoir	Reservoir**	Nueces	Fresh	226	226	226	226	226	226
Victor Braunig Lake/Reservoir	Reservoir**	San Antonio	Fresh	12,000	12,000	12,000	12,000	12,000	12,000
Region L Source Availability Total				**1,628,668**	**1,673,189**	**1,719,539**	**1,756,965**	**1,779,444**	**1,770,607**

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Atascosa County WUG Total			**53,821**	**53,775**	**53,769**	**53,788**	**53,811**	**53,837**
Atascosa County / Nueces Basin WUG Total			**53,153**	**53,099**	**53,085**	**53,095**	**53,108**	**53,238**
Benton City WSC	L	Carrizo-Wilcox Aquifer | Atascosa County	1,422	1,427	1,441	1,458	1,476	1,495
Charlotte	L	Carrizo-Wilcox Aquifer | Atascosa County	1,098	1,098	1,098	1,098	1,098	1,098
El Oso WSC*	L	Carrizo-Wilcox Aquifer | Wilson County	28	31	32	31	31	31
Jourdanton	L	Carrizo-Wilcox Aquifer | Atascosa County	2,250	2,250	2,250	2,250	2,250	2,250
Lytle	L	Edwards-BFZ Aquifer | Medina County	333	330	331	332	331	331
McCoy WSC*	L	Carrizo-Wilcox Aquifer | Atascosa County	927	924	921	919	918	917
McCoy WSC*	L	Queen City Aquifer | Atascosa County	89	90	90	91	92	92
Pleasanton	L	Carrizo-Wilcox Aquifer | Atascosa County	5,028	5,028	5,028	5,028	5,028	5,028
Poteet	L	Carrizo-Wilcox Aquifer | Atascosa County	806	806	806	806	806	806
San Antonio Water System	L	Canyon Lake/Reservoir	6	0	0	0	0	0
San Antonio Water System	L	Carrizo-Aquifer ASR | Bexar County	131	122	119	119	119	119
San Antonio Water System	L	Carrizo-Wilcox Aquifer | Bexar County	55	51	50	50	50	50
San Antonio Water System	G	Carrizo-Wilcox Aquifer | Burleson County	130	121	118	118	118	119
San Antonio Water System	L	Carrizo-Wilcox Aquifer | Gonzales County	30	28	27	28	28	28
San Antonio Water System	L	Direct Reuse	79	85	83	82	83	83
San Antonio Water System	L	Edwards-BFZ Aquifer | Bexar County	374	348	338	338	339	342
County-Other	L	Carrizo-Wilcox Aquifer | Atascosa County	194	194	194	194	194	194
County-Other	L	Edwards-BFZ Aquifer | Atascosa County	32	32	32	32	32	32
County-Other	L	Queen City Aquifer | Atascosa County	173	173	173	173	173	173

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year) 2030	2040	2050	2060	2070	2080
Manufacturing	L	Carrizo-Wilcox Aquifer | Atascosa County	74	74	74	74	74	74
Mining	L	Carrizo-Wilcox Aquifer | Atascosa County	4,563	4,556	4,549	4,543	4,537	4,645
Steam Electric Power	L	Carrizo-Wilcox Aquifer | Atascosa County	8,427	8,427	8,427	8,427	8,427	8,427
Livestock	L	Carrizo-Wilcox Aquifer | Atascosa County	230	230	230	230	230	230
Livestock	L	Local Surface Water Supply	767	767	767	767	767	767
Livestock	L	Queen City Aquifer | Atascosa County	403	403	403	403	403	403
Livestock	L	Yegua-Jackson Aquifer | Atascosa County	134	134	134	134	134	134
Irrigation	L	Carrizo-Wilcox Aquifer | Atascosa County	22,311	22,311	22,311	22,311	22,311	22,311
Irrigation	L	Edwards-BFZ Aquifer | Atascosa County	496	496	496	496	496	496
Irrigation	L	Queen City Aquifer | Atascosa County	1,638	1,638	1,638	1,638	1,638	1,638
Irrigation	L	Sparta Aquifer | Atascosa County	395	395	395	395	395	395
Irrigation	L	Yegua-Jackson Aquifer | Atascosa County	530	530	530	530	530	530
Atascosa County / San Antonio Basin WUG Total			**668**	**676**	**684**	**693**	**703**	**599**
Benton City WSC	L	Carrizo-Wilcox Aquifer | Atascosa County	224	225	227	230	233	236
Lytle	L	Edwards-BFZ Aquifer | Medina County	9	9	8	8	9	9
San Antonio Water System	L	Canyon Lake/Reservoir	0	0	0	0	0	0
San Antonio Water System	L	Carrizo-Aquifer ASR | Bexar County	3	3	3	3	3	4
Mining	L	Carrizo-Wilcox Aquifer | Atascosa County	176	183	190	196	202	94
Livestock	L	Carrizo-Wilcox Aquifer | Atascosa County	1	1	1	1	1	1
Livestock	L	Local Surface Water Supply	2	2	2	2	2	2
Irrigation	L	Carrizo-Wilcox Aquifer | Atascosa County	114	114	114	114	114	114

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Irrigation	L	Edwards-BFZ Aquifer | Atascosa County	139	139	139	139	139	139
Bexar County WUG Total			**514,774**	**518,384**	**518,491**	**511,759**	**511,755**	**511,992**
Bexar County / Nueces Basin WUG Total			**12,633**	**12,629**	**12,633**	**12,631**	**12,634**	**12,630**
Atascosa Rural WSC	L	Edwards-BFZ Aquifer | Bexar County	28	28	28	28	28	28
Lytle	L	Edwards-BFZ Aquifer | Medina County	31	33	33	34	36	37
San Antonio Water System	L	Canyon Lake/Reservoir	10	0	0	0	0	0
San Antonio Water System	L	Carrizo-Aquifer ASR | Bexar County	200	199	199	199	199	199
San Antonio Water System	L	Carrizo-Wilcox Aquifer | Bexar County	84	84	84	84	84	84
San Antonio Water System	G	Carrizo-Wilcox Aquifer | Burleson County	199	198	198	198	198	198
San Antonio Water System	L	Carrizo-Wilcox Aquifer | Gonzales County	46	46	46	46	46	46
San Antonio Water System	L	Direct Reuse	119	138	138	138	138	138
San Antonio Water System	L	Edwards-BFZ Aquifer | Bexar County	570	568	568	568	568	568
County-Other	L	Carrizo-Wilcox Aquifer | Bexar County	103	103	103	103	103	103
County-Other	L	Edwards-BFZ Aquifer | Bexar County	473	462	466	463	464	459
Manufacturing	L	Direct Reuse	4,076	4,076	4,076	4,076	4,076	4,076
Livestock	L	Carrizo-Wilcox Aquifer | Bexar County	31	31	31	31	31	31
Livestock	L	Local Surface Water Supply	31	31	31	31	31	31
Irrigation	L	Carrizo-Wilcox Aquifer | Bexar County	4,293	4,293	4,293	4,293	4,293	4,293
Irrigation	L	Edwards-BFZ Aquifer | Bexar County	2,339	2,339	2,339	2,339	2,339	2,339
Bexar County / San Antonio Basin WUG Total			**502,141**	**505,755**	**505,858**	**499,128**	**499,121**	**499,362**
Air Force Village II Inc	L	Edwards-BFZ Aquifer | Bexar County	263	263	263	263	263	263

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Alamo Heights	L	Edwards-BFZ Aquifer | Bexar County	1,611	1,611	1,611	1,611	1,611	1,611
Atascosa Rural WSC	L	Edwards-BFZ Aquifer | Bexar County	418	418	418	418	418	418
Bexar County WCID 10	L	Edwards-BFZ Aquifer | Bexar County	928	928	928	928	928	928
Converse	L	Carrizo-Wilcox Aquifer | Gonzales County	500	500	500	500	500	500
Converse	L	Edwards-BFZ Aquifer | Bexar County	1,916	1,916	1,916	1,916	1,916	1,916
East Central SUD	L	Canyon Lake/Reservoir	1,319	1,317	1,314	1,310	1,308	1,307
East Central SUD	L	Carrizo-Wilcox Aquifer | Bexar County	10	10	10	10	10	10
East Central SUD	G	Carrizo-Wilcox Aquifer | Burleson County	10	10	10	10	10	10
East Central SUD	L	Carrizo-Wilcox Aquifer | Gonzales County	943	941	938	936	935	934
East Central SUD	L	Direct Reuse	226	226	226	226	226	226
East Central SUD	L	Edwards-BFZ Aquifer | Bexar County	670	662	669	671	678	679
East Central SUD	L	Trinity Aquifer | Bexar County	10	10	10	10	10	10
Elmendorf	L	Carrizo-Wilcox Aquifer | Bexar County	1,211	1,211	1,211	1,211	1,211	1,211
Elmendorf	G	Carrizo-Wilcox Aquifer | Burleson County	1	1	1	1	1	1
Elmendorf	L	Edwards-BFZ Aquifer | Bexar County	100	100	100	100	100	100
Elmendorf	L	Trinity Aquifer | Bexar County	4	4	4	4	4	4
Fair Oaks Ranch	L	Canyon Lake/Reservoir	1,027	957	930	921	919	919
Fair Oaks Ranch	L	Direct Reuse	155	145	141	139	139	139
Fair Oaks Ranch	L	Trinity Aquifer | Comal County	347	323	314	311	310	310
Fort Sam Houston	L	Edwards-BFZ Aquifer | Bexar County	3,363	3,363	3,363	3,363	3,363	3,363
Green Valley SUD	L	Canyon Lake/Reservoir	61	55	50	46	41	40
Green Valley SUD	L	Carrizo-Wilcox Aquifer | Caldwell County	61	56	50	46	42	39
Green Valley SUD	L	Carrizo-Wilcox Aquifer | Gonzales County	39	35	32	28	26	25

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Green Valley SUD	L	Carrizo-Wilcox Aquifer | Guadalupe County	224	204	184	167	154	144
Green Valley SUD	L	Edwards-BFZ Aquifer | Comal County	71	65	59	54	49	47
Green Valley SUD	L	Trinity Aquifer | Bexar County	23	21	19	17	16	15
Kirby	L	Edwards-BFZ Aquifer | Bexar County	738	738	738	738	738	738
La Coste	L	Edwards-BFZ Aquifer | Medina County	2	2	2	2	2	3
Lackland Air Force Base	L	Edwards-BFZ Aquifer | Bexar County	2,557	2,557	2,557	2,557	2,557	2,557
Leon Valley	L	Edwards-BFZ Aquifer | Bexar County	1,016	1,016	1,016	1,016	1,016	1,016
Live Oak	L	Direct Reuse	238	238	238	238	212	238
Live Oak	L	Edwards-BFZ Aquifer | Bexar County	1,251	1,251	1,251	1,251	1,251	1,251
Lytle	L	Edwards-BFZ Aquifer | Medina County	2	2	2	2	2	2
Oak Hills WSC	L	Carrizo-Wilcox Aquifer | Wilson County	7	9	12	17	24	33
Randolph Air Force Base	L	Direct Reuse	4,862	7,841	7,841	7,841	7,841	7,841
Randolph Air Force Base	L	Edwards-BFZ Aquifer | Bexar County	807	807	807	807	807	807
San Antonio Water System	L	Canyon Lake/Reservoir	4,962	3,962	3,962	0	0	0
San Antonio Water System	L	Carrizo-Aquifer ASR | Bexar County	49,848	49,605	49,606	49,607	49,606	49,633
San Antonio Water System	L	Carrizo-Wilcox Aquifer | Bexar County	20,906	20,805	20,805	20,805	20,805	20,815
San Antonio Water System	G	Carrizo-Wilcox Aquifer | Burleson County	49,466	49,224	49,226	49,226	49,225	49,253
San Antonio Water System	L	Carrizo-Wilcox Aquifer | Gonzales County	14,847	14,772	14,773	11,999	11,998	12,007
San Antonio Water System	L	Direct Reuse	29,673	34,450	34,451	34,451	34,450	34,470
San Antonio Water System	L	Edwards-BFZ Aquifer | Bexar County	142,062	141,367	141,374	141,372	141,370	141,451
San Antonio Water System	L	San Antonio Indirect Reuse	5,000	5,000	5,000	5,000	5,000	5,000

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
San Antonio Water System	L	Trinity Aquifer | Bexar County	3,025	1,028	1,028	1,028	1,028	1,029
Schertz	L	Carrizo-Wilcox Aquifer | Gonzales County	1,433	1,667	1,775	1,799	1,820	1,839
Schertz	L	Direct Reuse	18	18	18	18	18	18
Schertz	L	Edwards-BFZ Aquifer | Comal County	115	134	142	144	146	148
Selma	L	Carrizo-Wilcox Aquifer | Gonzales County	672	715	735	741	747	751
Selma	L	Direct Reuse	52	52	52	52	52	52
Selma	L	Edwards-BFZ Aquifer | Bexar County	429	456	469	473	476	480
Shavano Park	L	Edwards-BFZ Aquifer | Bexar County	514	514	514	514	514	514
The Oaks WSC	L	Carrizo-Wilcox Aquifer | Bexar County	10	10	10	10	10	10
The Oaks WSC	G	Carrizo-Wilcox Aquifer | Burleson County	10	10	10	10	10	10
The Oaks WSC	L	Edwards-BFZ Aquifer | Bexar County	30	30	30	30	30	30
The Oaks WSC	L	Trinity Aquifer | Bexar County	120	120	120	120	120	120
Universal City	L	Carrizo-Wilcox Aquifer | Gonzales County	800	800	800	800	800	800
Universal City	L	Direct Reuse	750	742	734	724	714	702
Universal City	L	Edwards-BFZ Aquifer | Bexar County	2,139	2,139	2,139	2,139	2,139	2,139
Water Services	L	Trinity Aquifer | Bexar County	769	811	843	870	896	921
County-Other	L	Edwards-BFZ Aquifer | Bexar County	9,849	9,860	9,856	9,859	9,858	9,863
County-Other	L	Trinity Aquifer | Bexar County	426	426	426	426	426	426
Manufacturing	L	Carrizo-Wilcox Aquifer | Bexar County	17	17	17	17	17	17
Manufacturing	L	Edwards-BFZ Aquifer | Bexar County	8,670	8,670	8,670	8,670	8,670	8,670
Manufacturing	L	Trinity Aquifer | Bexar County	29	29	29	29	29	29
Mining	L	Carrizo-Wilcox Aquifer | Bexar County	400	400	400	400	400	400

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Mining	L	Edwards-BFZ Aquifer | Bexar County	4,342	4,342	4,342	4,342	4,342	4,342
Mining	L	Trinity Aquifer | Bexar County	6,535	6,535	6,535	6,535	6,535	6,535
Steam Electric Power	L	Calaveras Lake/Reservoir	36,900	36,900	36,900	36,900	36,900	36,900
Steam Electric Power	L	Edwards-BFZ Aquifer | Bexar County	1,751	1,751	1,751	1,751	1,751	1,751
Steam Electric Power	L	San Antonio Indirect Reuse	45,000	45,000	45,000	45,000	45,000	45,000
Steam Electric Power	L	Victor Braunig Lake/Reservoir	12,000	12,000	12,000	12,000	12,000	12,000
Livestock	L	Carrizo-Wilcox Aquifer | Bexar County	205	205	205	205	205	205
Livestock	L	Edwards-BFZ Aquifer | Bexar County	52	52	52	52	52	52
Livestock	L	Local Surface Water Supply	463	463	463	463	463	463
Livestock	L	Trinity Aquifer | Bexar County	206	206	206	206	206	207
Irrigation	L	Carrizo-Wilcox Aquifer | Bexar County	560	560	560	560	560	560
Irrigation	L	Edwards-BFZ Aquifer | Bexar County	18,943	18,943	18,943	18,943	18,943	18,943
Irrigation	L	San Antonio Run-of-River	4	4	4	4	4	4
Irrigation	L	Trinity Aquifer | Bexar County	1,148	1,148	1,148	1,148	1,148	1,148
Caldwell County WUG Total			**14,379**	**16,801**	**16,432**	**16,119**	**15,856**	**15,623**
Caldwell County / Colorado Basin WUG Total			**4,314**	**4,454**	**4,241**	**4,029**	**3,793**	**3,541**
Creedmoor-Maha WSC*	K	Carrizo-Wilcox Aquifer | Bastrop County	1,688	1,688	1,688	1,688	1,688	1,688
Creedmoor-Maha WSC*	L	Carrizo-Wilcox Aquifer | Gonzales County	2,216	1,809	1,594	1,376	1,141	888
Polonia WSC*	L	Carrizo-Wilcox Aquifer | Caldwell County	333	804	806	810	811	812
County-Other	L	Carrizo-Wilcox Aquifer | Caldwell County	19	95	95	97	95	95
Livestock	L	Carrizo-Wilcox Aquifer | Caldwell County	19	19	19	19	19	19

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Livestock	L	Local Surface Water Supply	20	20	20	20	20	20
Irrigation	L	Carrizo-Wilcox Aquifer | Caldwell County	17	17	17	17	17	17
Irrigation	L	Queen City Aquifer | Caldwell County	2	2	2	2	2	2
Caldwell County / Guadalupe Basin WUG Total			**10,065**	**12,347**	**12,191**	**12,090**	**12,063**	**12,082**
Aqua WSC*	L	Carrizo-Wilcox Aquifer | Caldwell County	166	186	205	221	239	259
County Line SUD	L	Carrizo-Wilcox Aquifer | Caldwell County	478	478	478	478	478	478
County Line SUD	L	Carrizo-Wilcox Aquifer | Gonzales County	160	119	92	91	91	91
Creedmoor-Maha WSC*	L	Carrizo-Wilcox Aquifer | Gonzales County	122	220	318	417	515	615
Goforth SUD*	L	Canyon Lake/Reservoir	70	54	42	33	27	24
Goforth SUD*	L	Carrizo-Wilcox Aquifer | Gonzales County	111	85	65	51	43	38
Goforth SUD*	L	Edwards-BFZ Aquifer | Hays County	2	1	1	1	1	1
Goforth SUD*	L	Trinity Aquifer | Hays County	38	28	22	17	15	13
Gonzales County WSC	L	Carrizo-Wilcox Aquifer | Gonzales County	48	47	48	48	50	51
Lockhart	L	Carrizo-Wilcox Aquifer | Caldwell County	2,967	3,395	3,395	3,395	3,395	3,395
Luling	L	Carrizo-Wilcox Aquifer | Caldwell County	774	1,598	1,598	1,599	1,599	1,600
Martindale WSC	L	Canyon Lake/Reservoir	163	161	157	154	152	149
Martindale WSC	L	Guadalupe Run-of-River	226	221	216	212	208	205
Martindale WSC	L	San Marcos River Alluvium Aquifer | Caldwell County	31	31	31	31	31	31
Maxwell SUD	L	Canyon Lake/Reservoir	416	355	302	254	221	198
Maxwell SUD	L	Carrizo-Wilcox Aquifer | Caldwell County	352	300	255	215	187	167
Maxwell SUD	L	Carrizo-Wilcox Aquifer | Gonzales County	352	300	255	215	187	167
Maxwell SUD	L	Edwards-BFZ Aquifer | Comal County	110	94	80	67	59	52
Maxwell SUD	L	Guadalupe Run-of-River	371	319	273	231	203	182

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Polonia WSC*	L	Carrizo-Wilcox Aquifer | Caldwell County	704	1,705	1,710	1,714	1,716	1,720
San Marcos	L	Canyon Lake/Reservoir	2	2	2	3	3	3
San Marcos	L	Edwards-BFZ Aquifer | Hays County	20	14	12	10	9	9
Tri Community WSC	L	Guadalupe Run-of-River	492	490	490	491	490	490
County-Other	L	Carrizo-Wilcox Aquifer | Caldwell County	62	316	316	314	316	316
County-Other	L	Queen City Aquifer | Caldwell County	18	18	18	18	18	18
Manufacturing	L	Carrizo-Wilcox Aquifer | Caldwell County	5	5	5	5	5	5
Mining	L	Carrizo-Wilcox Aquifer | Caldwell County	112	112	112	112	112	112
Mining	L	Queen City Aquifer | Caldwell County	240	240	240	240	240	240
Livestock	L	Carrizo-Wilcox Aquifer | Caldwell County	96	96	96	96	96	96
Livestock	L	Local Surface Water Supply	396	396	396	396	396	396
Livestock	L	Queen City Aquifer | Caldwell County	300	300	300	300	300	300
Irrigation	L	Carrizo-Wilcox Aquifer | Caldwell County	585	585	585	585	585	585
Irrigation	L	Queen City Aquifer | Caldwell County	76	76	76	76	76	76
Calhoun County WUG Total			**67,856**	**67,492**	**67,149**	**66,803**	**66,395**	**65,918**
Calhoun County / Colorado-Lavaca Basin WUG Total			**39,065**	**39,062**	**39,058**	**39,059**	**39,055**	**39,050**
Point Comfort	P	Texana Lake/Reservoir	178	178	178	178	178	178
County-Other	L	Gulf Coast Aquifer System | Calhoun County	110	107	103	103	99	93
Manufacturing	L	Guadalupe Run-of-River	17,199	17,199	17,199	17,199	17,199	17,200
Manufacturing	L	Gulf Coast Aquifer System | Calhoun County	200	200	200	200	200	200
Manufacturing	P	Texana Lake/Reservoir	20,596	20,596	20,596	20,597	20,597	20,597
Steam Electric Power	L	Gulf Coast Aquifer System | Calhoun County	37	37	37	37	37	37
Livestock	L	Gulf Coast Aquifer System | Calhoun County	22	22	22	22	22	22

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Livestock	L	Local Surface Water Supply	23	23	23	23	23	23
Irrigation	L	Gulf Coast Aquifer System | Calhoun County	700	700	700	700	700	700
Calhoun County / Lavaca-Guadalupe Basin WUG Total			**27,935**	**27,573**	**27,234**	**26,888**	**26,484**	**26,012**
Guadalupe-Blanco River Authority	L	Canyon Lake/Reservoir	2,640	2,779	2,513	2,247	1,939	1,579
Guadalupe-Blanco River Authority	L	Carrizo-Wilcox Aquifer | Caldwell County	620	405	371	337	295	244
Guadalupe-Blanco River Authority	L	Carrizo-Wilcox Aquifer | Gonzales County	619	404	371	337	294	244
Guadalupe-Blanco River Authority	L	Guadalupe Run-of-River	209	136	126	114	99	83
Port Lavaca	L	Guadalupe Run-of-River	4,480	4,480	4,480	4,480	4,480	4,480
Port Oconnor Improvement District	L	Gulf Coast Aquifer System | Calhoun County	102	102	102	102	102	102
Seadrift	L	Gulf Coast Aquifer System | Calhoun County	245	245	245	245	245	245
County-Other	L	Gulf Coast Aquifer System | Calhoun County	147	149	153	153	157	163
Manufacturing	L	Guadalupe Run-of-River	8,134	8,134	8,134	8,134	8,134	8,133
Manufacturing	P	Texana Lake/Reservoir	9,740	9,740	9,740	9,740	9,740	9,740
Livestock	L	Gulf Coast Aquifer System | Calhoun County	118	118	118	118	118	118
Livestock	L	Local Surface Water Supply	119	119	119	119	119	119
Irrigation	L	Gulf Coast Aquifer System | Calhoun County	762	762	762	762	762	762
Calhoun County / San Antonio-Nueces Basin WUG Total			**856**	**857**	**857**	**856**	**856**	**856**
County-Other	L	Gulf Coast Aquifer System | Calhoun County	5	6	6	6	6	6
Manufacturing	L	Guadalupe Run-of-River	387	387	387	387	387	387
Manufacturing	P	Texana Lake/Reservoir	464	464	464	463	463	463
Comal County WUG Total			**66,478**	**66,328**	**66,618**	**67,103**	**67,487**	**67,794**
Comal County / Guadalupe Basin WUG Total			**57,798**	**57,595**	**57,790**	**58,181**	**58,448**	**58,619**
3009 Water	L	Trinity Aquifer | Comal County	1,622	1,621	1,621	1,622	1,622	1,622

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Canyon Lake Water Service*	L	Canyon Lake/Reservoir	6,239	6,238	6,239	6,240	6,246	6,250
Canyon Lake Water Service*	L	Direct Reuse	78	215	215	215	215	217
Canyon Lake Water Service*	L	Trinity Aquifer | Comal County	6,404	6,403	6,404	6,405	6,411	6,415
Clear Water Estates Water System	L	Trinity Aquifer | Comal County	984	984	984	984	984	984
Crystal Clear SUD	L	Canyon Lake/Reservoir	59	57	55	53	52	51
Crystal Clear SUD	L	Carrizo-Wilcox Aquifer | Caldwell County	634	475	421	373	330	291
Crystal Clear SUD	L	Carrizo-Wilcox Aquifer | Gonzales County	202	152	134	119	105	93
Crystal Clear SUD	L	Edwards-BFZ Aquifer | Hays County	299	225	198	176	156	138
Crystal Clear SUD	L	Guadalupe Run-of-River	128	96	85	75	67	59
Garden Ridge	L	Edwards-BFZ Aquifer | Comal County	220	220	220	220	220	220
Garden Ridge	L	Trinity Aquifer | Comal County	305	305	305	305	305	305
Green Valley SUD	L	Canyon Lake/Reservoir	46	51	57	64	69	72
Green Valley SUD	L	Carrizo-Wilcox Aquifer | Caldwell County	45	50	56	63	68	72
Green Valley SUD	L	Carrizo-Wilcox Aquifer | Gonzales County	28	32	35	40	43	45
Green Valley SUD	L	Carrizo-Wilcox Aquifer | Guadalupe County	166	185	207	232	251	266
Green Valley SUD	L	Edwards-BFZ Aquifer | Comal County	53	60	66	75	81	85
Green Valley SUD	L	Trinity Aquifer | Bexar County	17	19	21	24	25	27
KT Water Development	L	Trinity Aquifer | Comal County	406	406	406	406	406	406
New Braunfels	L	Canyon Lake/Reservoir	6,214	6,191	6,252	6,359	6,430	6,481
New Braunfels	L	Carrizo-Wilcox Aquifer | Caldwell County	846	842	851	865	875	882
New Braunfels	L	Carrizo-Wilcox Aquifer | Gonzales County	5,073	5,054	5,104	5,191	5,249	5,290
New Braunfels	L	Direct Reuse	48	48	48	49	50	50
New Braunfels	L	Edwards-BFZ Aquifer | Comal County	3,175	3,163	3,194	3,248	3,285	3,311

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
New Braunfels	L	Guadalupe Run-of-River	4,036	4,022	4,061	4,129	4,177	4,210
New Braunfels	L	Trinity Aquifer | Comal County	3,169	3,157	3,189	3,243	3,279	3,305
San Antonio Water System	L	Canyon Lake/Reservoir	4	2	2	0	0	0
San Antonio Water System	L	Carrizo-Aquifer ASR | Bexar County	31	29	29	29	29	28
San Antonio Water System	L	Carrizo-Wilcox Aquifer | Bexar County	13	12	12	12	12	12
San Antonio Water System	G	Carrizo-Wilcox Aquifer | Burleson County	31	29	29	29	29	27
San Antonio Water System	L	Carrizo-Wilcox Aquifer | Gonzales County	9	9	9	7	7	7
San Antonio Water System	L	Direct Reuse	18	20	20	20	20	19
San Antonio Water System	L	Edwards-BFZ Aquifer | Bexar County	88	84	83	84	84	78
San Antonio Water System	L	Trinity Aquifer | Bexar County	2	1	1	1	1	1
Schertz	L	Carrizo-Wilcox Aquifer | Gonzales County	204	234	270	315	353	385
Schertz	L	Edwards-BFZ Aquifer | Comal County	16	19	22	25	28	31
Schertz	L	Edwards-BFZ Aquifer | Medina County	0	0	0	0	0	0
Wingert Water Systems	L	Trinity Aquifer | Hays County	251	251	251	251	251	251
County-Other	L	Canyon Lake/Reservoir	464	464	464	464	464	464
County-Other	L	Edwards-BFZ Aquifer | Comal County	595	595	595	595	595	595
County-Other	L	Trinity Aquifer | Comal County	2,470	2,470	2,470	2,470	2,470	2,470
Manufacturing	L	Canyon Lake/Reservoir	4	4	4	4	4	4
Manufacturing	L	Direct Reuse	784	784	784	784	784	784
Manufacturing	L	Edwards-BFZ Aquifer | Comal County	2,168	2,168	2,168	2,168	2,168	2,168
Manufacturing	L	Guadalupe Run-of-River	100	100	100	100	100	100
Manufacturing	L	Trinity Aquifer | Comal County	63	63	63	63	63	63
Mining	L	Edwards-BFZ Aquifer | Comal County	2,561	2,561	2,561	2,561	2,561	2,561

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Mining	L	Trinity Aquifer | Comal County	6,483	6,482	6,482	6,481	6,481	6,481
Livestock	L	Local Surface Water Supply	118	118	118	118	118	118
Livestock	L	Trinity Aquifer | Comal County	118	118	118	118	118	118
Irrigation	L	Canyon Lake/Reservoir	129	129	129	129	129	129
Irrigation	L	Edwards-BFZ Aquifer | Comal County	482	482	482	482	482	482
Irrigation	L	Guadalupe Run-of-River	6	6	6	6	6	6
Irrigation	L	Trinity Aquifer | Comal County	90	90	90	90	90	90
Comal County / San Antonio Basin WUG Total			**8,680**	**8,733**	**8,828**	**8,922**	**9,039**	**9,175**
3009 Water	L	Trinity Aquifer | Comal County	55	56	56	55	55	55
Canyon Lake Water Service*	L	Canyon Lake/Reservoir	1,331	1,331	1,332	1,332	1,333	1,334
Canyon Lake Water Service*	L	Direct Reuse	17	46	46	46	46	46
Canyon Lake Water Service*	L	Trinity Aquifer | Comal County	1,367	1,367	1,367	1,367	1,368	1,369
Fair Oaks Ranch	L	Canyon Lake/Reservoir	353	354	354	354	354	354
Fair Oaks Ranch	L	Direct Reuse	53	54	54	54	54	54
Fair Oaks Ranch	L	Trinity Aquifer | Comal County	119	120	120	120	120	120
Garden Ridge	L	Edwards-BFZ Aquifer | Comal County	153	153	153	153	153	153
Garden Ridge	L	Trinity Aquifer | Comal County	172	172	172	172	172	172
Guadalupe-Blanco River Authority	L	Canyon Lake/Reservoir	2,517	2,926	2,974	3,022	3,086	3,171
Guadalupe-Blanco River Authority	L	Carrizo-Wilcox Aquifer | Caldwell County	591	426	440	453	469	489
Guadalupe-Blanco River Authority	L	Carrizo-Wilcox Aquifer | Gonzales County	590	426	439	452	469	488
Guadalupe-Blanco River Authority	L	Guadalupe Run-of-River	200	144	148	153	159	165
San Antonio Water System	L	Canyon Lake/Reservoir	2	2	2	0	0	0

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
San Antonio Water System	L	Carrizo-Aquifer ASR | Bexar County	20	19	20	19	19	18
San Antonio Water System	L	Carrizo-Wilcox Aquifer | Bexar County	9	8	8	8	8	8
San Antonio Water System	G	Carrizo-Wilcox Aquifer | Burleson County	20	19	19	19	19	18
San Antonio Water System	L	Carrizo-Wilcox Aquifer | Gonzales County	6	6	6	5	5	4
San Antonio Water System	L	Direct Reuse	12	13	14	14	14	13
San Antonio Water System	L	Edwards-BFZ Aquifer | Bexar County	58	55	56	56	55	52
San Antonio Water System	L	Trinity Aquifer | Bexar County	1	0	0	0	0	0
Selma	L	Carrizo-Wilcox Aquifer | Gonzales County	41	58	78	100	119	137
Selma	L	Edwards-BFZ Aquifer | Bexar County	26	37	50	64	76	87
Water Services	L	Trinity Aquifer | Bexar County	343	316	295	278	260	242
County-Other	L	Edwards-BFZ Aquifer | Comal County	129	129	129	129	129	129
County-Other	L	Trinity Aquifer | Comal County	400	400	400	400	400	400
Mining	L	Trinity Aquifer | Comal County	2	3	3	4	4	4
Livestock	L	Local Surface Water Supply	18	18	18	18	18	18
Livestock	L	Trinity Aquifer | Comal County	17	17	17	17	17	17
Irrigation	L	Canyon Lake/Reservoir	26	26	26	26	26	26
Irrigation	L	Edwards-BFZ Aquifer | Comal County	10	10	10	10	10	10
Irrigation	L	Trinity Aquifer | Comal County	22	22	22	22	22	22
DeWitt County WUG Total			**9,972**	**9,971**	**9,969**	**9,969**	**9,967**	**9,966**
DeWitt County / Guadalupe Basin WUG Total			**7,538**	**7,536**	**7,535**	**7,536**	**7,533**	**7,532**
Cuero	L	Gulf Coast Aquifer System | DeWitt County	2,230	2,230	2,230	2,230	2,230	2,230

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Gonzales County WSC	L	Carrizo-Wilcox Aquifer | Gonzales County	67	66	65	65	63	61
Yorktown	L	Gulf Coast Aquifer System | DeWitt County	368	368	368	368	368	368
County-Other	L	Gulf Coast Aquifer System | DeWitt County	1,007	1,007	1,007	1,007	1,007	1,007
Manufacturing	L	Gulf Coast Aquifer System | DeWitt County	14	13	13	14	13	14
Mining	L	Gulf Coast Aquifer System | DeWitt County	2,270	2,270	2,270	2,270	2,270	2,270
Livestock	L	Gulf Coast Aquifer System | DeWitt County	659	659	659	659	659	659
Livestock	L	Local Surface Water Supply	660	660	660	660	660	660
Irrigation	L	Gulf Coast Aquifer System | DeWitt County	263	263	263	263	263	263
DeWitt County / Lavaca Basin WUG Total			**1,774**	**1,775**	**1,774**	**1,773**	**1,774**	**1,774**
Yoakum*	L	Gulf Coast Aquifer System | DeWitt County	351	351	351	351	351	351
County-Other	L	Gulf Coast Aquifer System | DeWitt County	212	212	211	211	211	212
Manufacturing	L	Gulf Coast Aquifer System | DeWitt County	366	367	367	366	367	366
Mining	L	Gulf Coast Aquifer System | DeWitt County	54	54	54	54	54	54
Livestock	L	Gulf Coast Aquifer System | DeWitt County	132	132	132	132	132	132
Livestock	L	Local Surface Water Supply	133	133	133	133	133	133
Irrigation	L	Gulf Coast Aquifer System | DeWitt County	526	526	526	526	526	526
DeWitt County / Lavaca-Guadalupe Basin WUG Total			**37**	**37**	**37**	**37**	**37**	**37**
County-Other	L	Gulf Coast Aquifer System | DeWitt County	3	3	3	3	3	3
Livestock	L	Gulf Coast Aquifer System | DeWitt County	12	12	12	12	12	12
Livestock	L	Local Surface Water Supply	12	12	12	12	12	12

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Irrigation	L	Gulf Coast Aquifer System | DeWitt County	10	10	10	10	10	10
DeWitt County / San Antonio Basin WUG Total			**623**	**623**	**623**	**623**	**623**	**623**
County-Other	L	Gulf Coast Aquifer System | DeWitt County	84	84	84	84	84	84
Mining	L	Gulf Coast Aquifer System | DeWitt County	347	347	347	347	347	347
Livestock	L	Gulf Coast Aquifer System | DeWitt County	64	64	64	64	64	64
Livestock	L	Local Surface Water Supply	64	64	64	64	64	64
Irrigation	L	Gulf Coast Aquifer System | DeWitt County	64	64	64	64	64	64
Dimmit County WUG Total			**4,026**	**4,026**	**4,026**	**4,026**	**4,032**	**4,089**
Dimmit County / Nueces Basin WUG Total			**3,921**	**3,921**	**3,921**	**3,921**	**3,927**	**3,984**
Asherton	L	Carrizo-Wilcox Aquifer | Dimmit County	193	193	193	193	193	193
Big Wells	L	Carrizo-Wilcox Aquifer | Dimmit County	168	168	168	168	168	168
Carrizo Hill WSC	L	Carrizo-Wilcox Aquifer | Dimmit County	154	154	154	154	160	217
Carrizo Springs	L	Carrizo-Wilcox Aquifer | Dimmit County	1,789	1,789	1,789	1,789	1,789	1,789
County-Other	L	Carrizo-Wilcox Aquifer | Dimmit County	303	303	303	303	303	303
Mining	L	Carrizo-Wilcox Aquifer | Dimmit County	695	695	695	695	695	695
Livestock	L	Carrizo-Wilcox Aquifer | Dimmit County	172	172	172	172	172	172
Livestock	L	Local Surface Water Supply	172	172	172	172	172	172
Irrigation	L	Carrizo-Wilcox Aquifer | Dimmit County	64	64	64	64	64	64
Irrigation	L	Nueces Run-of-River	211	211	211	211	211	211
Dimmit County / Rio Grande Basin WUG Total			**105**	**105**	**105**	**105**	**105**	**105**
County-Other	L	Carrizo-Wilcox Aquifer | Dimmit County	4	4	4	4	4	4

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Mining		No water supply associated with WUG	0	0	0	0	0	0
Livestock	L	Carrizo-Wilcox Aquifer | Dimmit County	11	11	11	11	11	11
Livestock	L	Local Surface Water Supply	12	12	12	12	12	12
Irrigation	L	Carrizo-Wilcox Aquifer | Dimmit County	78	78	78	78	78	78
Frio County WUG Total			**82,268**	**82,294**	**82,282**	**82,256**	**82,226**	**82,218**
Frio County / Nueces Basin WUG Total			**82,268**	**82,294**	**82,282**	**82,256**	**82,226**	**82,218**
Benton City WSC	L	Carrizo-Wilcox Aquifer | Atascosa County	147	173	185	178	171	163
Dilley	L	Carrizo-Wilcox Aquifer | Frio County	2,147	2,147	2,147	2,147	2,147	2,147
Moore WSC	L	Carrizo-Wilcox Aquifer | Frio County	4,033	4,033	4,033	4,033	4,033	4,033
Pearsall	L	Carrizo-Wilcox Aquifer | Frio County	1,410	1,410	1,410	1,410	1,410	1,410
County-Other	L	Carrizo-Wilcox Aquifer | Frio County	499	499	499	499	499	499
Mining	L	Carrizo-Wilcox Aquifer | Frio County	984	984	984	984	984	984
Mining	L	Queen City Aquifer | Frio County	984	984	984	984	984	984
Steam Electric Power	L	Carrizo-Wilcox Aquifer | Frio County	124	124	124	124	124	124
Livestock	L	Local Surface Water Supply	482	482	482	482	482	482
Livestock	L	Queen City Aquifer | Frio County	482	482	482	482	482	482
Irrigation	L	Carrizo-Wilcox Aquifer | Frio County	69,351	69,351	69,351	69,351	69,351	69,351
Irrigation	L	Queen City Aquifer | Frio County	1,025	1,025	1,025	1,025	1,025	1,025
Irrigation	L	Sparta Aquifer | Frio County	600	600	576	557	534	534

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Goliad County WUG Total			**29,897**	**30,052**	**30,207**	**30,359**	**30,278**	**30,018**
Goliad County / Guadalupe Basin WUG Total			**25,600**	**25,600**	**25,600**	**25,600**	**25,366**	**25,106**
County-Other	L	Gulf Coast Aquifer System | Goliad County	307	307	307	307	307	307
Mining	L	Gulf Coast Aquifer System | Goliad County	14	14	14	14	14	14
Steam Electric Power	L	Coleto Creek Lake/Reservoir	24,160	24,160	24,160	24,160	23,926	23,666
Steam Electric Power	L	Gulf Coast Aquifer System | Goliad County	223	223	223	223	223	223
Livestock	L	Gulf Coast Aquifer System | Goliad County	99	99	99	99	99	99
Livestock	L	Local Surface Water Supply	100	100	100	100	100	100
Irrigation	L	Gulf Coast Aquifer System | Goliad County	697	697	697	697	697	697
Goliad County / San Antonio Basin WUG Total			**3,554**	**3,702**	**3,851**	**3,997**	**4,146**	**4,146**
Goliad	L	Gulf Coast Aquifer System | Goliad County	920	920	920	920	920	920
County-Other	L	Gulf Coast Aquifer System | Goliad County	335	335	335	335	335	335
Livestock	L	Gulf Coast Aquifer System | Goliad County	155	155	155	155	155	155
Livestock	L	Local Surface Water Supply	156	156	156	156	156	156
Irrigation	L	Gulf Coast Aquifer System | Goliad County	1,988	2,136	2,285	2,431	2,580	2,580
Goliad County / San Antonio-Nueces Basin WUG Total			**743**	**750**	**756**	**762**	**766**	**766**
County-Other	L	Gulf Coast Aquifer System | Goliad County	53	53	53	53	53	53
Livestock	L	Gulf Coast Aquifer System | Goliad County	139	139	139	139	139	139
Livestock	L	Local Surface Water Supply	140	140	140	140	140	140
Irrigation	L	Gulf Coast Aquifer System | Goliad County	411	418	424	430	434	434

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Gonzales County WUG Total			**24,145**	**24,145**	**24,134**	**24,121**	**24,106**	**24,091**
Gonzales County / Guadalupe Basin WUG Total			**24,018**	**24,019**	**24,007**	**23,994**	**23,979**	**23,965**
Fayette WSC*	K	Yegua-Jackson Aquifer | Fayette County	5	7	9	12	15	20
Gonzales	L	Carrizo-Wilcox Aquifer | Gonzales County	2,920	2,920	2,920	2,920	2,920	2,920
Gonzales	L	Guadalupe Run-of-River	2,240	2,240	2,240	2,240	2,240	2,240
Gonzales County WSC	L	Carrizo-Wilcox Aquifer | Gonzales County	2,396	2,387	2,374	2,359	2,341	2,322
Luling	L	Carrizo-Wilcox Aquifer | Caldwell County	7	14	14	13	13	12
Nixon	L	Carrizo-Wilcox Aquifer | Gonzales County	866	866	866	866	866	866
Smiley	L	Carrizo-Wilcox Aquifer | Gonzales County	117	117	117	117	117	117
Waelder	L	Queen City Aquifer | Gonzales County	630	630	630	630	630	630
County-Other	L	Carrizo-Wilcox Aquifer | Gonzales County	129	129	129	128	128	129
Manufacturing	L	Carrizo-Wilcox Aquifer | Gonzales County	451	451	451	451	451	451
Manufacturing	L	Queen City Aquifer | Gonzales County	534	534	534	534	534	534
Manufacturing	L	Sparta Aquifer | Gonzales County	1,140	1,140	1,140	1,140	1,140	1,140
Manufacturing	L	Yegua-Jackson Aquifer | Gonzales County	687	687	687	687	687	687
Mining	L	Carrizo-Wilcox Aquifer | Gonzales County	1,796	1,796	1,796	1,796	1,796	1,796
Mining	L	Sparta Aquifer | Gonzales County	101	101	101	101	101	101
Mining	L	Yegua-Jackson Aquifer | Gonzales County	982	983	982	983	983	983
Livestock	L	Carrizo-Wilcox Aquifer | Gonzales County	1,065	1,065	1,065	1,065	1,065	1,065
Livestock	L	Local Surface Water Supply	2,050	2,050	2,050	2,050	2,050	2,050
Livestock	L	Queen City Aquifer | Gonzales County	315	315	315	315	315	315
Livestock	L	Sparta Aquifer | Gonzales County	256	256	256	256	256	256

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Livestock	L	Yegua-Jackson Aquifer | Gonzales County	413	413	413	413	413	413
Irrigation	L	Canyon Lake/Reservoir	2	2	2	2	2	2
Irrigation	L	Carrizo-Wilcox Aquifer | Gonzales County	3,788	3,788	3,788	3,788	3,788	3,788
Irrigation	L	Queen City Aquifer | Gonzales County	867	867	867	867	867	867
Irrigation	L	Yegua-Jackson Aquifer | Gonzales County	261	261	261	261	261	261
Gonzales County / Lavaca Basin WUG Total			**127**	**126**	**127**	**127**	**127**	**126**
County-Other	L	Carrizo-Wilcox Aquifer | Gonzales County	6	6	6	7	7	6
Mining	L	Sparta Aquifer | Gonzales County	8	8	8	8	8	8
Mining	L	Yegua-Jackson Aquifer | Gonzales County	74	73	74	73	73	73
Livestock	L	Carrizo-Wilcox Aquifer | Gonzales County	19	19	19	19	19	19
Livestock	L	Local Surface Water Supply	20	20	20	20	20	20
Guadalupe County WUG Total			**67,474**	**65,820**	**65,550**	**65,238**	**65,056**	**64,954**
Guadalupe County / Guadalupe Basin WUG Total			**46,801**	**45,648**	**45,572**	**45,346**	**45,211**	**45,134**
Crystal Clear SUD	L	Canyon Lake/Reservoir	317	321	322	320	317	313
Crystal Clear SUD	L	Carrizo-Wilcox Aquifer | Caldwell County	1,480	1,619	1,691	1,781	1,862	1,934
Crystal Clear SUD	L	Carrizo-Wilcox Aquifer | Gonzales County	473	517	541	569	595	618
Crystal Clear SUD	L	Edwards-BFZ Aquifer | Hays County	699	764	799	841	879	913
Crystal Clear SUD	L	Guadalupe Run-of-River	298	326	341	359	375	390
Gonzales County WSC	L	Carrizo-Wilcox Aquifer | Gonzales County	42	53	66	81	99	119
Green Valley SUD	L	Canyon Lake/Reservoir	475	476	475	475	475	474
Green Valley SUD	L	Carrizo-Wilcox Aquifer | Caldwell County	474	475	474	474	473	473
Green Valley SUD	L	Carrizo-Wilcox Aquifer | Gonzales County	297	297	297	297	297	296
Green Valley SUD	L	Carrizo-Wilcox Aquifer | Guadalupe County	1,741	1,742	1,741	1,739	1,737	1,735

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Green Valley SUD	L	Edwards-BFZ Aquifer | Comal County	557	557	557	556	556	555
Green Valley SUD	L	Trinity Aquifer | Bexar County	178	178	178	178	178	178
Martindale WSC	L	Canyon Lake/Reservoir	25	27	31	34	36	39
Martindale WSC	L	Guadalupe Run-of-River	32	37	42	46	50	53
New Braunfels	L	Canyon Lake/Reservoir	2,186	2,209	2,148	2,041	1,970	1,919
New Braunfels	L	Carrizo-Wilcox Aquifer | Caldwell County	297	301	292	278	268	261
New Braunfels	L	Carrizo-Wilcox Aquifer | Gonzales County	1,784	1,803	1,753	1,666	1,608	1,567
New Braunfels	L	Direct Reuse	17	17	17	16	15	15
New Braunfels	L	Edwards-BFZ Aquifer | Comal County	1,116	1,128	1,097	1,043	1,006	980
New Braunfels	L	Guadalupe Run-of-River	1,420	1,434	1,395	1,327	1,279	1,246
New Braunfels	L	Trinity Aquifer | Comal County	1,115	1,127	1,095	1,041	1,005	979
Schertz	L	Carrizo-Wilcox Aquifer | Gonzales County	642	613	598	590	584	579
Schertz	L	Edwards-BFZ Aquifer | Comal County	52	49	48	48	47	46
Schertz	L	Edwards-BFZ Aquifer | Medina County	1	1	1	1	1	1
Seguin	L	Canyon Lake/Reservoir	0	0	0	0	0	0
Seguin	L	Carrizo-Wilcox Aquifer | Gonzales County	1,468	1,468	1,468	1,468	1,468	1,468
Seguin	L	Carrizo-Wilcox Aquifer | Guadalupe County	3,515	3,515	3,515	3,515	3,515	3,515
Seguin	L	Direct Reuse	788	1,344	1,344	1,344	1,344	1,344
Seguin	L	Guadalupe Run-of-River	4,200	4,200	4,200	4,200	4,200	4,200
Springs Hill WSC	L	Canyon Lake/Reservoir	3,776	1,719	1,719	1,719	1,719	1,719
Springs Hill WSC	L	Carrizo-Wilcox Aquifer | Guadalupe County	2,283	2,283	2,283	2,283	2,283	2,283
Springs Hill WSC	L	Guadalupe Run-of-River	0	0	0	0	0	0
Tri Community WSC	L	Guadalupe Run-of-River	8	10	10	9	10	10
Water Services	L	Trinity Aquifer | Bexar County	42	35	30	25	21	18
County-Other	L	Canyon Lake/Reservoir	10	10	10	10	10	10
County-Other	L	Carrizo-Wilcox Aquifer | Guadalupe County	305	305	305	305	305	305

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
County-Other	L	Edwards-BFZ Aquifer | Guadalupe County	12	12	12	12	12	12
County-Other	L	Guadalupe Run-of-River	61	61	61	61	61	61
Manufacturing	L	Canyon Lake/Reservoir	2,709	2,709	2,710	2,688	2,645	2,600
Manufacturing	L	Carrizo-Wilcox Aquifer | Guadalupe County	110	110	110	110	110	110
Manufacturing	L	Edwards-BFZ Aquifer | Guadalupe County	201	201	201	201	201	201
Manufacturing	L	Guadalupe Run-of-River	59	59	59	59	59	59
Mining	L	Carrizo-Wilcox Aquifer | Guadalupe County	342	342	342	342	342	342
Steam Electric Power	L	Canyon Lake/Reservoir	4,520	4,520	4,520	4,520	4,520	4,520
Steam Electric Power	L	Carrizo-Wilcox Aquifer | Gonzales County	2,600	2,600	2,600	2,600	2,600	2,600
Steam Electric Power	L	Direct Reuse	2,345	2,345	2,345	2,345	2,345	2,345
Livestock	L	Carrizo-Wilcox Aquifer | Guadalupe County	492	492	492	492	492	492
Livestock	L	Local Surface Water Supply	493	493	493	493	493	493
Irrigation	L	Canyon Lake/Reservoir	307	307	307	307	307	307
Irrigation	L	Carrizo-Wilcox Aquifer | Guadalupe County	366	366	366	366	366	366
Irrigation	L	Guadalupe Run-of-River	71	71	71	71	71	71
Guadalupe County / San Antonio Basin WUG Total			**20,673**	**20,172**	**19,978**	**19,892**	**19,845**	**19,820**
Cibolo	L	Canyon Lake/Reservoir	1,350	1,350	1,350	1,350	1,350	1,350
Cibolo	L	Carrizo-Wilcox Aquifer | Guadalupe County	1,861	1,861	1,861	1,861	1,861	1,861
Cibolo	L	Direct Reuse	7	7	7	7	7	7
Cibolo	L	Edwards-BFZ Aquifer | Comal County	400	400	400	400	400	400
East Central SUD	L	Canyon Lake/Reservoir	41	44	48	51	55	59
East Central SUD	L	Carrizo-Wilcox Aquifer | Gonzales County	29	31	34	37	39	42
East Central SUD	L	Edwards-BFZ Aquifer | Bexar County	25	26	23	28	25	30
Green Valley SUD	L	Canyon Lake/Reservoir	1,018	1,018	1,018	1,015	1,015	1,014

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Green Valley SUD	L	Carrizo-Wilcox Aquifer | Caldwell County	1,015	1,014	1,015	1,012	1,012	1,011
Green Valley SUD	L	Carrizo-Wilcox Aquifer | Gonzales County	636	636	636	635	634	634
Green Valley SUD	L	Carrizo-Wilcox Aquifer | Guadalupe County	3,725	3,725	3,724	3,718	3,714	3,711
Green Valley SUD	L	Edwards-BFZ Aquifer | Comal County	1,194	1,193	1,193	1,190	1,189	1,188
Green Valley SUD	L	Trinity Aquifer | Bexar County	382	382	382	381	381	380
Marion	L	Canyon Lake/Reservoir	100	100	100	100	100	100
Marion	L	Carrizo-Wilcox Aquifer | Gonzales County	200	200	200	200	200	200
Marion	L	Direct Reuse	23	45	45	45	45	45
Marion	L	Edwards-BFZ Aquifer | Guadalupe County	78	78	78	78	78	78
Schertz	L	Carrizo-Wilcox Aquifer | Gonzales County	5,304	5,069	4,940	4,879	4,826	4,780
Schertz	L	Edwards-BFZ Aquifer | Comal County	426	407	397	392	388	384
Schertz	L	Edwards-BFZ Aquifer | Medina County	4	4	4	4	4	4
Selma	L	Carrizo-Wilcox Aquifer | Gonzales County	337	277	237	209	184	162
Selma	L	Edwards-BFZ Aquifer | Bexar County	215	177	151	133	118	103
Springs Hill WSC	L	Canyon Lake/Reservoir	414	231	231	231	231	231
Springs Hill WSC	L	Carrizo-Wilcox Aquifer | Guadalupe County	237	237	237	237	237	237
Springs Hill WSC	L	Guadalupe Run-of-River	0	0	0	0	0	0
Universal City	L	Direct Reuse	29	37	45	55	65	77
County-Other	L	Carrizo-Wilcox Aquifer | Guadalupe County	69	69	69	69	69	69
County-Other	L	Edwards-BFZ Aquifer | Guadalupe County	2	2	2	2	2	2
County-Other	L	Trinity Aquifer | Guadalupe County	9	9	9	9	9	9
Manufacturing	L	Canyon Lake/Reservoir	1,151	1,151	1,150	1,172	1,215	1,260
Livestock	L	Carrizo-Wilcox Aquifer | Guadalupe County	97	97	97	97	97	97

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year) 2030	2040	2050	2060	2070	2080
Livestock	L	Local Surface Water Supply	97	97	97	97	97	97
Irrigation	L	Carrizo-Wilcox Aquifer | Guadalupe County	198	198	198	198	198	198
Hays County WUG Total			**61,790**	**62,246**	**62,533**	**62,637**	**62,451**	**62,204**
Hays County / Guadalupe Basin WUG Total			**61,790**	**62,246**	**62,533**	**62,637**	**62,451**	**62,204**
County Line SUD	L	Canyon Lake/Reservoir	1,308	1,308	1,308	1,308	1,308	1,308
County Line SUD	L	Carrizo-Wilcox Aquifer | Gonzales County	2,119	2,160	2,187	2,188	2,188	2,188
County Line SUD	L	Edwards-BFZ Aquifer | Hays County	166	166	166	166	166	166
Creedmoor-Maha WSC*	L	Carrizo-Wilcox Aquifer | Gonzales County	6	6	6	6	6	6
Crystal Clear SUD	L	Canyon Lake/Reservoir	124	122	123	127	131	136
Crystal Clear SUD	L	Carrizo-Wilcox Aquifer | Caldwell County	366	386	368	326	288	255
Crystal Clear SUD	L	Carrizo-Wilcox Aquifer | Gonzales County	117	123	117	104	92	81
Crystal Clear SUD	L	Edwards-BFZ Aquifer | Hays County	173	182	174	154	136	120
Crystal Clear SUD	L	Guadalupe Run-of-River	74	78	74	66	58	51
Goforth SUD*	L	Canyon Lake/Reservoir	3,804	3,848	3,877	3,898	3,911	3,920
Goforth SUD*	L	Carrizo-Wilcox Aquifer | Gonzales County	5,959	6,029	6,075	6,039	5,780	5,489
Goforth SUD*	L	Edwards-BFZ Aquifer | Hays County	105	107	107	108	108	109
Goforth SUD*	K	Edwards-BFZ Aquifer | Travis County	7	7	7	7	7	7
Goforth SUD*	L	Trinity Aquifer | Hays County	2,013	2,036	2,051	2,063	2,069	2,074
Kyle	L	Canyon Lake/Reservoir	5,443	5,443	5,443	5,443	5,443	5,443
Kyle	L	Carrizo-Wilcox Aquifer | Caldwell County	4,225	4,225	4,225	4,225	4,225	4,225
Kyle	L	Direct Reuse	1,936	1,936	1,936	1,936	1,936	1,936
Kyle	L	Edwards-BFZ Aquifer | Hays County	370	370	370	370	370	370
Maxwell SUD	L	Canyon Lake/Reservoir	472	533	586	634	667	690
Maxwell SUD	L	Carrizo-Wilcox Aquifer | Caldwell County	398	450	495	535	563	583

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Maxwell SUD	L	Carrizo-Wilcox Aquifer | Gonzales County	398	450	495	535	563	583
Maxwell SUD	L	Edwards-BFZ Aquifer | Comal County	125	141	155	168	176	183
Maxwell SUD	L	Guadalupe Run-of-River	413	465	511	553	581	602
San Marcos	L	Canyon Lake/Reservoir	9,998	9,998	9,998	9,997	9,997	9,997
San Marcos	L	Carrizo-Wilcox Aquifer | Caldwell County	5,380	5,380	5,380	5,380	5,380	5,380
San Marcos	L	Direct Reuse	1,905	1,905	1,905	1,905	1,905	1,905
San Marcos	L	Edwards-BFZ Aquifer | Hays County	3,081	3,087	3,089	3,091	3,092	3,092
South Buda WCID 1	L	Trinity Aquifer | Hays County	850	850	850	850	850	850
Texas State University	L	Edwards-BFZ Aquifer | Hays County	1,143	1,143	1,143	1,143	1,143	1,143
Wimberley WSC	L	Trinity Aquifer | Hays County	750	750	750	750	750	750
County-Other*	L	Canyon Lake/Reservoir	560	560	560	560	560	560
County-Other*	L	Edwards-BFZ Aquifer | Hays County	1,371	1,371	1,371	1,371	1,371	1,371
County-Other*	L	Trinity Aquifer | Hays County	1,100	1,100	1,100	1,100	1,100	1,100
Manufacturing*	L	Edwards-BFZ Aquifer | Hays County	70	70	70	70	70	70
Mining*	L	Trinity Aquifer | Hays County	71	71	71	71	71	71
Steam Electric Power	L	Canyon Lake/Reservoir	2,464	2,464	2,464	2,464	2,464	2,464
Livestock*	L	Guadalupe Run-of-River	0	0	0	0	0	0
Livestock*	L	Local Surface Water Supply	140	140	140	140	140	140
Livestock*	L	Trinity Aquifer | Hays County	140	140	140	140	140	140
Livestock*	L	Water Recycling	2,420	2,420	2,420	2,420	2,420	2,420
Irrigation*	L	Direct Reuse	37	37	37	37	37	37
Irrigation*	L	Guadalupe Run-of-River	130	130	130	130	130	130
Irrigation*	L	Trinity Aquifer | Hays County	59	59	59	59	59	59

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Karnes County WUG Total			**7,510**	**7,469**	**6,882**	**6,853**	**6,818**	**6,767**
Karnes County / Guadalupe Basin WUG Total			**340**	**340**	**339**	**339**	**338**	**338**
El Oso WSC*	L	Carrizo-Wilcox Aquifer | Karnes County	0	1	1	1	1	2
El Oso WSC*	L	Carrizo-Wilcox Aquifer | Wilson County	7	6	5	5	4	5
County-Other	L	Gulf Coast Aquifer System | Karnes County	7	7	7	7	7	7
County-Other	L	Yegua-Jackson Aquifer | Karnes County	1	1	1	1	1	1
Mining	L	Carrizo-Wilcox Aquifer | Karnes County	0	0	0	0	0	0
Mining	L	Direct Reuse	2	2	2	2	2	0
Livestock	L	Gulf Coast Aquifer System | Karnes County	10	10	10	10	10	10
Livestock	L	Local Surface Water Supply	21	21	21	21	21	21
Livestock	L	Yegua-Jackson Aquifer | Karnes County	10	10	10	10	10	10
Irrigation	L	Yegua-Jackson Aquifer | Karnes County	282	282	282	282	282	282
Karnes County / Nueces Basin WUG Total			**188**	**189**	**189**	**186**	**183**	**181**
El Oso WSC*	L	Carrizo-Wilcox Aquifer | Karnes County	3	6	9	11	12	12
El Oso WSC*	L	Carrizo-Wilcox Aquifer | Wilson County	52	48	46	42	40	38
Three Oaks WSC	L	Carrizo-Wilcox Aquifer | Wilson County	16	18	17	16	14	16
County-Other	L	Gulf Coast Aquifer System | Karnes County	1	1	1	1	1	1
Mining	L	Direct Reuse	2	2	2	2	2	0
Mining	L	Gulf Coast Aquifer System | Karnes County	38	38	38	38	38	38
Livestock	L	Gulf Coast Aquifer System | Karnes County	25	25	25	25	25	25
Livestock	L	Local Surface Water Supply	38	38	38	38	38	38
Livestock	L	Yegua-Jackson Aquifer | Karnes County	13	13	13	13	13	13

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Irrigation	L	Carrizo-Wilcox Aquifer | Karnes County	0	0	0	0	0	0
Karnes County / San Antonio Basin WUG Total			**6,885**	**6,843**	**6,258**	**6,232**	**6,200**	**6,152**
El Oso WSC*	L	Carrizo-Wilcox Aquifer | Karnes County	84	161	242	305	343	341
El Oso WSC*	L	Carrizo-Wilcox Aquifer | Wilson County	1,498	1,394	1,297	1,217	1,150	1,108
Falls City	L	Carrizo-Wilcox Aquifer | Karnes County	142	142	142	142	142	142
Karnes City	L	Carrizo-Wilcox Aquifer | Karnes County	525	525	525	525	525	525
Karnes City	L	Direct Reuse	90	90	90	90	90	90
Kenedy	L	Direct Reuse	30	30	30	30	30	30
Kenedy	L	Gulf Coast Aquifer System | Karnes County	1,838	1,838	1,838	1,838	1,838	1,838
Runge	L	Gulf Coast Aquifer System | Karnes County	225	225	225	225	225	225
Sunko WSC	L	Carrizo-Wilcox Aquifer | Wilson County	64	53	46	39	35	33
Three Oaks WSC	L	Carrizo-Wilcox Aquifer | Wilson County	70	67	64	62	64	58
County-Other	L	Gulf Coast Aquifer System | Karnes County	302	301	301	301	300	300
County-Other	L	Yegua-Jackson Aquifer | Karnes County	50	50	50	50	50	50
Manufacturing	L	Gulf Coast Aquifer System | Karnes County	84	84	84	84	84	84
Mining	L	Direct Reuse	26	26	26	26	26	30
Mining	L	Yegua-Jackson Aquifer | Karnes County	411	411	411	411	411	411
Livestock	L	Gulf Coast Aquifer System | Karnes County	197	197	197	197	197	197
Livestock	L	Local Surface Water Supply	394	394	394	394	394	394
Livestock	L	Yegua-Jackson Aquifer | Karnes County	196	196	196	196	196	196
Irrigation	L	Gulf Coast Aquifer System | Karnes County	559	559	0	0	0	0
Irrigation	L	San Antonio Run-of-River	100	100	100	100	100	100

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Karnes County / San Antonio-Nueces Basin WUG Total			**97**	**97**	**96**	**96**	**97**	**96**
El Oso WSC*	L	Carrizo-Wilcox Aquifer | Karnes County	1	2	2	3	3	3
El Oso WSC*	L	Carrizo-Wilcox Aquifer | Wilson County	15	13	12	11	11	10
County-Other	L	Gulf Coast Aquifer System | Karnes County	6	7	7	7	8	8
Livestock	L	Gulf Coast Aquifer System | Karnes County	25	25	25	25	25	25
Livestock	L	Local Surface Water Supply	25	25	25	25	25	25
Irrigation	L	Gulf Coast Aquifer System | Karnes County	25	25	25	25	25	25
Kendall County WUG Total			**17,217**	**20,004**	**20,158**	**20,290**	**20,449**	**20,647**
Kendall County / Colorado Basin WUG Total			**127**	**102**	**102**	**102**	**102**	**102**
County-Other	L	Canyon Lake/Reservoir	25	0	0	0	0	0
County-Other	L	Edwards-Trinity-Plateau Aquifer | Kendall County	2	2	2	2	2	2
County-Other	L	Trinity Aquifer | Kendall County	96	96	96	96	96	96
Livestock	L	Edwards-Trinity-Plateau Aquifer | Kendall County	1	1	1	1	1	1
Livestock	L	Local Surface Water Supply	2	2	2	2	2	2
Livestock	L	Trinity Aquifer | Kendall County	1	1	1	1	1	1
Kendall County / Guadalupe Basin WUG Total			**7,480**	**10,742**	**10,862**	**10,985**	**11,143**	**11,345**
Guadalupe-Blanco River Authority	L	Canyon Lake/Reservoir	1,215	4,521	4,595	4,669	4,768	4,898
Guadalupe-Blanco River Authority	L	Carrizo-Wilcox Aquifer | Caldwell County	285	659	679	700	725	756
Guadalupe-Blanco River Authority	L	Carrizo-Wilcox Aquifer | Gonzales County	285	658	678	699	724	755
Guadalupe-Blanco River Authority	L	Guadalupe Run-of-River	96	223	229	236	245	255
Kendall County WCID 1	L	Direct Reuse	227	227	227	227	227	227
Kendall County WCID 1	L	Trinity Aquifer | Kendall County	500	500	500	500	500	500

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
County-Other	L	Canyon Lake/Reservoir	1,668	750	750	750	750	750
County-Other	L	Edwards-Trinity-Plateau Aquifer | Kendall County	53	53	53	53	53	53
County-Other	L	Trinity Aquifer | Kendall County	2,167	2,167	2,167	2,167	2,167	2,167
Manufacturing	L	Trinity Aquifer | Kendall County	3	3	3	3	3	3
Livestock	L	Edwards-Trinity-Plateau Aquifer | Kendall County	9	9	9	9	9	9
Livestock	L	Local Surface Water Supply	172	172	172	172	172	172
Livestock	L	Trinity Aquifer | Kendall County	162	162	162	162	162	162
Irrigation	L	Direct Reuse	230	230	230	230	230	230
Irrigation	L	Guadalupe Run-of-River	26	26	26	26	26	26
Irrigation	L	Trinity Aquifer | Kendall County	382	382	382	382	382	382
Kendall County / San Antonio Basin WUG Total			**9,610**	**9,160**	**9,194**	**9,203**	**9,204**	**9,200**
Boerne	L	Boerne Lake/Reservoir	648	648	648	648	648	648
Boerne	L	Canyon Lake/Reservoir	3,611	3,611	3,611	3,611	3,611	3,611
Boerne	L	Direct Reuse	523	523	523	523	523	523
Boerne	L	Trinity Aquifer | Kendall County	1,850	1,850	1,850	1,850	1,850	1,850
Fair Oaks Ranch	L	Canyon Lake/Reservoir	470	539	566	575	577	577
Fair Oaks Ranch	L	Direct Reuse	72	81	85	87	87	87
Fair Oaks Ranch	L	Trinity Aquifer | Comal County	159	182	191	194	195	195
Guadalupe-Blanco River Authority	L	Carrizo-Wilcox Aquifer | Caldwell County	5	11	11	11	12	12
Guadalupe-Blanco River Authority	L	Carrizo-Wilcox Aquifer | Gonzales County	5	11	11	11	12	12
Guadalupe-Blanco River Authority	L	Guadalupe Run-of-River	2	4	4	4	4	4
Kendall West Utility	L	Trinity Aquifer | Kendall County	500	500	500	500	500	500
Water Services	L	Trinity Aquifer | Bexar County	46	38	32	27	23	19
County-Other	L	Canyon Lake/Reservoir	557	0	0	0	0	0

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
County-Other	L	Trinity Aquifer | Kendall County	1,026	1,026	1,026	1,026	1,026	1,026
Livestock	L	Local Surface Water Supply	21	21	21	21	21	21
Livestock	L	Trinity Aquifer | Kendall County	20	20	20	20	20	20
Irrigation	L	Trinity Aquifer | Kendall County	95	95	95	95	95	95
La Salle County WUG Total			**6,627**	**6,627**	**6,627**	**6,627**	**6,627**	**6,627**
La Salle County / Nueces Basin WUG Total			**6,627**	**6,627**	**6,627**	**6,627**	**6,627**	**6,627**
Cotulla	L	Carrizo-Wilcox Aquifer | La Salle County	1,100	1,100	1,100	1,100	1,100	1,100
Encinal WSC	L	Carrizo-Wilcox Aquifer | La Salle County	296	296	296	296	296	296
County-Other	L	Carrizo-Wilcox Aquifer | La Salle County	260	260	260	260	260	260
Mining	L	Carrizo-Wilcox Aquifer | La Salle County	529	529	529	529	529	529
Livestock	L	Carrizo-Wilcox Aquifer | La Salle County	105	105	105	105	105	105
Livestock	L	Local Surface Water Supply	197	197	197	197	197	197
Livestock	L	Queen City Aquifer | La Salle County	1	1	1	1	1	1
Livestock	L	Yegua-Jackson Aquifer | La Salle County	91	91	91	91	91	91
Irrigation	L	Carrizo-Wilcox Aquifer | La Salle County	3,574	3,574	3,574	3,574	3,574	3,574
Irrigation	L	Nueces Run-of-River	474	474	474	474	474	474
Irrigation	L	Sparta Aquifer | La Salle County	0	0	0	0	0	0
Medina County WUG Total			**46,525**	**48,057**	**47,949**	**47,807**	**47,717**	**47,475**
Medina County / Nueces Basin WUG Total			**35,260**	**35,151**	**35,042**	**34,957**	**34,877**	**34,810**
Benton City WSC	L	Carrizo-Wilcox Aquifer | Atascosa County	674	642	614	601	587	573
Devine	L	Carrizo-Wilcox Aquifer | Medina County	280	280	280	280	280	280
Devine	L	Edwards-BFZ Aquifer | Medina County	471	471	471	471	471	471

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
East Medina County SUD	L	Edwards-BFZ Aquifer | Medina County	924	924	924	924	924	924
Hondo	L	Edwards-BFZ Aquifer | Medina County	1,823	1,823	1,823	1,823	1,823	1,823
Lytle	L	Edwards-BFZ Aquifer | Medina County	79	80	80	78	76	75
Medina County WCID 2	L	Edwards-BFZ Aquifer | Medina County	102	102	102	102	102	102
Medina County WCID 2	L	Trinity Aquifer | Medina County	468	468	468	468	468	468
Medina River West WSC	L	Edwards-BFZ Aquifer | Medina County	67	67	67	67	67	67
Medina River West WSC	L	Trinity Aquifer | Medina County	215	214	214	214	214	215
Natalia	L	Edwards-BFZ Aquifer | Medina County	186	186	186	186	186	186
Ville Dalsace Water Supply	L	Edwards-BFZ Aquifer | Medina County	15	15	15	15	15	15
West Medina WSC	L	Edwards-BFZ Aquifer | Medina County	246	246	246	246	246	246
Yancey WSC	L	Edwards-BFZ Aquifer | Medina County	97	97	97	98	98	98
County-Other	L	Carrizo-Wilcox Aquifer | Medina County	315	315	315	315	315	315
County-Other	L	Edwards-BFZ Aquifer | Medina County	968	968	970	968	969	968
County-Other	L	Leona Gravel Aquifer | Medina County	32	32	32	32	32	32
Manufacturing	L	Carrizo-Wilcox Aquifer | Medina County	2	2	2	2	2	2
Manufacturing	L	Edwards-BFZ Aquifer | Medina County	1,567	1,567	1,567	1,567	1,567	1,567
Manufacturing	L	Leona Gravel Aquifer | Medina County	15	15	15	15	15	15
Mining	L	Edwards-BFZ Aquifer | Medina County	101	101	101	101	101	101
Mining	L	Leona Gravel Aquifer | Medina County	551	551	551	551	551	551
Mining	L	Trinity Aquifer | Medina County	369	369	369	369	369	369
Livestock	L	Carrizo-Wilcox Aquifer | Medina County	20	20	20	20	20	20

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Livestock	L	Edwards-BFZ Aquifer | Medina County	314	314	314	314	314	314
Livestock	L	Leona Gravel Aquifer | Medina County	55	55	55	55	55	55
Livestock	L	Local Surface Water Supply	444	444	444	444	444	444
Livestock	L	Trinity Aquifer | Medina County	55	55	55	55	55	55
Irrigation	L	Carrizo-Wilcox Aquifer | Medina County	1,602	1,525	1,442	1,373	1,308	1,256
Irrigation	L	Edwards-BFZ Aquifer | Medina County	17,419	17,419	17,419	17,419	17,419	17,419
Irrigation	L	Trinity Aquifer | Medina County	5,784	5,784	5,784	5,784	5,784	5,784
Medina County / San Antonio Basin WUG Total			**11,265**	**12,906**	**12,907**	**12,850**	**12,840**	**12,665**
Canyon Lake Water Service*	L	Canyon Lake/Reservoir	32	33	31	30	23	18
Canyon Lake Water Service*	L	Direct Reuse	0	1	1	1	1	1
Canyon Lake Water Service*	L	Trinity Aquifer | Comal County	32	33	32	31	24	19
Castroville	L	Edwards-BFZ Aquifer | Medina County	632	632	632	632	632	632
East Medina County SUD	L	Edwards-BFZ Aquifer | Medina County	76	76	76	76	76	76
La Coste	L	Edwards-BFZ Aquifer | Medina County	128	128	128	128	128	127
Medina River West WSC	L	Edwards-BFZ Aquifer | Medina County	35	35	35	35	35	35
Medina River West WSC	L	Trinity Aquifer | Medina County	109	110	110	110	110	109
San Antonio Water System	L	Canyon Lake/Reservoir	16	34	34	0	0	0
San Antonio Water System	L	Carrizo-Aquifer ASR | Bexar County	167	423	424	424	425	399
San Antonio Water System	L	Carrizo-Wilcox Aquifer | Bexar County	70	177	178	178	178	168
San Antonio Water System	G	Carrizo-Wilcox Aquifer | Burleson County	165	420	421	421	422	396
San Antonio Water System	L	Carrizo-Wilcox Aquifer | Gonzales County	50	127	127	103	104	96

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
San Antonio Water System	L	Direct Reuse	99	294	294	295	295	277
San Antonio Water System	L	Edwards-BFZ Aquifer | Bexar County	475	1,205	1,208	1,209	1,211	1,136
San Antonio Water System	L	Trinity Aquifer | Bexar County	10	9	9	9	9	8
Ville Dalsace Water Supply	L	Edwards-BFZ Aquifer | Medina County	14	14	14	14	14	14
Yancey WSC	L	Edwards-BFZ Aquifer | Medina County	1,203	1,203	1,203	1,202	1,202	1,202
County-Other	L	Edwards-BFZ Aquifer | Medina County	699	699	697	699	698	699
County-Other	L	Leona Gravel Aquifer | Medina County	218	218	218	218	218	218
County-Other	L	Trinity Aquifer | Medina County	202	202	202	202	202	202
Mining	L	Edwards-BFZ Aquifer | Medina County	77	77	77	77	77	77
Mining	L	Leona Gravel Aquifer | Medina County	184	184	184	184	184	184
Livestock	L	Leona Gravel Aquifer | Medina County	43	43	43	43	43	43
Livestock	L	Local Surface Water Supply	85	85	85	85	85	85
Livestock	L	Trinity Aquifer | Medina County	42	42	42	42	42	42
Irrigation	L	Carrizo-Wilcox Aquifer | Medina County	5	5	5	5	5	5
Irrigation	L	Edwards-BFZ Aquifer | Medina County	4,803	4,803	4,803	4,803	4,803	4,803
Irrigation	L	Trinity Aquifer | Medina County	1,594	1,594	1,594	1,594	1,594	1,594
Refugio County WUG Total			**2,513**	**2,513**	**2,513**	**2,513**	**2,513**	**2,513**
Refugio County / San Antonio Basin WUG Total			**58**	**58**	**58**	**58**	**58**	**58**
County-Other	L	Gulf Coast Aquifer System | Refugio County	17	17	17	17	17	17
Livestock	L	Gulf Coast Aquifer System | Refugio County	20	20	20	20	20	20
Livestock	L	Local Surface Water Supply	21	21	21	21	21	21

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Refugio County / San Antonio-Nueces Basin WUG Total			**2,455**	**2,455**	**2,455**	**2,455**	**2,455**	**2,455**
Refugio	L	Gulf Coast Aquifer System | Refugio County	645	645	645	645	645	645
Woodsboro	L	Gulf Coast Aquifer System | Refugio County	210	210	210	210	210	210
County-Other	L	Gulf Coast Aquifer System | Refugio County	312	312	312	312	312	312
Livestock	L	Gulf Coast Aquifer System | Refugio County	210	210	210	210	210	210
Livestock	L	Local Surface Water Supply	210	210	210	210	210	210
Irrigation	L	Gulf Coast Aquifer System | Refugio County	868	868	868	868	868	868
Uvalde County WUG Total			**44,463**	**44,463**	**44,463**	**44,463**	**44,463**	**44,463**
Uvalde County / Nueces Basin WUG Total			**44,463**	**44,463**	**44,463**	**44,463**	**44,463**	**44,463**
Concan WSC	L	Edwards-Trinity-Plateau, Pecos Valley, and Trinity Aquifers | Uvalde County	75	75	75	75	75	75
Concan WSC	L	Trinity Aquifer | Uvalde County	6	6	6	6	6	6
Knippa WSC	L	Austin Chalk Aquifer | Uvalde County	100	100	100	100	100	100
Knippa WSC	L	Edwards-BFZ Aquifer | Uvalde County	127	127	127	127	127	127
Sabinal	L	Edwards-BFZ Aquifer | Uvalde County	307	307	307	307	307	307
Uvalde	L	Edwards-BFZ Aquifer | Uvalde County	3,159	3,159	3,159	3,159	3,159	3,159
Windmill WSC	L	Austin Chalk Aquifer | Uvalde County	480	480	480	480	480	480
County-Other	L	Buda Limestone Aquifer | Uvalde County	525	525	525	525	525	525
County-Other	L	Edwards-BFZ Aquifer | Uvalde County	1,672	1,672	1,672	1,672	1,672	1,672
County-Other	L	Leona Gravel Aquifer | Uvalde County	150	150	150	150	150	150
County-Other	L	Trinity Aquifer | Uvalde County	140	140	140	140	140	140
Mining	L	Edwards-BFZ Aquifer | Uvalde County	30	30	30	30	30	30

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Mining	L	Leona Gravel Aquifer | Uvalde County	1,565	1,565	1,565	1,565	1,565	1,565
Livestock	L	Edwards-BFZ Aquifer | Uvalde County	989	989	989	989	989	989
Livestock	L	Edwards-Trinity-Plateau, Pecos Valley, and Trinity Aquifers | Uvalde County	9	9	9	9	9	9
Livestock	L	Leona Gravel Aquifer | Uvalde County	17	17	17	17	17	17
Livestock	L	Local Surface Water Supply	1,025	1,025	1,025	1,025	1,025	1,025
Livestock	L	Trinity Aquifer | Uvalde County	9	9	9	9	9	9
Irrigation	L	Austin Chalk Aquifer | Uvalde County	1,780	1,780	1,780	1,780	1,780	1,780
Irrigation	L	Edwards-BFZ Aquifer | Uvalde County	23,404	23,404	23,404	23,404	23,404	23,404
Irrigation	L	Edwards-Trinity-Plateau, Pecos Valley, and Trinity Aquifers | Uvalde County	1,374	1,374	1,374	1,374	1,374	1,374
Irrigation	L	Leona Gravel Aquifer | Uvalde County	6,200	6,200	6,200	6,200	6,200	6,200
Irrigation	L	Nueces Run-of-River	720	720	720	720	720	720
Irrigation	L	Trinity Aquifer | Uvalde County	600	600	600	600	600	600
Victoria County WUG Total			**27,724**	**27,724**	**27,724**	**27,724**	**27,724**	**27,724**
Victoria County / Guadalupe Basin WUG Total			**12,891**	**12,890**	**12,890**	**12,890**	**12,891**	**12,890**
Quail Creek MUD	L	Gulf Coast Aquifer System | Victoria County	1,235	1,235	1,235	1,235	1,235	1,235
Victoria	L	Canyon Lake/Reservoir	836	836	836	836	836	836
Victoria	L	Guadalupe Run-of-River	410	409	409	409	410	409
Victoria	L	Gulf Coast Aquifer System | Victoria County	4,264	4,264	4,264	4,264	4,264	4,264
County-Other	L	Gulf Coast Aquifer System | Victoria County	1,504	1,504	1,504	1,504	1,504	1,504
Manufacturing	L	Guadalupe Run-of-River	2	2	2	2	2	2
Manufacturing	L	Gulf Coast Aquifer System | Victoria County	470	470	470	470	470	470
Mining	L	Gulf Coast Aquifer System | Victoria County	52	52	52	52	52	52

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Steam Electric Power	L	Gulf Coast Aquifer System | Victoria County	2,532	2,532	2,532	2,532	2,532	2,532
Livestock	L	Gulf Coast Aquifer System | Victoria County	227	227	227	227	227	227
Livestock	L	Local Surface Water Supply	228	228	228	228	228	228
Irrigation	L	Gulf Coast Aquifer System | Victoria County	1,131	1,131	1,131	1,131	1,131	1,131
Victoria County / Lavaca Basin WUG Total			**23**	**23**	**23**	**23**	**23**	**23**
County-Other	L	Gulf Coast Aquifer System | Victoria County	20	20	20	20	20	20
Livestock	L	Gulf Coast Aquifer System | Victoria County	1	1	1	1	1	1
Livestock	L	Local Surface Water Supply	2	2	2	2	2	2
Victoria County / Lavaca-Guadalupe Basin WUG Total			**14,566**	**14,567**	**14,567**	**14,567**	**14,566**	**14,567**
Victoria	L	Canyon Lake/Reservoir	404	404	404	404	404	404
Victoria	L	Guadalupe Run-of-River	198	199	199	199	198	199
Victoria	L	Gulf Coast Aquifer System | Victoria County	2,063	2,063	2,063	2,063	2,063	2,063
Victoria County WCID 1	L	Gulf Coast Aquifer System | Victoria County	370	370	370	370	370	370
County-Other	L	Gulf Coast Aquifer System | Victoria County	1,086	1,086	1,086	1,086	1,086	1,086
Livestock	L	Gulf Coast Aquifer System | Victoria County	242	242	242	242	242	242
Livestock	L	Local Surface Water Supply	242	242	242	242	242	242
Irrigation	L	Gulf Coast Aquifer System | Victoria County	9,961	9,961	9,961	9,961	9,961	9,961
Victoria County / San Antonio Basin WUG Total			**244**	**244**	**244**	**244**	**244**	**244**
County-Other	L	Gulf Coast Aquifer System | Victoria County	207	207	207	207	207	207
Livestock	L	Gulf Coast Aquifer System | Victoria County	18	18	18	18	18	18
Livestock	L	Local Surface Water Supply	19	19	19	19	19	19

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DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Wilson County WUG Total			**37,307**	**37,333**	**37,348**	**37,353**	**37,350**	**37,340**
Wilson County / Guadalupe Basin WUG Total			**204**	**205**	**205**	**206**	**205**	**205**
Sunko WSC	L	Carrizo-Wilcox Aquifer | Wilson County	8	9	9	10	9	9
County-Other	L	Carrizo-Wilcox Aquifer | Wilson County	125	125	125	125	125	125
Livestock	L	Carrizo-Wilcox Aquifer | Wilson County	35	35	35	35	35	35
Livestock	L	Local Surface Water Supply	36	36	36	36	36	36
Wilson County / Nueces Basin WUG Total			**8,560**	**8,566**	**8,570**	**8,573**	**8,576**	**8,578**
McCoy WSC*	L	Carrizo-Wilcox Aquifer | Atascosa County	48	51	54	56	57	58
McCoy WSC*	L	Queen City Aquifer | Atascosa County	5	5	6	6	6	6
Picosa WSC	L	Carrizo-Wilcox Aquifer | Wilson County	3	3	4	4	5	5
Three Oaks WSC	L	Carrizo-Wilcox Aquifer | Wilson County	355	358	357	358	359	360
County-Other	L	Carrizo-Wilcox Aquifer | Wilson County	95	95	95	95	95	95
Mining	L	Carrizo-Wilcox Aquifer | Wilson County	1,631	1,631	1,631	1,631	1,631	1,631
Livestock	L	Carrizo-Wilcox Aquifer | Wilson County	102	102	102	102	102	102
Livestock	L	Local Surface Water Supply	103	103	103	103	103	103
Irrigation	L	Carrizo-Wilcox Aquifer | Wilson County	6,138	6,138	6,138	6,138	6,138	6,138
Irrigation	L	Queen City Aquifer | Wilson County	80	80	80	80	80	80
Wilson County / San Antonio Basin WUG Total			**28,543**	**28,562**	**28,573**	**28,574**	**28,569**	**28,557**
C Willow Water	L	Carrizo-Wilcox Aquifer | Wilson County	123	123	123	123	123	123
East Central SUD	L	Canyon Lake/Reservoir	40	39	38	39	37	34
East Central SUD	L	Carrizo-Wilcox Aquifer | Gonzales County	28	28	28	27	26	24
East Central SUD	L	Edwards-BFZ Aquifer | Bexar County	75	82	78	71	67	61

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
El Oso WSC*	L	Carrizo-Wilcox Aquifer | Karnes County	3	6	10	14	17	18
El Oso WSC*	L	Carrizo-Wilcox Aquifer | Wilson County	45	49	53	54	57	59
Floresville	L	Carrizo-Wilcox Aquifer | Wilson County	2,486	2,486	2,486	2,486	2,486	2,486
La Vernia	L	Canyon Lake/Reservoir	270	270	270	270	270	270
La Vernia	L	Carrizo-Wilcox Aquifer | Wilson County	1,935	1,935	1,935	1,935	1,935	1,935
La Vernia	L	Guadalupe Run-of-River	130	130	130	130	130	130
Oak Hills WSC	L	Carrizo-Wilcox Aquifer | Wilson County	446	444	441	436	429	420
Picosa WSC	L	Carrizo-Wilcox Aquifer | Wilson County	303	303	302	302	301	301
Poth	L	Carrizo-Wilcox Aquifer | Wilson County	630	630	630	630	630	630
S S WSC	L	Carrizo-Wilcox Aquifer | Wilson County	4,705	4,705	4,705	4,705	4,705	4,705
Springs Hill WSC	L	Guadalupe Run-of-River	0	0	0	0	0	0
Stockdale	L	Carrizo-Wilcox Aquifer | Wilson County	920	920	920	920	920	920
Sunko WSC	L	Carrizo-Wilcox Aquifer | Wilson County	1,453	1,463	1,470	1,476	1,481	1,483
Three Oaks WSC	L	Carrizo-Wilcox Aquifer | Wilson County	1,009	1,007	1,012	1,014	1,013	1,016
County-Other	L	Carrizo-Wilcox Aquifer | Wilson County	1,256	1,256	1,256	1,256	1,256	1,256
Manufacturing	L	Carrizo-Wilcox Aquifer | Wilson County	57	57	57	57	57	57
Mining	L	Carrizo-Wilcox Aquifer | Wilson County	4,010	4,010	4,010	4,010	4,010	4,010
Livestock	L	Carrizo-Wilcox Aquifer | Wilson County	321	321	321	321	321	321
Livestock	L	Local Surface Water Supply	717	717	717	717	717	717
Livestock	L	Queen City Aquifer | Wilson County	168	168	168	168	168	168
Livestock	L	Sparta Aquifer | Wilson County	94	94	94	94	94	94
Livestock	L	Yegua-Jackson Aquifer | Wilson County	133	133	133	133	133	133

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region L Water User Group (WUG) Existing Water Supply

WUG Name	Source Region	Source Description	Existing Supply (acre-feet per year)					
			2030	2040	2050	2060	2070	2080
Irrigation	L	Carrizo-Wilcox Aquifer | Wilson County	5,989	5,989	5,989	5,989	5,989	5,989
Irrigation	L	San Antonio Run-of-River	1,093	1,093	1,093	1,093	1,093	1,093
Irrigation	L	Yegua-Jackson Aquifer | Wilson County	104	104	104	104	104	104
Zavala County WUG Total			**34,968**	**34,968**	**34,968**	**34,968**	**34,968**	**34,968**
Zavala County / Nueces Basin WUG Total			**34,968**	**34,968**	**34,968**	**34,968**	**34,968**	**34,968**
Batesville WSC	L	Carrizo-Wilcox Aquifer | Zavala County	215	215	215	215	215	215
Crystal City	L	Carrizo-Wilcox Aquifer | Zavala County	2,455	2,455	2,455	2,455	2,455	2,455
Loma Alta Chula Vista Water System	L	Carrizo-Wilcox Aquifer | Zavala County	205	205	205	205	205	205
Zavala County WCID 1	L	Carrizo-Wilcox Aquifer | Zavala County	1,340	1,340	1,340	1,340	1,340	1,340
County-Other	L	Carrizo-Wilcox Aquifer | Zavala County	245	245	245	245	245	245
Manufacturing	L	Carrizo-Wilcox Aquifer | Zavala County	0	0	0	0	0	0
Mining	L	Carrizo-Wilcox Aquifer | Zavala County	1,268	1,268	1,268	1,268	1,268	1,268
Livestock	L	Carrizo-Wilcox Aquifer | Zavala County	427	427	427	427	427	427
Livestock	L	Local Surface Water Supply	428	428	428	428	428	428
Irrigation	L	Carrizo-Wilcox Aquifer | Zavala County	28,385	28,385	28,385	28,385	28,385	28,385
Region L WUG Existing Water Supply Total			**1,221,734**	**1,230,492**	**1,229,792**	**1,222,776**	**1,222,049**	**1,221,228**

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

Appendix 3B: Hydrologic Assumptions Requests and Approvals

Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

January 8, 2024

Mr. Tim Andruss
Chair
South Central Texas (Region L) Regional Water Planning Group
c/o San Antonio River Authority
100 East Guenther Street
San Antonio, TX 78204

Dear Mr. Andruss:

I have reviewed your request dated November 15, 2023, for approval of alternative water supply assumptions to be used in determining existing and future surface water availability. This letter confirms that the TWDB approves the following assumptions that require a variance:

1. Use of the Region L Guadalupe-San Antonio Water Availability Model (i.e., "Region L WAM") to evaluate existing supply for Canyon Reservoir, and for the power plant reservoirs Braunig Lake, Calaveras Lake, and Coleto Creek Reservoir. The Region L WAM includes the following:
    a. Simulates Federal Energy Regulatory Commission (FERC) requirements, a drought contingency trigger at the Spring Branch stream gauge, an agreement with Guadalupe Trout Unlimited, and various water rights, including special conditions, and daily operations dependent on Canyon Reservoir.
    b. Uses of a daily timestep simulation with no use of effluent or other changes to water rights.
    c. Reflects the operation of the power plant reservoirs as being subject to authorized consumptive uses, with makeup diversions as needed to maintain full conservation storage to the extent possible, subject to senior water rights, instream flow considerations, and/or applicable contractual provisions. Add return flows to the Region L WAM and the TCEQ Guadalupe/San Antonio WAM Run 3 in the evaluation of existing supply when specifically required by a surface water right.
2. Add return flows to the TCEQ Guadalupe/San Antonio WAM Run 3 in the evaluation of water management strategies if an entity requests inclusion of a project that includes an indirect reuse permit. The source water available for reuse will be:

   a. Estimated as the amount of water returned to a utility's wastewater treatment plant for each decade, less the amount of reuse water already utilized as existing supply.
   b. Where the upper limit of source water available for reuse water management strategies will be based on the amount of water returned to a utility's wastewater treatment plants, estimated at 50% of the utility's projected water demands and adjusted for water conservation and drought management strategies, unless site specific information is available.
3. Add return flows to the TCEQ Nueces WAM for the evaluation of strategy supplies if an entity requests inclusion of a project that includes an indirect reuse permit. The source water available for reuse will be:
   a. Estimated as the amount of water returned to a utility's wastewater treatment plant for each decade, less the amount of reuse water already utilized as existing supply.
   b. Where the upper limit of source water available for reuse water management strategies will be based on the amount of water returned to a utility's wastewater treatment plants, estimated at 50% of the utility's projected water demands and adjusted for water conservation and drought management strategies, unless site specific information is available.
4. Use of the Flow Regime Application Tool (FRAT), with the relevant TCEQ WAM Run 3, to evaluate environmental flows for new surface water management strategies.

For the purpose of evaluating potentially feasible water management strategies not included in the above list, the TCEQ WAM Run 3 is to be used.

While the TWDB authorizes these modifications to evaluate existing and future water supplies for development of the 2026 Region L South Central Texas RWP, it is the responsibility of the RWPG to ensure that the resulting estimates of water availability are reasonable for drought planning purposes and will reflect conditions expected in the event of actual drought conditions; and in all other regards will be evaluated in accordance with the most recent version of regional water planning contract Exhibit C, *General Guidelines for Development of the 2026 Regional Water Plans.*

Please do not hesitate to contact Michele Foss of our Regional Water Planning staff at 512-463-9225 or mfoss@twdb.texas.gov if you have any questions.

Sincerely,

Temple McKinnon Digitally signed by Temple McKinnon
Date: 2024.01.08 08:59:10 -06'00'

Matt Nelson
Deputy Executive Administrator

c: Cayethania Castillo, San Antonio River Authority
Lauren Gonzalez, Black & Veatch
Jaime Burke, Black & Veatch
Michele Foss, Water Supply Planning
Sarah Lee, Water Supply Planning
Nelun Fernando, Ph.D., Surface Water

ATTACHMENT A

REGION L HYDROLOGIC VARIANCE REQUEST SUBMITTAL

Black & Veatch
4009 Banister Lane, Suite 412; Austin, Texas 78704
P +1 512-782-4914 **E** GonzalezL@bv.com

November 15, 2023

B&V Project 411170

Mr. Jeff Walker
Executive Administrator
Texas Water Development Board
P.O. Box 13231
1700 North Congress Avenue
Austin, Texas 78711-3231

Transmitted Via Email

RE: Submittal of Hydrologic Variance Request Checklists on behalf of the South Central Texas (Region L) Regional Water Planning Group 2026 Regional Water Planning Cycle

Dear Mr. Walker,

The South Central Texas (Region L) Regional Water Planning Group (SCTRWPG) approved hydrologic assumptions and needed hydrologic variances for submittal to the Texas Water Development Board (TWDB) at the November 2, 2023, SCTRWPG meeting. On behalf of the SCTRWPG, Black & Veatch submits this transmittal letter and enclosed hydrologic variance checklists for the Guadalupe-San Antonio River Basin and Nueces River Basin for your consideration for the 2026 Region L Regional Water Planning Cycle.

We appreciate your consideration of this request. Please let me know if you need any additional information or if you have any questions. Thank you.

Sincerely,

Lauren E. Gonzalez
Planning and Regulatory Permitting Lead
BLACK & VEATCH

Enclosures (2)

cc: Michele Foss, Texas Water Development Board
Tim Andruss, Victoria County Groundwater Conservation District
Vanessa Puig-Williams, Environmental Defense Fund
Steve Graham, San Antonio River Authority
Cayethania Castillo, San Antonio River Authority
Jaime Burke, Black & Veatch

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ENCLOSURE 1
Hydrologic Variance Checklist for the Guadalupe-San Antonio River Basin

Surface Water Hydrologic Variance Request Checklist

Texas Water Development Board (TWDB) rules[1] require that regional water planning groups (RWPG) use most current Water Availability Models (WAM) from the Texas Commission on Environmental Quality (TCEQ) and assume full utilization of existing water rights and no return flows for surface water supply analysis. Additionally, evaluation of existing stored surface water available during Drought of Record conditions must be based on Firm Yield using anticipated sedimentation rates. However, the TWDB rules also allow, and **we encourage**, RWPGs to use more representative, water availability modeling assumptions; better site-specific information; or justified operational procedures other than Firm Yield with written approval (via a Hydrologic Variance) from the Executive Administrator in order to better represent and therefore prepare for expected drought conditions.

RWPGs must use this checklist, which is intended to save time and reduce effort, to request a Hydrologic Variance for estimating the availability of surface water sources. For Questions 4 – 10, please indicate whether the requested variance is for determining Existing Supply, Strategy Supply, or both. Please complete a separate checklist for each river basin in which variances are being requested.

Water Planning Region: **L**

1. Which major river basin does the request apply to? Please specify if the request only applies part of the basin or only to certain reservoirs.

   Guadalupe-San Antonio Basin

2. Please give a brief, bulleted, description of the requested hydrologic variances including how the alternative availability assumptions vary from rule requirements, how the modifications will affect the associated annual availability volume(s) in the regional water plan, and why the variance is necessary or provides a better basis for planning. You must provide more-detailed descriptions in the subsequent checklist questions. Attach any available documentation supporting the request.

   A. **The unmodified (other than reservoir sedimentation) Guadalupe-San Antonio Water Availability Model (WAM) from Texas Commission on Environmental Quality (TCEQ) will be used for surface water supply evaluations, except as described below.**
   B. **The Region L WAM will be used to establish existing supply for Canyon Reservoir and power plant reservoirs of Braunig Lake, Calaveras Lake, and Coleto Creek Reservoir. This is the same model approved by the Texas Water Development Board (TWDB) and used in the currently approved 2021 Region L Regional Water Plan. The model uses a daily time step simulation with no use of effluent or other changes to water rights. The Region L WAM more accurately considers reservoir operations in its analysis, including operation of the power plant reservoirs subject to authorized consumptive uses, with makeup diversions as needed to maintain full conservation storage to the extent possible, subject to senior water rights, instream flow**

[1] 31 Texas Administrative Code (TAC) §§ 357.10(14) and 357.32(c)

considerations, and/or applicable contractual provisions. The associated annual availability of the reservoirs is expected to increase with use of the Region L WAM.

C. **The Flow Regime Application Tool (FRAT) will be used, in conjunction with the TCEQ WAM Run 3, to evaluate environmental flows for new surface water management strategies (WMSs). FRAT converts between monthly time step simulations and daily time step simulations.**

3. Was this request submitted in a previous planning cycle? If yes, please indicate which cycle and note how it is different, if at all, from the previous request?

   Yes

   The same hydrologic assumptions and variances were used in the 2016 and 2021 Regional Water Plan.

4. Are you requesting to extend the period of record beyond the current applicable WAM hydrologic period? If yes, please describe the proposed methodology. Indicate whether you believe there is a new drought of record in the basin.

   No

   Choose an item.

   No, Region L does not request to extend the period of record beyond the current applicable WAM hydrologic period.

   No, Region L does not believe there is a new drought of record in the basin.

5. Are you requesting to use a reservoir safe yield? If yes, please describe in detail how the safe yield would be calculated and defined, which reservoir(s) it would apply to, and why the modification is needed or preferrable for drought planning purposes.

   No

   Choose an item.

   No, Region L does not request to use a reservoir safe yield.

6. Are you requesting to use a reservoir yield other than firm yield or safe yield? If yes, please describe, in a bulleted list, each modification requested including how the alternative yield was calculated, which reservoir(s) it applies to, and why the modification is needed or preferrable for drought planning purposes. Examples of alternative reservoir yield analyses may include using an alternative reservoir level, conditional reliability, or other special reservoir operations.

   No

Choose an item.

No, Region L will use firm yield to determine reservoir yield.

7. Are you requesting to use a different model (such as a RiverWare or Excel-based models) than RUN 3 of the applicable TCEQ WAM? If yes, please describe the model being considered including how it incorporates water rights and prior appropriation and how it is more conservative than RUN 3 of the applicable TCEQ WAM.

   Yes

   Existing Supply

   The Region L Water Availability Model (WAM) will be used to establish existing supply for Canyon Reservoir and power plant reservoirs of Braunig Lake, Calaveras Lake, and Coleto Creek Reservoir. This model simulates Federal Energy Regulatory Commission (FERC) requirements, a drought contingency trigger at the Spring Branch stream gauge, an agreement with Guadalupe River Trout Unlimited, and various water rights and daily operations dependent on Canyon Reservoir. The model uses a daily time step simulation with no use of effluent or other changes to water rights. The Region L WAM more accurately considers reservoir operations in its analysis, including operation of the power plant reservoirs subject to authorized consumptive uses, with makeup diversions as needed to maintain full conservation storage to the extent possible, subject to senior water rights, instream flow considerations, and/or applicable contractual provisions.

8. Are you requesting to use a modified TCEQ WAM? If yes, please describe in a bulleted list all modifications in detail including all specific changes to the WAM and whether the modified WAM is more conservative than the TCEQ WAM RUN 3. Examples of WAM modifications may include adding subordination agreements, contracts, updated water rights, modified spring flows, updated lake evaporation, updated sedimentation[2], system or reservoir operations, or special operational procedures into the WAM.

   Yes

   Existing Supply

   The Region L WAM more accurately considers reservoir operations in its analysis. The Region L WAM includes the following considerations:

   - **Simulates Federal Energy Regulatory Commission (FERC) requirements, a drought contingency trigger at the Spring Branch stream gauge, an agreement with Guadalupe**

[2] Updating anticipated sedimentation rates does not require a hydrologic variance under 31 TAC § 357.10(14). The Technical Memorandum will require providing details regarding the sedimentation methodology utilized. Please consider providing that information with this request.

River Trout Unlimited, and various water rights, including special conditions, and daily operations dependent on Canyon Reservoir.

- **The model uses a daily time step simulation with no use of effluent or other changes to water rights.**
- **Operation of the power plant reservoirs subject to authorized consumptive uses, with makeup diversions as needed to maintain full conservation storage to the extent possible, subject to senior water rights, instream flow considerations, and/or applicable contractual provisions.**

9. Are you requesting to include return flows in the modeling? If yes, are you doing so to model an indirect reuse water management strategy (WMS)? Please provide complete details regarding the proposed methodology for determining reuse WMS availability.

   Yes

   Existing and Strategy Supply

   For Existing Supply, return flows will be included in the WAM when specifically required by a surface water right. For example, the Region L WAM includes a detailed simulation of Calaveras Reservoir, which incorporates effluent from the San Antonio Water System (SAWS), subject to downstream senior water rights and CPS Energy's diversion operations.

   Additionally, return flows will be included for Water Management Strategies (WMSs) if an entity requests inclusion of a project that includes a bed and banks permit. For example, the 2021 Regional Water Plan included the Canyon Regional Water Authority (CRWA) Siesta Project, which modeled firm yield based on return flows from a wastewater treatment facility.

   Source water available for reuse WMSs will be determined based on the estimated amount of water returned to a utility's WWTPs for each decade, less the amount of reuse water already being utilized as existing supply. The upper limit of source water available for reuse WMSs will be determined based on the amount of water returned to a utility's wastewater treatment plants, estimated at 50% of the utility's projected water demands, adjusted for water conservation and drought management strategies, unless site specific information is available. Indirect reuse WMSs are evaluated using TCEQ WAM Run 3. Direct reuse WMSs do not require WAM modeling.

10. Are any of the requested Hydrologic Variances also planned to be used by another region for the same basin? If yes, please indicate the other Region. Please indicate if unknown.

    No

    Click or tap here to enter text.

11. Please describe any other variance requests not captured on this checklist or add any other information regarding the variance requests on this checklist.

    Not Applicable – No additional variances are requested.

Black & Veatch
4009 Banister Lane, Suite 412; Austin, Texas 78704
P +1 512-782-4914 **E** GonzalezL@bv.com

ENCLOSURE 2
Hydrologic Variance Checklist for the Nueces River Basin

Surface Water Hydrologic Variance Request Checklist

Texas Water Development Board (TWDB) rules[1] require that regional water planning groups (RWPG) use most current Water Availability Models (WAM) from the Texas Commission on Environmental Quality (TCEQ) and assume full utilization of existing water rights and no return flows for surface water supply analysis. Additionally, evaluation of existing stored surface water available during Drought of Record conditions must be based on Firm Yield using anticipated sedimentation rates. However, the TWDB rules also allow, and **we encourage**, RWPGs to use more representative, water availability modeling assumptions; better site-specific information; or justified operational procedures other than Firm Yield with written approval (via a Hydrologic Variance) from the Executive Administrator in order to better represent and therefore prepare for expected drought conditions.

RWPGs must use this checklist, which is intended to save time and reduce effort, to request a Hydrologic Variance for estimating the availability of surface water sources. For Questions 4 – 10, please indicate whether the requested variance is for determining Existing Supply, Strategy Supply, or both. Please complete a separate checklist for each river basin in which variances are being requested.

Water Planning Region: **L**

1. Which major river basin does the request apply to? Please specify if the request only applies part of the basin or only to certain reservoirs.

   Nueces Basin

2. Please give a brief, bulleted, description of the requested hydrologic variances including how the alternative availability assumptions vary from rule requirements, how the modifications will affect the associated annual availability volume(s) in the regional water plan, and why the variance is necessary or provides a better basis for planning. You must provide more-detailed descriptions in the subsequent checklist questions. Attach any available documentation supporting the request.

   Return flows will be included for Water Management Strategies (WMSs) if an entity requests inclusion of a project that includes a bed and banks permit.

3. Was this request submitted in a previous planning cycle? If yes, please indicate which cycle and note how it is different, if at all, from the previous request?

   Yes

[1] 31 Texas Administrative Code (TAC) §§ 357.10(14) and 357.32(c)

The same hydrologic assumptions and variances were used in the 2016 and 2021 Regional Water Plan.

4. Are you requesting to extend the period of record beyond the current applicable WAM hydrologic period? If yes, please describe the proposed methodology. Indicate whether you believe there is a new drought of record in the basin.

   No

   Choose an item.

   No, Region L does not request to extend the period of record beyond the current applicable WAM hydrologic period.

   No, Region L does not believe there is a new drought of record in the basin.

5. Are you requesting to use a reservoir safe yield? If yes, please describe in detail how the safe yield would be calculated and defined, which reservoir(s) it would apply to, and why the modification is needed or preferrable for drought planning purposes.

   No

   Choose an item.

   No, Region L does not request to use a reservoir safe yield for existing supplies or for WMSs.

6. Are you requesting to use a reservoir yield other than firm yield or safe yield? If yes, please describe, in a bulleted list, each modification requested including how the alternative yield was calculated, which reservoir(s) it applies to, and why the modification is needed or preferrable for drought planning purposes. Examples of alternative reservoir yield analyses may include using an alternative reservoir level, conditional reliability, or other special reservoir operations.

   No

   Choose an item.

   No, Region L will use firm yield to determine reservoir yield.

7. Are you requesting to use a different model (such as a RiverWare or Excel-based models) than RUN 3 of the applicable TCEQ WAM? If yes, please describe the model being considered including how it incorporates water rights and prior appropriation and how it is more conservative than RUN 3 of the applicable TCEQ WAM.

No

Choose an item.

No, Region L does not request to use a different model than RUN 3 of the applicable TCEQ WAM.

8. Are you requesting to use a modified TCEQ WAM? If yes, please describe in a bulleted list all modifications in detail including all specific changes to the WAM and whether the modified WAM is more conservative than the TCEQ WAM RUN 3. Examples of WAM modifications may include adding subordination agreements, contracts, updated water rights, modified spring flows, updated lake evaporation, updated sedimentation[2], system or reservoir operations, or special operational procedures into the WAM.

No

Choose an item.

No, Region L does not request to use a modified TCEQ WAM for the Nueces Basin.

9. Are you requesting to include return flows in the modeling? If yes, are you doing so to model an indirect reuse water management strategy (WMS)? Please provide complete details regarding the proposed methodology for determining reuse WMS availability.

Yes

Strategy Supply

Return flows will not be included in the modeling for the Nueces Basin for existing supply.

Return flows will be included for Water Management Strategies (WMSs) if an entity requests inclusion of a project that includes a bed and banks permit.

Source water available for reuse WMSs will be determined based on the estimated amount of water returned to a utility's WWTPs for each decade, less the amount of reuse water already being utilized as existing supply. The upper limit of source water available for reuse WMSs will be determined based on the amount of water returned to a utility's wastewater treatment plants, estimated at 50% of the utility's projected water demands, adjusted for water conservation and drought management strategies, unless site specific information is available. Indirect reuse WMSs are evaluated using TCEQ WAM Run 3. Direct reuse WMSs do not require WAM modeling.

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[2] Updating anticipated sedimentation rates does not require a hydrologic variance under 31 TAC § 357.10(14). The Technical Memorandum will require providing details regarding the sedimentation methodology utilized. Please consider providing that information with this request.

10. Are any of the requested Hydrologic Variances also planned to be used by another region for the same basin? If yes, please indicate the other Region. Please indicate if unknown.

    Unknown

    Click or tap here to enter text.

11. Please describe any other variance requests not captured on this checklist or add any other information regarding the variance requests on this checklist.

    N/A – None.

ATTACHMENT B

MEMORANDUM: RECOMMENDATIONS ON REGION L'S HYDROLOGIC VARIANCE REQUEST FOR THE 2026 REGIONAL WATER PLAN

TO: Michele Foss, Regional Water Planner, Regional Water Planning

FROM: Nelun Fernando, Ph.D., Manager, Water Availability

DATE: January 2, 2024

SUBJECT: Recommendations on Region L's hydrologic variance request for the 2026 Regional Water Plan

---

This memorandum summarizes my review recommendations on the hydrologic variance request submitted for assessing current surface water availability in Region L's 2026 regional water plan.

1. Use the Region L Guadalupe-San Antonio Water Availability Model (i.e., "Region L WAM") to evaluate existing supply for Canyon Reservoir, and for the power plant reservoirs Braunig Lake, Calaveras Lake, and Coleto Creek Reservoir. The Region L WAM includes the following:
    a. Simulates Federal Energy Regulatory Commission (FERC) requirements, a drought contingency trigger at the Spring Branch stream gauge, an agreement with Guadalupe Trout Unlimited, and various water rights, including special conditions, and daily operations dependent on Canyon Reservoir.
    b. Uses of a daily timestep simulation with no use of effluent or other changes to water rights.
    c. Reflects the operation of the power plant reservoirs as being subject to authorized consumptive uses, with makeup diversions as needed to maintain full conservation storage to the extent possible, subject to senior water rights, instream flow considerations, and/or applicable contractual provisions.

    Recommendation: Approve request.

    Justification: The Region L WAM more accurately considers reservoir operations in its analysis. Furthermore, this variance request was implemented in the 2016 and 2021 regional water plans.

2. Add return flows to the Region L WAM and to the Texas Commission on Environmental Quality (TCEQ) Guadalupe/San Antonio WAM Run 3 in the evaluation of existing supply when specifically required by a surface water right. Also add return flows in the evaluation of water management strategies if an entity requests inclusion of a project that includes a bed and banks permit. The TCEQ Guadalupe/San Antonio WAM Run 3 will be used for the evaluation of indirect reuse water management strategies. The source water available for reuse will be:
    - Estimated as the amount of water returned to a utility's wastewater treatment plant for each decade, less the amount of reuse water already utilized as existing supply.
    - Where the upper limit of source water available for reuse water management strategies will be based on the amount of water returned to a utility's wastewater treatment plants, estimated at 50% of the utility's projected water demands and adjusted for water conservation and drought management strategies, unless site specific information is available.

    Recommendation: Approve request.

    Justification: Adding return flows in the evaluation of existing supply reflects current operations within the Guadalupe-San Antonio River Basin. The methodology for including return flows in the evaluation of strategy supply is similar to the method implemented in the 2021 regional water plan (e.g., Canyon Regional Water Authority Siesta Project).

Page **1** of **2**

3. Add return flows to the TCEQ Nueces WAM for the evaluation of strategy supplies if an entity requests inclusion of a project that includes a bed and banks permit. The source water available for reuse will be:
   - Estimated as the amount of water returned to a utility's wastewater treatment plant for each decade, less the amount of reuse water already utilized as existing supply.
   - Where the upper limit of source water available for reuse water management strategies will be based on the amount of water returned to a utility's wastewater treatment plants, estimated at 50% of the utility's projected water demands and adjusted for water conservation and drought management strategies, unless site specific information is available.

   Recommendation: Approve request.

   Justification: The request was implemented in the 2016 and 2021 regional water plans.

4. Use the Flow Regime Application Tool (FRAT), with the relevant TCEQ WAM Run 3, to evaluate environmental flows for new surface water management strategies.

   Recommendation: Approve request.

   Justification: FRAT was used to evaluate environmental flows for new surface water management strategies in the 2016 and 2021 regional water plans.

Appendix 3C: Technical Memorandum for the 2026 South Central Texas Regional Water Plan

FINAL

TECHNICAL MEMORANDUM

2026 South Central Texas Regional Water Plan

B&V PROJECT NO. 411170

PREPARED FOR

South Central Texas Regional Water Planning Group & Texas Water Development Board

4 MARCH 2024

STATE OF TEXAS
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TBPELS Reg. No F-258

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List of Abbreviations

acft/yr	Acre-Feet per Year
BFZ	Balcones Fault Zone
DB27	2027 State Water Planning Database
DFC	Desired Future Condition
EAA	Edwards Aquifer Authority
EAHCP	Edwards Aquifer Habitat Conservation Plan
EARM	Empirical Area-Reduction Method
GAM	Groundwater Availability Model
GCD	Groundwater Conservation District
GMA	Groundwater Management Area
GSA WAM	Guadalupe-San Antonio River Basin Water Availability Model
HCP	Habitat Conservation Plan
MAG	Modeled Available Groundwater
PGMA	Priority Groundwater Management Area
Region J	Plateau Region
Region K	Lower Colorado Region
Region L	South Central Texas Region
Region M	Rio Grande Region
Region N	Coastal Bend Region
Region P	Lavaca Region
RWPG	Regional Water Planning Group
SCTRWPG	South Central Texas Regional Water Planning Group
SV/SA	Storage Volume-Surface Area
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TWDB	Texas Water Development Board
WAM	Water Availability Model
WUG	Water User Group
WWP	Wholesale Water Provider
WWTP	Wastewater Treatment Plant

1.0 INTRODUCTION

At its meeting on February 14, 2024, the South Central Texas (Region L) Regional Water Planning Group (SCTRWPG) reviewed the information pertinent to this Technical Memorandum, allotted additional time to its technical consultant, Black & Veatch, to continue updating the 2027 State Water Planning Database (DB27), and approved the submittal of the Technical Memorandum to the Texas Water Development Board (TWDB).

This Technical Memorandum is intended to be a snapshot of the planning process at approximately the halfway point of the planning cycle to document the progress of plan development. Information contained in this Technical Memorandum is preliminary, as the SCTRWPG and Black & Veatch will continue to refine the data through the remainder of the planning process. Specifically, it should be noted that estimates of Existing Supplies and calculation of Identified Needs may change between the submittal of this Technical Memorandum and the adoption of the 2026 Region L Regional Water Plan.

2.0 SUMMARY OF PUBLIC COMMENTS

Rules in Title 31 of the Texas Administrative Code (TAC) Chapter 357.21(g)(2) describe notice requirements when a Regional Water Planning Group (RWPG) approves submittal of the Technical Memorandum. Specifically, notice must be provided at least 14 days prior to the meeting, written comment must be accepted for 14 days prior to the meeting and considered by the RWPG members prior to taking the associated action, and meeting materials must be made available on the RWPG website for a minimum of seven days prior to and 14 days following the meeting.

There was one comment received from the public during the requisite public comment period. At the February 14th Regional Water Planning Group meeting, David Caldwell, General Manager for the Medina County Groundwater Conservation District, indicated that the availability volumes estimated for the Leona Gravel Aquifer are higher than currently available. To address this comment, the SCTRWPG established a new subcommittee entitled the Groundwater Availabilities Workgroup to review and determine RWPG-estimated groundwater availabilities for inclusion in the 2026 Region L Regional Water Plan. Meetings will be held in Spring 2024, after submittal of this Technical Memorandum. Therefore, groundwater availability estimates may change between submittal of this Technical Memorandum and the adoption of the 2026 Region L Regional Water Plan.

3.0 TWDB DB27 REPORTS

The following reports have been generated from DB27 and are included in Appendix A.

1. Population Projections
2. Water Demand Projections
3. Source Water Availability
4. Existing Water Supplies
5. Identified Water Needs/Surpluses
6. Comparison of Supply, Demand, and Needs to 2021 RWP
7. Comparison of Source Availability to 2021 RWP

4.0 SOURCE WATER AVAILABILITY ASSUMPTIONS

The following describes the models and assumptions used to estimate the availability of water for surface water, groundwater, and other sources.

4.1. SURFACE WATER

4.1.1. Water Availability Models and Associated Hydrologic Variances

The SCTRWPG reviewed, considered, and approved hydrologic assumptions and needed hydrologic variances for submittal to the TWDB at the November 2, 2023, SCTRWPG meeting. Region L submitted a Hydrologic Variance Request letter to TWDB on November 15, 2023. The request letter included hydrologic variance checklists for the Guadalupe-San Antonio River Basin and the Nueces River Basin. The TWDB subsequently approved the variance requests on January 8, 2024. Appendix B includes the TWDB's approval letter of hydrologic variances with attachments that include the initial variance request submitted by Region L and a memorandum regarding hydrologic variance request recommendations.

As described in the hydrologic variance checklists, the SCTRWPG used the Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM) Run 3, which assumes all water rights use their full authorized amount, all applicable permit conditions, such as flow requirements, are met, and no return flows. The hydrologic variance checklists also requested use of an alternative surface water model, the "Region L WAM", to assess surface water availabilities for certain reservoirs, including Canyon Reservoir, Victor Braunig Lake, Calaveras Lake, and Coleto-Creek Reservoir. The TWDB subsequently approved use of the Region L WAM in their correspondence dated January 8, 2024. Firm yields for all other reservoirs in Region L were determined using the TCEQ's unmodified WAM Run 3. Table 1 provides the original, unmodified firm yields from WAM Run 3, along with the alternative surface water model (Region L WAM) availabilities, measured in acre-feet per year (acft/yr), utilized as the basis for planning.

Table 1 Major Reservoir Firm Yields Using WAM Run 3 and the Region L WAM

SOURCE [A]	FIRM YIELD FROM UNMODIFIED WAM RUN 3 [B] (ACFT/YR)		FIRM YIELD FROM REGION L WAM [B] (ACFT/YR)	
	2030	2080	2030	2080
Canyon Reservoir	63,182	62,591	86,138	85,414
Victor Braunig Lake	7,802	7,775	12,916 [C]	12,901 [C]
Calaveras Lake	11,290	11,008	39,975 [C]	39,285 [C]
Coleto-Creek Reservoir	11,934	11,257	24,965 [C]	23,666 [C]

Notes:

[A] For all other reservoirs in Region L, firm yields were determined using the unmodified WAM Run 3. Firm yields are provided in the DB27 report (Appendix A)

[B] Firm yields incorporate sedimentation

[C] For certain reservoirs, firm yield estimates using the Region L WAM are greater than the authorized diversion amounts in their respective water rights permits. Therefore, the 2030-2080 firm yields included in DB27 are the authorized diversion amounts in the water right permits. For Victor Braunig Lake, Calaveras Lake, and Coleto-Creek Reservoir, DB27 firm yields are 12,000 acft/yr, 36,900 acft/yr, and 24,160 acft/yr, respectively.

Table 2 includes details for hydrologic models used, including the model name, version date, model input/output files used, date model used and any relevant comments. Appendix C is an electronic appendix that includes model input/output or other model files used to date in determining water availability.

Table 2 Details for Hydrologic Models Used

MODEL NAME	VERSION DATE	INPUT/OUTPUT FILES USED	DATE MODEL USED	COMMENTS
TCEQ Full Authorization WAM for the Guadalupe-San Antonio River Basin	10/1/2023	WRAP SIM input file extensions: DAT, DIS, FLO, EVA, FAD, HIS WRAP SIM output file extensions: OUT WRAP TAB input file extensions: TIN WRAP TAB output file extensions: TOU	December 2023	N/A – None
Region L WAM	WRAP SIM: December 1999 DAT File: February 2004	WRAP SIM input file extensions: DAT, DIS, INF, EVA, FAD, BSP, DAY, HUE, RCH WRAP SIM output file extensions: OUT	December 2023	N/A – None
TCEQ Full Authorization WAM for the Nueces River Basin	10/1/2023	WRAP SIM input file extensions: DAT, DIS, FLO, EVA WRAP SIM output file extensions: OUT WRAP TAB input file extensions: TIN WRAP TAB output file extensions: TOU	December 2023	N/A – None

4.1.2. Sedimentation Methodology

Sedimentation is the anticipated decreases in a reservoir's area-capacity condition, resulting in projected firm yield decreases in each decade. Sedimentation must be performed by RWPGs and incorporating into the WAM Run 3 models and the alternative model, the "Region L WAM". The following summarizes the methodology used for estimating and incorporating sedimentation into the WAMs.

The storage volume - surface area (SV/SA) tables for Canyon Reservoir, Victor Braunig Lake, Calaveras Lake, and Coleto-Creek Reservoir are adjusted to reflect sedimentation for the 2030 and 2080 planning horizons. The program, SEDDIS2.exe, was used to execute the Empirical Area-Reduction Method (EARM). The EARM was developed by Borland and Miller (1960)[1] for the Bureau of Reclamation as a means to mathematically distribute a given sediment loading across the topology of a large reservoir. The EARM inputs include pre-sedimentation SV/SA tables and a projected sediment load. The modified SV/SA tables were computed for each reservoir for the 2030 and 2080 decades.

4.2. GROUNDWATER

The most-recent work from Groundwater Management Areas (GMAs) are detailed in Modeled Available Groundwater (MAG) reports, prepared by the TWDB. There are five GMAs located wholly or partially within the Region L planning area, including GMA 7, GMA 9, GMA 10, GMA 13, and GMA 15. The MAG reports, which show availability for each decade of the planning horizon for most of the aquifers in Region L, include the following:

- GR21-012 MAG (GMA 7);
- GR21-014 MAG (GMA 9);
- GR21-015 MAG (GMA 10);
- GR21-018 MAG (GMA 13); and
- GR21-020 MAG (GMA 15).

At present, the SCTRWPG has not reallocated annual MAG volumes, nor identified the need to use MAG Peak Factors.

4.2.1. TWDB Unmodified, Original Groundwater Availabilities

For each GMA, the TWDB develops MAG reports with MAG values for each major or minor (i.e., relevant) aquifer. MAG values represent the average annual volume of groundwater production that would achieve the DFCs established by GMAs. The TWDB provided RWPGs with MAG volumes through the DB27 interface, organized by aquifer, county, and basin. In addition, the TWDB provided non-MAG availabilities that align with DFC pumping for non-relevant aquifers and local groundwater supply areas. Table 3 provides a list of aquifers in Region L for which the TWDB provided MAG and non-MAG groundwater availability estimates.

[1] Borland, W.M., Miller, C.R., 1960. Distribution of Sediment in Large Reservoirs. Transactions of the American Society of Civil Engineers. Vol. 125. Iss. 1. DOI: 10.1061/TACEAT.0007776

Table 3 MAG and Non-MAG Groundwater Availabilities Provided by TWDB

AQUIFER	GROUNDWATER MODELING TYPE	
	TWDB MAG AVAILABILITY ESTIMATES	TWDB NON-MAG AVAILABILITY ESTIMATES
Austin Chalk	●	
Buda Limestone	●	
Carrizo-Wilcox	●	●
Edwards-Balcones Fault Zone (BFZ) (not regulated by the Edwards Authority [EAA])	●	●
Edwards-Trinity-Plateau	●	
Edwards-Trinity-Plateau, Pecos Valley, and Trinity	●	
Ellenburger-San Saba	●	
Gulf Coast System	●	●
Hickory	●	●
Leona Gravel	●	●
Queen City	●	●
Sparta	●	●
Trinity	●	●
Yegua-Jackson	●	●

4.2.2. RWPG-Estimated Groundwater Availabilities

The SCTRWPG estimated groundwater availabilities for non-MAG aquifers or portions thereof. The sources used to estimate groundwater availabilities include published groundwater reports, maximum historic annual production volumes, contracts, permit limitations, and other limitations. The table provided in Appendix D summarizes RWPG-estimated groundwater availabilities to date by county, aquifer, and basin, and identifies the source methodology used for the estimates.

4.2.2.1. Carrizo-Wilcox Aquifer in Karnes County

Historic annual production values indicate that groundwater availabilities in the Carrizo-Wilcox Aquifer in Karnes County are likely higher than MAG values. Data published in the TWDB Water Use Survey Detailed Groundwater Pumpage by County were analyzed to determine the maximum annual groundwater production values from 2019 to 2021. Groundwater pumpage volumes for the Carrizo-Wilcox Aquifer in Karnes County in the Guadalupe, Nueces, and San Antonio Basins were 50 acft/yr, 84 acft/yr, and 1,078 acft/yr, respectively. Appendix D provides a summary of RWPG-estimated groundwater availabilities to date for the Carrizo-Wilcox Aquifer in Karnes County.

4.2.2.2. Portions of the Edwards-BFZ Aquifer Regulated by Edwards Aquifer Authority

The SCTRWPG estimated groundwater availabilities for the portion of the Edwards-BFZ Aquifer regulated by EAA. The EAA-Regulated Edwards-BFZ Aquifer availability was determined using the current Edwards Aquifer Authority permitted volumes, while being consistent with the full implementation of the Edwards Aquifer Habitat Conservation Plan and any forbearance programs. Appendix D provides a summary of RWPG-estimated groundwater availabilities to date for the portions of the Edwards-BFZ Aquifer regulated by EAA.

Hays County is partially regulated by EAA, GMA 9, and GMA 10. GMA 9 declared the entire Edwards-BFZ aquifer to be non-relevant within Hays County. For GMA 10, the MAG value for the Edwards BFZ Aquifer, freshwater, in Hays County is 942 acft/yr. The EAA permitted amount is 7,116 acft/yr. The RWPG estimated the Hays County freshwater groundwater availability by summing the MAG values and EAA-permitted amounts, which results in 8,058 acft/yr.

4.2.2.3. Edwards-BFZ Aquifer in Frio County

Frio County is located within Groundwater Management Area 13 and is not regulated by the EAA. The TWDB's 2022 published report, entitled *GAM Run 21-018 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers In Groundwater Management Area 13* indicates that the Edwards-BFZ Aquifer was declared not relevant for purposes of joint planning. However, a TWDB published report in 2012, entitled *GTA Aquifer Assessment 10-40 MAG: Analytical Model Estimates of Modeled Available Groundwater for the Edwards Aquifer within Frio County in GMA 13,* estimated the MAG for the Edwards-BFZ Aquifer within Frio County to be approximately 23,213 acft/yr. Therefore, the RWPG has estimated groundwater availabilities for the Edwards-BFZ Aquifer within Frio County to be 23,213 acft/yr for all decades within the planning horizon (Appendix D). This non-MAG value is consistent with the values included in the 2021 Region L Regional Water Plan.

4.2.2.4. Leona Gravel Aquifer in Medina County

Medina County is located within GMAs 9, 10, and 13. Additionally, the county is partially within the Nueces River Basin and the San Antonio River Basin. MAG values for the Leona Gravel Aquifer in Medina County are provided in the Medina County Groundwater Conservation District Groundwater Management Plan[2], which includes and references the following two TWDB-published reports to estimate groundwater availabilities for the Leona Gravel Aquifer in Medina County (Appendix D), as follows:

- GMA 10, Medina County, Leona Gravel Aquifer: Bradley, Robert. GTA Aquifer Assessment 10-07 MAG: Modeled Available Groundwater Estimates for Leona Gravel Aquifer in Medina County. Texas Water Development Board. 20 August 2012, 8 p
- GMA 13, Medina County, Leona Gravel Aquifer: Bradley, Robert. *Aquifer Assessment 10-41: Aquifer Assessment for the Leona Gravel Aquifer in Groundwater Management Area 13*. Texas Water Development Board. 20 August 2012, 8 p.

[2] Medina County Groundwater Conservation District Groundwater Management Plan. Medina County Groundwater Conservation District. 30 March 2022, 112 p.

These reports each estimate MAG values for the Leona Gravel Aquifer within its respective GMAs. Table 4 summarizes the basin-specific MAG values identified in these two reports. To determine RWPG-estimated groundwater availabilities for the Leona Gravel in Medina County, each GMA's MAG values were summed to determine RWPG-estimated values by basin. The RWPG-estimated groundwater availabilities for the Leona Gravel Aquifer in Medina County are shown in Appendix D. These non-MAG values are consistent with the values included in the 2021 Region L Regional Water Plan.

Table 4 Summary of Leona Gravel Aquifer Groundwater Availabilities in Medina County Based on TWDB Published Reports for GMAs 10 and 13

COUNTY	GROUNDWATER MANAGEMENT AREA	LEONA GRAVEL AQUIFER AVAILABILITIES (ACFT/YR)						
		BASIN	2030	2040	2050	2060	2070	2080
Medina	**GMA 10 [A]**	Nueces	12,369	12,369	12,369	12,369	N/A	N/A
		San Antonio	4,013	4,013	4,013	4,013	N/A	N/A
	GMA 13 [B]	Nueces	5,586	5,586	5,586	5,586	N/A	N/A
		San Antonio	49	49	49	49	N/A	N/A

Notes:
[A] **MAG values from *GTA Aquifer Assessment 10-07 MAG (2012)***
[B] **MAG values from *Aquifer Assessment 10-41: Aquifer Assessment for the Leona Gravel Aquifer in Groundwater Management Area 13 (2012)***

4.2.2.5. San Marcos River Alluvium in Caldwell County

For the San Marcos River Alluvium Aquifer, groundwater availability estimates are based on a TWDB-published groundwater report[3] and the maximum historic annual production volume from 1980 to 2021. Appendix D provides a summary of the RWPG-estimated groundwater availabilities for the planning horizon. These non-MAG values are consistent with the values included in the 2021 South Central Texas (Region L) Regional Water Plan.

4.3. REUSE/RECYCLE WATER SUPPLIES

As described in the TWDB-approved hydrologic variances, the SCTRWPG will determine reuse/recycle water supplies based on the estimated amount of water returned to a utility's wastewater treatment plant (WWTP) for each decade, less the amount of reuse water already being utilized as existing supply. The upper limit of source water available for reuse water management strategies (WMSs) will be determined based on the amount of water returned to a utility's WWTP, estimated at 50 percent (%) of the utility's projected water demands, adjusted for water conservation and drought management strategies, unless site specific information is available.

[3] Follett, C.R. Ground-Water Resources of Caldwell County, Texas; Texas Water Development Board Report 12. Texas Water Development Board. January 1966; 88 p.

4.4. LIVESTOCK LOCAL SUPPLIES

For all areas within the planning region, livestock water demand is generally assumed to be supplied 50% from quantified groundwater sources and 50 percent from local surface water and unquantified groundwater sources such as stock tanks, streams, and windmills. This assumption is based on data from the TWDB historic water use estimates, which indicate that the counties within the planning area average approximately 60% groundwater supply to meet livestock use over the past ten years (2011-2021). Because the demands are based on a drought year scenario, it was assumed that ranchers will manage their livestock in such a way that populations will be maintained at a level that can be supported by a combination of local surface water supplies and known water or groundwater supplies. Livestock water supply is set equal to projected livestock demands due to the nature of livestock water use. Livestock demand tends to match the available supply. If the supply is not present, the livestock numbers are reduced until they match the available supply. Infrastructure is not a consideration for livestock supplies, and livestock pumpage is typically exempt from regulations; therefore, there are no regulatory considerations that might impact livestock groundwater supplies.

5.0 INFEASIBLE WATER MANAGEMENT STRATEGIES FROM THE 2021 RWP

The SCTRWPG conducted a one-time, mid-cycle analysis of the 2021 Region L Regional Water Plan (RWP) to identify any newly infeasible WMSs and water management strategy projects (WMSPs). The SCTRWPG reviewed a list of WMSs and WMSPs from TWDB that were feasible and recommended at the time of adoption of the 2021 Region L Regional Water Plan but which have since become infeasible. Information from WMS and WMSP sponsors was gathered to determine whether they have taken affirmative steps to implement projects with a near-term online decade (2020, 2030, and 2040). In addition, the list of TWDB-provided strategies was presented to the SCTRWPG for discussion related to implementation status.

On November 2, 2023, the SCTRWPG held a public meeting to receive results of the potentially infeasible WMS analysis. These results were presented at the same public meeting in which the methodology for identifying potentially feasible WMSs for the current plan were presented and approved.

The analysis identified no infeasible WMSs or WMSPs; therefore, an amendment of the 2021 Region L Regional Water Plan is not necessary.

6.0 DOCUMENTED PROCESS TO IDENTIFY POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES FOR THE 2026 PLANNING CYCLE

On November 2, 2023, the SCTRWPG considered and approved a documented process to identify potentially feasible WMSs for the 2026 Regional Water Planning Cycle. The process is documented in Appendix E of this Technical Memorandum.

7.0 POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES IDENTIFIED BY THE RWPG

The SCTRWPG identified potentially feasible WMSs for meeting Needs in the region. In future meetings, the SCTRWPG may consider additional WMSs, review scope and fee of each, and submit a request to TWDB for notice to proceed. Appendix F provides the potentially feasible WMSs identified to date for WUGs with identified Needs. A summary of the potentially feasible WMSs is provided in Table 5.

Table 5 Summary of Potentially Feasible WMSs Identified to Date

NO.	POTENTIALLY FEASIBLE WMS	NO.	POTENTIALLY FEASIBLE WMS
1	Advanced Water Conservation	16	SAWS Regional Wilcox Project
2	Non-municipal Water Conservation	17	ARWA Project (Phase 2)
3	Drought Management	18	ARWA Project (Phase 3)
4	Edwards Transfers	19	GBRA WaterSECURE
5	Fresh Groundwater Development	20	GBRA Lower Basin New Appropriation
6	Brackish Groundwater Development	21	CRWA Wells Ranch (Phase 3)
7	Groundwater Conversions	22	CRWA Siesta Project
8	Brush Management	23	CRWA Expanded Brackish Carrizo-Wilcox Project
9	Rainwater Harvesting	24	CVLGC Carrizo Project
10	Surface Water Rights	25	SSLGC Expanded Carrizo Project
11	Balancing Storage	26	SSLGC Expanded Brackish Wilcox Project
12	Facilities Expansion	27	NBU ASR
13	Recycled Water Strategies	28	NBU Trinity Well Field Expansion
14	SAWS Expanded Local Carrizo Project	29	City of Victoria ASR
15	SAWS Expanded Brackish Groundwater Project	30	City of Victoria Groundwater-Surface Water Exchange

8.0 INTERREGIONAL COORDINATION EFFORTS TO DATE

Region L is bordered by five regional water planning areas, including the Plateau (Region J), Lower Colorado (Region K), Rio Grande (Region M), Coastal Bend (Region N), and Lavaca (Region P). The following summarizes interregional coordination efforts to date.

- Regular meetings or conversations with consultants in Regions G, K, M, and P
- Regular reports from interregional liaisons
- Engagement and membership in the Interregional Planning Council
- Engagement in Regional Water Planning Chairs' Meetings

Note on Technical Memorandum Appendices:

For clarity and accuracy, appendices from the 2024 Technical Memorandum are excluded from the 2026 South Central Texas (Region L) Regional Water Plan.

In some instances, the appendices of the 2024 Technical Memorandum are duplicates of those already contained in the 2026 Region L Regional Water Plan. In other instances, the data and information contained in the appendices have been superseded and may conflict with current data presented in the 2026 Region L Regional Water Plan.

Appendix 3D: Surface Water Reliability

Appendix 3D: Surface Water Reliability

No.	Basin	County	Use	Water Right ID No.	Authorized Diversion (acft /yr)	2030 Volume Reliability (%)	2030 Minimum Annual Supply (acft)	2080 Volume Reliability (%)	2080 Minimum Annual Supply (acft)	Owner
1	Guadalupe	Caldwell	HYD	P4492_1	15,000	61.55	0	61.55	0	HYDRACO POWER INC
2	Guadalupe	Caldwell	IRR	P4080_1	425	71.94	0	71.94	0	BENO CORPORATION
3	Guadalupe	Caldwell	IRR	C3898_1	20	88.83	0	88.83	0	CITY OF LULING
4	Guadalupe	Caldwell	IRR	P4373_1	300	66.50	0	66.50	0	CONTINENTAL WHOLESALE FLORISTS
5	Guadalupe	Caldwell	IRR	P4373_2	300	65.59	0	65.59	0	CONTINENTAL WHOLESALE FLORISTS
6	Guadalupe	Caldwell	IRR	P4033_1	300	74.01	0	74.01	0	DICK BROWN
7	Guadalupe	Caldwell	IRR	P5857_1	1	84.43	0	84.43	0	GENE MILLIGAN
8	Guadalupe	Caldwell	IRR	C3890_1	50	88.83	0	88.83	0	GEORGE PARTNERSHIP LTD
9	Guadalupe	Caldwell	IRR	C3900_2	500	86.37	0	86.37	0	JAMES D JAMISON
10	Guadalupe	Caldwell	IRR	P4518_1	120	80.57	0	80.57	0	JOHN H COX
11	Guadalupe	Caldwell	IRR	P4597_1	320	65.85	0	65.85	0	JOHN TO'BANION JR ET AL
12	Guadalupe	Caldwell	IRR	P4110_1	240	73.01	0	73.01	0	LYNN STORM
13	Guadalupe	Caldwell	IRR	P4022_1	450	79.33	0	79.33	0	MARY ANN LANGFORD ET AL
14	Guadalupe	Caldwell	IRR	C3899_1	1,180	88.80	0	88.80	0	MIGUEL CALZADA URQUIZA ET UX
15	Guadalupe	Caldwell	IRR	P4569_2	240	66.34	0	66.34	0	ROBERT L BOOTHE
16	Guadalupe	Caldwell	IRR	P3857_1	144	84.25	0	84.25	0	ROBERT M KIEHN
17	Guadalupe	Caldwell	IRR	C3904_1	28	79.75	0	79.75	0	SHERRY CHAPPELL
18	Guadalupe	Caldwell	IRR	C3906_1	63	90.45	0	90.45	0	TEXAS PARKS & WILDLIFE DEPT
19	Guadalupe	Caldwell	IRR	C3906_2	12	93.17	0	93.17	0	TEXAS PARKS & WILDLIFE DEPT
20	Guadalupe	Caldwell	MUN	C3889_1	24	100.00	24	100.00	24	CANYON REGIONAL
21	Guadalupe	Caldwell	MUN	C3896_1	1,500	87.35	0	87.35	0	GUADALUPE - BLANCO RIVER AUTH
22	Guadalupe	Caldwell	MUN	C3896_2	1,300	73.31	0	73.31	0	GUADALUPE - BLANCO RIVER AUTH
23	Guadalupe	Caldwell	MUN	P5234_2	1,022	63.68	0	63.68	0	GUADALUPE - BLANCO RIVER AUTHORITY
24	Guadalupe	Caldwell	MUN	C3895_2	580	90.26	0	90.26	0	STATE BANK & TRUST COMPANY
25	Guadalupe	Caldwell	MUN	C3891_3	500	100.00	500	100.00	500	TRI - COMMUNITY WSC
26	Guadalupe	Caldwell	MUN	P5092_2	150	63.63	0	63.63	0	WILLIAM JAMES WOOTEN ET AL
27	Guadalupe	Calhoun	IND	P4586_1	272	82.09	0	82.09	0	DEL & GLORIA WILLIAMS , Crawfish Isle P

No.	Basin	County	Use	Water Right ID No.	Authorized Diversion (acft /yr)	2030 Volume Reliability (%)	2030 Minimum Annual Supply (acft)	2080 Volume Reliability (%)	2080 Minimum Annual Supply (acft)	Owner
28	Guadalupe	Calhoun	IND	C5173_2	1,250	100.00	1,250	100.00	1,250	GUADALUPE - BLANCO RIVER AUTH
29	Guadalupe	Calhoun	IND	C5174_3	935	99.48	0	99.48	0	GUADALUPE - BLANCO RIVER AUTH
30	Guadalupe	Calhoun	IND	C5176_3	3,315	99.09	0	99.09	0	GUADALUPE - BLANCO RIVER AUTH
31	Guadalupe	Calhoun	IND	C5177_1	10,763	100.00	10,763	100.00	10,763	GUADALUPE - BLANCO RIVER AUTH
32	Guadalupe	Calhoun	IND	C5177_4	10,000	99.69	0	99.69	0	GUADALUPE - BLANCO RIVER AUTH
33	Guadalupe	Calhoun	IND	C5178_2	30,525	97.71	0	97.71	0	GUADALUPE - BLANCO RIVER AUTH
34	Guadalupe	Calhoun	IND	C5175_2	470	99.30	0	99.30	0	UNION CARBIDE
35	Guadalupe	Calhoun	IRR	P5381_1	150	82.57	0	82.57	0	BRETT BRATCHER
36	Guadalupe	Calhoun	IRR	C5173_1	1,250	100.00	1,250	100.00	1,250	GUADALUPE - BLANCO RIVER AUTH
37	Guadalupe	Calhoun	IRR	C5174_2	935	99.25	0	99.25	0	GUADALUPE - BLANCO RIVER AUTH
38	Guadalupe	Calhoun	IRR	C5175_1	470	99.04	0	99.04	0	GUADALUPE - BLANCO RIVER AUTH
39	Guadalupe	Calhoun	IRR	C5176_1	3,315	99.04	0	99.04	0	GUADALUPE - BLANCO RIVER AUTH
40	Guadalupe	Calhoun	IRR	C5177_2	10,763	100.00	10,763	100.00	10,763	GUADALUPE - BLANCO RIVER AUTH
41	Guadalupe	Calhoun	IRR	C5177_6	4,316	99.17	0	99.17	0	GUADALUPE - BLANCO RIVER AUTH
42	Guadalupe	Calhoun	IRR	C5178_3	44,950	95.40	0	95.40	0	GUADALUPE - BLANCO RIVER AUTH
43	Guadalupe	Calhoun	MUN	C5176_2	3,314	99.09	0	99.09	0	GUADALUPE - BLANCO RIVER AUTH
44	Guadalupe	Calhoun	MUN	C5177_3	11,089	99.97	9,531	99.97	9,531	GUADALUPE - BLANCO RIVER AUTH
45	Guadalupe	Calhoun	MUN	C5177_5	4,316	99.37	0	99.37	0	GUADALUPE - BLANCO RIVER AUTH
46	Guadalupe	Calhoun	MUN	C5178_1	30,525	98.43	0	98.43	0	GUADALUPE - BLANCO RIVER AUTH
47	Guadalupe	Comal	EVN	C2074_1	10,000	98.14	0	97.97	0	GUADALUPE - BLANCO RIVER AUTH
48	Guadalupe	Comal	EVN	C2074_2	40,000	97.93	0	97.88	0	GUADALUPE - BLANCO RIVER AUTH
49	Guadalupe	Comal	HYD	C3824_1	124,870	5.34	0	5.34	0	NEW BRAUNFELS UTILITIES
50	Guadalupe	Comal	IND	C3829_1	100	100.00	100	100.00	100	MISSION VALLEY MILL HOLDINGS , LLC
51	Guadalupe	Comal	IRR	C3828_1	1	100.00	0.86	100.00	0.86	CAMP WARNECKE INC
52	Guadalupe	Comal	IRR	C1955_1	10	47.84	0	47.84	0	CHESTER & RICKIE KRAUSE
53	Guadalupe	Comal	IRR	C3826_2	100	24.36	0	24.36	0	CITY OF NEW BRAUNFELS
54	Guadalupe	Comal	IRR	C3817_1	79	88.94	0	88.94	0	CLARENCE B ANDERSON ET AL
55	Guadalupe	Comal	IRR	C2060_2	80	68.28	0	68.28	0	DAVID MICHAEL HIXON 2011 TRUST ET AL
56	Guadalupe	Comal	IRR	C2072_1	35	98.45	0	98.45	0	ELOY GARCIA JR ET UX

No.	Basin	County	Use	Water Right ID No.	Authorized Diversion (acft /yr)	2030 Volume Reliability (%)	2030 Minimum Annual Supply (acft)	2080 Volume Reliability (%)	2080 Minimum Annual Supply (acft)	Owner
57	Guadalupe	Comal	IRR	C2070_1	98	19.98	0	19.98	0	FRANK A STANUSH
58	Guadalupe	Comal	IRR	C2070_2	22	19.98	0	19.98	0	FRANK A STANUSH
59	Guadalupe	Comal	IRR	C2071_1	1	99.05	0	99.05	0	GUADALUPE RIVER RANCH & CATTLE
60	Guadalupe	Comal	IRR	C1954_1	15	49.09	0	49.09	0	LAWRENCE D KRAUSE
61	Guadalupe	Comal	IRR	C1954_2	5	67.06	0	67.06	0	LAWRENCE D KRAUSE
62	Guadalupe	Comal	IRR	C3828_2	2	100.00	2.14	100.00	2.14	LIBERTY PARTNERSHIP LTD
63	Guadalupe	Comal	IRR	C3824_4	200	94.36	38	94.36	38	NEW BRAUNFELS UTILITIES
64	Guadalupe	Comal	IRR	C3819_1	14	98.96	0	98.96	0	PATRICK S MOLAK
65	Guadalupe	Comal	IRR	P4607_1	50	88.20	0	88.20	0	PURALLOY INC
66	Guadalupe	Comal	IRR	A5647_1	350	65.63	0	65.63	0	RIVER CROSSING HOLDINGS LLC
67	Guadalupe	Comal	IRR	C3821_1	4	99.02	0	99.02	0	ROBERT & MARY RAE PRESTON
68	Guadalupe	Comal	IRR	C3821_2	1	100.00	1	100.00	1	ROBERT & MARY RAE PRESTON
69	Guadalupe	Comal	IRR	C3822_1	3	99.91	3	99.91	3	ROBERT KRUEGER ET AL
70	Guadalupe	Comal	MUN	C3829_3	400	100.00	400	100.00	400	CANYON REGIONAL WATER AUTHORITY
71	Guadalupe	Comal	MUN	P4491_1	120	86.19	0	86.19	0	COMAL CO FRESH WSD # 1
72	Guadalupe	Comal	MUN	C2074_7	40,000	98.09	0	97.99	0	GUADALUPE - BLANCO RIVER AUTH
73	Guadalupe	Comal	MUN	C3815_1	3	28.98	0	28.98	0	J D MURRELL
74	Guadalupe	Comal	MUN	C3823_2	1,289	72.28	0	72.28	0	NEW BRAUNFELS UTILITIES
75	Guadalupe	Comal	MUN	C3824_5	2,240	99.65	68	99.65	68	NEW BRAUNFELS UTILITIES
76	Guadalupe	Comal	MUN	C3824_6	3,418	73.06	0	73.06	0	NEW BRAUNFELS UTILITIES
77	Guadalupe	Comal	MUN	C3830_2	5	72.20	0	72.20	0	NEW BRAUNFELS UTILITIES
78	Guadalupe	Comal	MUN	C3819_2	9	99.26	0	99.26	0	PATRICK S MOLAK
79	Guadalupe	Comal	REC	P4114_1	3,711	4.30	0	4.30	0	BAD SCHOLOESS INC
80	Guadalupe	Comal	REC	P4114_2	1,289	7.88	0	7.88	0	BAD SCHOLOESS INC
81	Guadalupe	Comal	REC	C3816_1	1,460	27.63	0	27.63	0	WHITEWATER SPORTS INC
82	Guadalupe	De Witt	IRR	P4318_1	80	82.45	0	82.45	0	F T BUCHEL
83	Guadalupe	De Witt	IRR	C3854_1	32	95.83	0	95.83	0	J D BRAMLETTE JR
84	Guadalupe	De Witt	IRR	C3851_1	182	97.82	0	97.82	0	JACK H BOOTHE
85	Guadalupe	De Witt	IRR	C3852_1	35	98.61	0	98.61	0	JOHN BRADEN JR ET AL

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86	Guadalupe	De Witt	IRR	C3850_1	80	98.75	0	98.75	0	JOSEPHINE B MUSSELMAN ET AL
87	Guadalupe	De Witt	IRR	P5006_2	299	85.35	0	85.35	0	LORITA MAE FITZGERALD
88	Guadalupe	De Witt	IRR	C3855_1	26	98.75	0	98.75	0	MRS JOHN C LEY
89	Guadalupe	De Witt	IRR	C3856_1	50	84.25	0	84.25	0	PATRICK B & MARY KARYN ELDER
90	Guadalupe	De Witt	REC	P5294_1	15	94.15	0	94.15	0	CITY OF YORKTOWN
91	Guadalupe	Goliad	IRR	C3820_1	4	99.15	0	99.15	0	VETERANS OF FOREIGN WARS
92	Guadalupe	Gonzales	HYD	C3846_1	796,363	56.80	0	56.81	0	CITY OF GONZALES
93	Guadalupe	Gonzales	HYD	C5172_1	585,599	56.31	0	56.31	0	GUADALUPE - BLANCO R A H - 4
94	Guadalupe	Gonzales	HYD	C5172_2	574,832	56.88	0	56.89	0	GUADALUPE - BLANCO R A H - 5
95	Guadalupe	Gonzales	IRR	P5038_1	66	75.95	0	75.95	0	ARTHUR DENNIS HUEBNER ET AL
96	Guadalupe	Gonzales	IRR	P4075_1	225	70.00	0	70.00	0	DAVID S SHELTON
97	Guadalupe	Gonzales	IRR	P3916_1	50	84.25	0	84.25	0	DON A LIGHTSEY ET UX
98	Guadalupe	Gonzales	IRR	P4089_1	830	76.80	0	76.80	0	DR IV EPSTEIN
99	Guadalupe	Gonzales	IRR	C3847_1	250	98.75	0	98.75	0	DR JAMES W NIXON JR
100	Guadalupe	Gonzales	IRR	C3848_1	1,800	99.18	0	99.18	0	KING RANCH INC
101	Guadalupe	Gonzales	IRR	C3908_1	670	88.52	0	88.52	0	LARRY E & PHYLIS A BROWNE
102	Guadalupe	Gonzales	IRR	P5037_1	230	76.00	0	76.00	0	RICHARD D BRAMLET
103	Guadalupe	Gonzales	IRR	P4539_1	8	86.48	0	86.48	0	T PAUL SIDES
104	Guadalupe	Gonzales	MUN	C3846_2	2,240	100.00	2,240	100.00	2,240	CITY OF GONZALES
105	Guadalupe	Gonzales	MUN	P12378	75,000	85.76	0	85.76	0	GUADALUPE - BLANCO RIVER AUTH
106	Guadalupe	Guadalupe	HYD	C5488_1	663,892	50.65	0	50.65	0	GUADALUPE - BLANCO R A TP - 1
107	Guadalupe	Guadalupe	HYD	C5488_2	659,995	50.77	0	50.77	0	GUADALUPE - BLANCO R A TP - 3
108	Guadalupe	Guadalupe	HYD	C5488_3	655,323	50.89	0	50.90	0	GUADALUPE - BLANCO R A TP - 4
109	Guadalupe	Guadalupe	HYD	C5488_4	624,781	52.64	0	52.64	0	GUADALUPE - BLANCO R A TP - 5
110	Guadalupe	Guadalupe	HYD	CANSUBBU	25,144	0.00	0	0.00	0	GUADALUPE - BLANCO R A TP-1
111	Guadalupe	Guadalupe	IND	C3836_1	25	100.00	25	100.00	25	ACME BRICK COMPANY
112	Guadalupe	Guadalupe	IND	P5240_1	31	71.34	0	71.34	0	B SHANKLIN
113	Guadalupe	Guadalupe	IND	C3837_1	34	100.00	34	100.00	34	STRUCTURAL METALS INC
114	Guadalupe	Guadalupe	IRR	P5604_1	8	62.01	0	62.01	0	ALBERT GREEN , ET UX SAN MA

No.	Basin	County	Use	Water Right ID No.	Authorized Diversion (acft /yr)	2030 Volume Reliability (%)	2030 Minimum Annual Supply (acft)	2080 Volume Reliability (%)	2080 Minimum Annual Supply (acft)	Owner
115	Guadalupe	Guadalupe	IRR	C3840_1	34	87.32	0	87.32	0	ARNO NEUMANN
116	Guadalupe	Guadalupe	IRR	C3834_1	71	100.00	71.48	100.00	71.48	CANYON REGIONAL WATER AUTH
117	Guadalupe	Guadalupe	IRR	C3844_1	608	100.00	608	100.00	608	CITY OF VICTORIA
118	Guadalupe	Guadalupe	IRR	C3838_1	37	47.18	0	47.18	0	DONALD E NORED
119	Guadalupe	Guadalupe	IRR	P3973_1	73	34.50	0	34.50	0	DONALD J JOHNSON ET UX
120	Guadalupe	Guadalupe	IRR	P4502_1	600	68.40	0	68.40	0	JOHN SCOTT GREENE ET AL
121	Guadalupe	Guadalupe	IRR	C3841_1	5	64.37	0	64.37	0	LEO P CLOUD JR ET AL
122	Guadalupe	Guadalupe	IRR	C3843_1	27	100.00	27	100.00	27	LEONARD FLEMING
123	Guadalupe	Guadalupe	IRR	C3835_1	19	80.76	0	80.76	0	OTTO VOIGT
124	Guadalupe	Guadalupe	IRR	C3832_1	44	100.00	44	100.00	44	RAY E DITTMAR
125	Guadalupe	Guadalupe	IRR	C3842_1	158	87.26	0	87.26	0	SARA DARILEK RAINWATER
126	Guadalupe	Guadalupe	IRR	C3839_3	200	100.00	200	100.00	200	SEGUIN MUNICIPAL UTILITIES
127	Guadalupe	Guadalupe	IRR	P4043_1	150	74.03	0	74.03	0	TERRAND LTD ET AL
128	Guadalupe	Guadalupe	IRR	P3600_3	750	73.07	0	73.07	0	THE LULING FOUNDATION
129	Guadalupe	Guadalupe	MUN	C3834_2	19	100.00	18.52	100.00	18.52	CANYON REGIONAL WATER AUTH
130	Guadalupe	Guadalupe	MUN	C3833_1	56	100.00	56	100.00	56	GARY A DITTMAR
131	Guadalupe	Guadalupe	MUN	C3833_2	5	100.00	5	100.00	5	GARY A DITTMAR
132	Guadalupe	Guadalupe	MUN	C3839_1	7,000	100.00	7,000	100.00	7,000	SEGUIN MUNICIPAL UTILITIES
133	Guadalupe	Guadalupe	REC	P5121_1	83	64.99	0	64.99	0	GUADALUPE SKI - PLEX HOME ASSOC
134	Guadalupe	Hays	HYD	C3865_1	64,370	98.16	37,910	98.16	37,910	TEXAS STATE UNIVERSITY
135	Guadalupe	Hays	IND	C3869_1	10,000	99.48	0	99.48	0	TEXAS PARKS & WILDLIFE DEPT
136	Guadalupe	Hays	IND	C3865_3	534	89.77	0	89.77	0	TEXAS STATE UNIVERSITY
137	Guadalupe	Hays	IND	C3866_1	60	80.18	0	80.18	0	TEXAS STATE UNIVERSITY
138	Guadalupe	Hays	IRR	C3884_1	20	78.97	0	78.97	0	BRUCE COLLIE ET AL
139	Guadalupe	Hays	IRR	C3884_2	90	81.31	0	81.31	0	BRUCE COLLIE ET AL
140	Guadalupe	Hays	IRR	P5545_1	7	67.56	0	67.56	0	FRANK T & PAMELA H ARNOSKY
141	Guadalupe	Hays	IRR	C3902_1	30	85.04	0	85.04	0	FRITZ OTTO ANTON
142	Guadalupe	Hays	IRR	C3887_1	15	100.00	15	100.00	15	GREEN VALLEY FARMS INC
143	Guadalupe	Hays	IRR	C3886_1	150	79.82	0	79.82	0	HAYS COUNTY REC ASSOC INC

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144	Guadalupe	Hays	IRR	C3868_2	70	100.00	70	100.00	70	J R THORNTON , ET AL
145	Guadalupe	Hays	IRR	P4027_1	9	59.31	0	59.31	0	JESS WEBB ET UX
146	Guadalupe	Hays	IRR	P5426_1	165	67.97	0	67.97	0	JOHN G CURRIE
147	Guadalupe	Hays	IRR	C3881_1	40	100.00	40	100.00	40	LYON L BRINSMADE
148	Guadalupe	Hays	IRR	C3901_1	100	32.65	0	32.65	0	M D HEATLY SR
149	Guadalupe	Hays	IRR	C3882_1	100	94.39	0	94.39	0	NEWTON B THOMPSON
150	Guadalupe	Hays	IRR	P5371_1	5	60.92	0	60.92	0	ROBERT BOURKE SIMPSON
151	Guadalupe	Hays	IRR	C3887_3	5	100.00	5	100.00	5	SAN MARCOS RIVER FOUNDATION
152	Guadalupe	Hays	IRR	C3865_5	100	89.01	0	89.01	0	TEXAS STATE UNIVERSITY
153	Guadalupe	Hays	IRR	C3866_2	20	89.10	0	89.10	0	TEXAS STATE UNIVERSITY
154	Guadalupe	Hays	IRR	C3866_3	20	57.04	0	57.04	0	TEXAS STATE UNIVERSITY
155	Guadalupe	Hays	IRR	P4027_2	82	59.31	0	59.31	0	THOMAS L HUSBANDS ET UX
156	Guadalupe	Hays	IRR	P4170_1	15	38.60	0	38.60	0	TWAIN J JAGGE ET UX
157	Guadalupe	Hays	MUN	C3888_1	320	91.26	0	91.26	0	JOHN F BAUGH
158	Guadalupe	Hays	MUN	C3887_2	772	100.00	772	100.00	772	MAXWELL
159	Guadalupe	Hays	MUN	C3865_4	513	89.40	0	89.40	0	TEXAS STATE UNIVERSITY
160	Guadalupe	Hays	REC	C3865_2	700	90.36	0	90.36	0	TEXAS STATE UNIVERSITY
161	Guadalupe	Kendall	IRR	P5501_1	5	18.21	0	18.21	0	BARRY T & KATHRYN B NALL
162	Guadalupe	Kendall	IRR	P5490_1	10	71.58	0	71.58	0	BILLY J. & KARAN R. BOLES
163	Guadalupe	Kendall	IRR	C2047_1	20	88.84	0	88.84	0	C SEIDENSTICKER
164	Guadalupe	Kendall	IRR	C2069_1	30	95.72	0	95.72	0	DOUBLE U - SPRING BRANCH
165	Guadalupe	Kendall	IRR	C2064_1	4	97.68	0	97.68	0	EARL S DODERER ET UX
166	Guadalupe	Kendall	IRR	C2054_1	80	19.48	0	19.48	0	EDMUND BEHR ESTATE
167	Guadalupe	Kendall	IRR	P5474_1	10	71.58	0	71.58	0	ELTON RUST
168	Guadalupe	Kendall	IRR	C2053_1	32	19.92	0	19.92	0	ERNO SPENRATH
169	Guadalupe	Kendall	IRR	C2050_2	136	72.71	0	72.71	0	ERWIN KLEMSTEIN ET AL
170	Guadalupe	Kendall	IRR	C2063_1	44	88.84	0	88.84	0	FROST - LANCASTER PROPERTIES
171	Guadalupe	Kendall	IRR	C2065_1	10	19.89	0	19.89	0	G PHIL BERRYMAN ET UX
172	Guadalupe	Kendall	IRR	P5528_1	49	71.58	0	71.58	0	GEORGE A SCHMIDT ET UX

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173	Guadalupe	Kendall	IRR	P5528_2	49	71.58	0	71.58	0	GEORGE A SCHMIDT ET UX
174	Guadalupe	Kendall	IRR	P4590_1	50	18.34	0	18.34	0	GEORGE M WILLIAMS SR ET AL
175	Guadalupe	Kendall	IRR	C2065_2	10	19.89	0	19.89	0	GUY BODINE III ET UX
176	Guadalupe	Kendall	IRR	C2051_1	2	86.15	0	86.15	0	JOE B. KERCHEVILLE
177	Guadalupe	Kendall	IRR	C2051_2	260	83.49	0	83.49	0	JOE B. KERCHEVILLE
178	Guadalupe	Kendall	IRR	C2049_1	5	19.55	0	19.55	0	KENNETH M & CYNTHIA RUSCH
179	Guadalupe	Kendall	IRR	C2068_1	72	84.97	0	84.97	0	KWW Ranches LTD
180	Guadalupe	Kendall	IRR	P5321_1	150	78.42	0	78.42	0	LARRY J LANGBEIN
181	Guadalupe	Kendall	IRR	C2044_1	16	100.00	16.38	100.00	16.38	LION'S LAIR LLC
182	Guadalupe	Kendall	IRR	C2061_1	16	19.46	0	19.46	0	LOUIS SCOTT FELDER ET UX
183	Guadalupe	Kendall	IRR	P5534_1	20	71.58	0	71.58	0	MARGOT O BURRELL
184	Guadalupe	Kendall	IRR	C2061_2	18	19.46	0	19.46	0	MARJORIE RANZAU INGENHUETT
185	Guadalupe	Kendall	IRR	C2056_1	20	56.20	0	56.20	0	MARK E. WATSON , JR . , ET UX
186	Guadalupe	Kendall	IRR	C2057_1	25	56.63	0	56.63	0	MARK E. WATSON , JR . , ET UX
187	Guadalupe	Kendall	IRR	C2045_1	8	100.00	8	100.00	8	MARSHALL STEVES
188	Guadalupe	Kendall	IRR	C2061_3	37	19.46	0	19.46	0	MURRAY A WINN JR
189	Guadalupe	Kendall	IRR	C2035_1	2	19.54	0	19.54	0	OHARRY C MECKEL
190	Guadalupe	Kendall	IRR	C2058_1	40	19.98	0	19.98	0	OTTO KASTEN
191	Guadalupe	Kendall	IRR	C2044_2	2	100.00	1.62	100.00	1.62	PATRICIA GALT STEVES
192	Guadalupe	Kendall	IRR	C2048_1	100	22.23	0	22.23	0	RAYMOND JAMES ROSE
193	Guadalupe	Kendall	IRR	C2059_1	39	19.98	0	19.98	0	ROBERT C REINARZ ET AL
194	Guadalupe	Kendall	IRR	C2450_1	158	93.32	0	93.32	0	ROBERT L MOSTY ET AL
195	Guadalupe	Kendall	IRR	C2063_2	15	88.84	0	88.84	0	RONALD L BAETZ ET AL
196	Guadalupe	Kendall	IRR	C2066_1	5	20.01	0	20.01	0	ROY C SMITH ESTATE
197	Guadalupe	Kendall	IRR	C2064_2	8	96.20	0	96.20	0	SYBIL R JONES CO - TRUSTEE ET AL
198	Guadalupe	Kendall	IRR	C3870_1	3	99.78	0	99.78	0	T R and PRISCILLA H IMMEL
199	Guadalupe	Kendall	IRR	C3870_2	22	99.50	0	99.50	0	T R and PRISCILLA H IMMEL
200	Guadalupe	Kendall	IRR	C2060_1	10	19.98	0	19.98	0	TEXAS BEVERAGE PACKERS INC
201	Guadalupe	Kendall	IRR	C2067_1	20	20.16	0	20.16	0	TY RAMPY ET AL

No.	Basin	County	Use	Water Right ID No.	Authorized Diversion (acft /yr)	2030 Volume Reliability (%)	2030 Minimum Annual Supply (acft)	2080 Volume Reliability (%)	2080 Minimum Annual Supply (acft)	Owner
202	Guadalupe	Kendall	IRR	C2067_2	20	48.02	0	48.02	0	TY RAMPY ET AL
203	Guadalupe	Kendall	IRR	C2046_1	28	20.16	0	20.16	0	WILLIAM G & MILDRED D SPROWLS
204	Guadalupe	Kendall	IRR	C2036_1	125	46.40	0	46.40	0	WILLIAM K ANDERSON ET UX
205	Guadalupe	Kendall	IRR	P5107_1	518	83.17	0	83.17	0	WILLIAM K ANDERSON ET UX
206	Guadalupe	Kendall	IRR	C2062_1	60	44.95	0	44.95	0	WILLIAM L PULS
207	Guadalupe	Kendall	IRR	C2052_1	232	88.84	0	88.84	0	ZARCO FOWARDING , INC
208	Guadalupe	Kendall	MUN	P4106_1	25	90.93	0	90.93	0	TEXAS PARKS & WILDLIFE DEPT
209	Guadalupe	Kerr	IRR	C2034_1	2	96.90	0	96.90	0	CHESTER P HEINEN ET AL
210	Guadalupe	Kerr	IRR	C2043_1	17	18.65	0	18.65	0	EDGAR SEIDENSTICKER ET UX
211	Guadalupe	Kerr	IRR	C2043_2	4	18.65	0	18.65	0	L J MANNERING ET UX
212	Guadalupe	Kerr	IRR	C2043_3	20	18.65	0	18.65	0	MARY LEE EDWARDS
213	Guadalupe	Kerr	IRR	C2041_1	25	86.13	0	86.13	0	THOMAS L BRUNDAGE ET AL
214	Guadalupe	Kerr	IRR	C2041_2	109	85.28	0	85.28	0	THOMAS L BRUNDAGE ET AL
215	Guadalupe	Victoria	HYD	C3853_1	538,560	63.01	0	63.01	0	CUERO HYDROELECTRIC , INC .
216	Guadalupe	Victoria	IND	C5485_1	209,189	93.86	0	93.86	0	CENTRAL POWER & LIGHT CO
217	Guadalupe	Victoria	IND	C5486_1	20,000	94.39	0	94.39	0	COLETO CREEK POWER LP
218	Guadalupe	Victoria	IND	C3861_1	60,000	98.90	0	98.90	0	E I DU PONT DE NEMOURS
219	Guadalupe	Victoria	IND	P5376_1	2	100.00	2	100.00	2	HELDENFELS BROTHERS INC
220	Guadalupe	Victoria	IND	C3859_1	110,000	85.16	0	85.16	0	SOUTH TEXAS ELECTRIC COOP INC
221	Guadalupe	Victoria	IRR	C3862_1	263	93.76	0	93.76	0	CITY OF VICTORIA
222	Guadalupe	Victoria	IRR	P4441_1	200	85.26	0	85.26	0	CITY OF VICTORIA
223	Guadalupe	Victoria	IRR	C3862_2	137	98.65	0	98.65	0	E I DUPONT DE NEMOURS & CO
224	Guadalupe	Victoria	IRR	C3863_2	3,000	97.42	0	97.42	0	GUADALUPE - BLANCO RIVER AUTH
225	Guadalupe	Victoria	IRR	C3863_1	200	99.04	0	99.04	0	JESS YELL WOMACK II ET AL
226	Guadalupe	Victoria	IRR	P5012_1	140	72.96	0	72.96	0	JOE D. HAWES
227	Guadalupe	Victoria	IRR	P4182_1	200	85.58	0	85.58	0	MAXINE ROBSON KYLE ET AL
228	Guadalupe	Victoria	IRR	P4020_1	100	85.86	0	85.86	0	NELSON PANTEL
229	Guadalupe	Victoria	IRR	P4062_1	90	86.14	0	86.14	0	RONALD A KURTZ ET UX
230	Guadalupe	Victoria	LIV	P5489_1	750	88.36	0	88.36	0	JESSY WOMACK II

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231	Guadalupe	Victoria	MUN	C3858_1	1,000	98.61	0	98.61	0	CITY OF VICTORIA
232	Guadalupe	Victoria	MUN	P5466_1	20,000	86.26	0	86.26	0	VICTORIA , CITY OF
233	Guadalupe	Victoria	MUN	C3860_2	260	78.58	0	78.58	0	W L LIPSCOMB ET AL
234	Guadalupe	Wilson	IRR	STORY_1	400	91.04	0	91.04	0	JAMES D STORY
235	Nueces	Atascosa	IRR	C3216_1	20	15.58	0	15.58	0	ATASCOSA COWBOY RECREATION
236	Nueces	Atascosa	IRR	C3219_1	30	15.86	0	15.86	0	ERNKORUS LP
237	Nueces	Atascosa	IRR	C3217_1	27	15.96	0	15.96	0	FRANCES S MARSH
238	Nueces	Atascosa	IRR	C3218_1	7	15.68	0	15.68	0	JEROME W. SCHUCHART
239	Nueces	Atascosa	IRR	C3218_2	11	15.67	0	15.67	0	JEROME W. SCHUCHART
240	Nueces	Atascosa	IRR	C4772_1	2	98.41	0	98.41	0	MAGSONS NV
241	Nueces	Atascosa	IRR	C3213_1	13	0.98	0	0.98	0	SAM COUNTISS
242	Nueces	Atascosa	Other	P5511_1	120	2.4	0	2.4	0	SAN MIGUEL ELECTRIC COOP INC
243	Nueces	Bexar	IRR	C3196_1	40	9.73	0	9.73	0	SAN ANTONIO RANCH LTD
244	Nueces	Dimmit	IRR	C3093_1	102	99.64	0	99.64	0	CHARLES LYDELL THALMANN
245	Nueces	Dimmit	IRR	C3093_2	1	99.6	0	99.6	0	CHARLES LYDELL THALMANN
246	Nueces	Dimmit	IRR	C3099_1	34	37.35	0	37.35	0	CHARLES W WILSON ET UX
247	Nueces	Dimmit	IRR	C3086_1	554	38.23	0	38.23	0	CHARLES W WILSON SR ET AL
248	Nueces	Dimmit	IRR	C3097_1	231	99.64	0	99.64	0	DONALD E JACKSON , ET UX
249	Nueces	Dimmit	IRR	C3098_1	60	68.19	0	68.19	0	FREDERICK JAY WHITECOTTON
250	Nueces	Dimmit	IRR	C3096_1	337	99.64	0	99.64	0	JAMES A WILSON JR
251	Nueces	Dimmit	IRR	C3102_1	15	30.9	0	30.9	0	NEEDMORE RANCH INC
252	Nueces	Dimmit	IRR	C3103_1	400	89.12	0	89.12	0	R W BRIGGS JR
253	Nueces	Dimmit	IRR	C3094_1	300	99.93	210.61	99.93	210.61	RESIDUAL TRUST OF ALBERT IVY SR
254	Nueces	Dimmit	IRR	C3095_1	1,090	99.71	0	99.71	0	RUTH BOWMAN RUSSELL
255	Nueces	Dimmit	IRR	C3095_2	201	99.64	0	99.64	0	RUTH BOWMAN RUSSELL
256	Nueces	Frio	IRR	P3914_1	19	6.75	0	6.75	0	A R GALLOWAY ET UX
257	Nueces	Frio	IRR	P3914_2	7	6.59	0	6.59	0	A R GALLOWAY ET UX
258	Nueces	Frio	IRR	C3212_1	25	2.48	0	2.48	0	CHARLES CURTIS RAMSEY ET UX
259	Nueces	Frio	IRR	P3884_1	80	0.02	0	0.02	0	Claude DJ Smith

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260	Nueces	Frio	IRR	C3208_1	230	1.3	0	1.3	0	COX FEEDLOTS INC
261	Nueces	Frio	IRR	P4113_1	15	1.13	0	1.13	0	DR LESLIE R FRICKE
262	Nueces	Frio	IRR	P4041_1	25	0	0	0	0	FLOYD B NEUMAN
263	Nueces	Frio	IRR	P4041_2	20	0.17	0	0.17	0	FLOYD B NEUMAN
264	Nueces	Frio	IRR	C3210_1	20	1.96	0	1.96	0	FRANCIS MALDONADO
265	Nueces	Frio	IRR	C3193_1	8	31.63	0	31.63	0	GEOFFREY A STONE
266	Nueces	Frio	IRR	P4014_1	124	1.37	0	1.37	0	JOE H BERRY
267	Nueces	Frio	IRR	C3199_1	50	20.08	0	20.08	0	JOHN COALTER BAKER , ET AL
268	Nueces	Frio	IRR	C3209_1	118	24.91	0	24.91	0	MIKE MORRIS
269	Nueces	Frio	IRR	C3211_1	40	48.09	0	48.09	0	ROBERT ARTHUR BAKER ET AL
270	Nueces	Frio	IRR	C3211_2	60	17.78	0	17.78	0	ROBERT ARTHUR BAKER ET AL
271	Nueces	La Salle	IRR	C3115_1	55	96.58	0	96.58	0	ANDREW DE LA GARZA ET AL
272	Nueces	La Salle	IRR	C3107_1	210	43.32	0	43.32	0	BC GETAWAY LLC
273	Nueces	La Salle	IRR	C3108_1	298	31.54	0	31.54	0	C L PROPERTIES LLC
274	Nueces	La Salle	IRR	C3138_1	55	88.63	0	88.63	0	CHARLES D JOHNSON
275	Nueces	La Salle	IRR	C3136_1	200	99.16	0.04	99.16	0.04	DOROTHY M KINSEL
276	Nueces	La Salle	IRR	C3203_1	106	35.54	0	35.54	0	DOUGLAS A MILLER ET AL
277	Nueces	La Salle	IRR	C3201_1	649	35.61	0	35.61	0	EL JARDIN LP
278	Nueces	La Salle	IRR	C3111_1	30	92.49	0	92.49	0	EUGENE WHITE
279	Nueces	La Salle	IRR	C3116_1	33	96.5	0	96.5	0	FRANK S MORELLO JR
280	Nueces	La Salle	IRR	C3116_2	145	96.31	0	96.31	0	FRANK S MORELLO JR
281	Nueces	La Salle	IRR	C3105_1	150	99.79	0.51	99.79	0.51	FRANKLIN JERRY MEEKS
282	Nueces	La Salle	IRR	C3140_1	76	60.53	0	60.53	0	FRED HILLJE ESTATE
283	Nueces	La Salle	IRR	C3112_1	47	97.64	0	97.64	0	FREDNA K DOBIE
284	Nueces	La Salle	IRR	C3125_1	20	81.2	0	81.2	0	GEORGE & SHARON TRIGO
285	Nueces	La Salle	IRR	C3118_1	50	100	50	100	50	GLENNT ROBERTS ET UX
286	Nueces	La Salle	IRR	C3133_1	54	90.61	0	90.61	0	H B RAMSEY
287	Nueces	La Salle	IRR	C3133_2	296	89.75	0	89.75	0	H B RAMSEY
288	Nueces	La Salle	IRR	C3135_1	42	99.89	11.26	99.89	11.26	H B RAMSEY

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289	Nueces	La Salle	IRR	C3135_2	38	88.54	0	88.54	0	H B RAMSEY
290	Nueces	La Salle	IRR	C3139_1	2,023	97.78	0.02	97.78	0.02	HOLLAND TEXAS DAM & IRR CO
291	Nueces	La Salle	IRR	C3131_1	50	88.3	0	88.3	0	IPO RANCH LP
292	Nueces	La Salle	IRR	C3132_1	195	88.3	0	88.3	0	IPO RANCH LP
293	Nueces	La Salle	IRR	C3120_1	200	100	200	100	200	JOEL GILBERT
294	Nueces	La Salle	IRR	C3130_1	92	88.39	0	88.39	0	JOSE R GARZA and GARZA BLUEBIRD MANAGEMENT LLC
295	Nueces	La Salle	IRR	C3127_1	180	89.48	0	89.48	0	LEE M GATES ET UX
296	Nueces	La Salle	IRR	C3129_1	180	91.42	0	91.42	0	LOUISE G DAVIS
297	Nueces	La Salle	IRR	C3123_1	70	100	70	100	70	LUIS ALLALA JR
298	Nueces	La Salle	IRR	C3123_2	130	99.95	67.08	99.95	67.08	LUIS ALLALA JR
299	Nueces	La Salle	IRR	C3106_1	20	94.89	0	94.89	0	M C WHITWELL ET UX
300	Nueces	La Salle	IRR	C3106_2	20	93.78	0	93.78	0	M C WHITWELL ET UX
301	Nueces	La Salle	IRR	C3109_1	10	47.33	0	47.33	0	M C WHITWELL ET UX
302	Nueces	La Salle	IRR	C3110_1	22	47.08	0	47.08	0	MKM BUSINESS HOLDINGS LLC
303	Nueces	La Salle	IRR	C3119_1	40	100	40	100	40	NORMA D GARCIA ET VIR
304	Nueces	La Salle	IRR	C3117_1	270	95.44	0	95.44	0	PRESIDIO RANCH , LP
305	Nueces	La Salle	IRR	C3114_1	199	97.19	0	97.19	0	RALPH P GUTTMAN
306	Nueces	La Salle	IRR	C3124_1	5	99.9	0	99.9	0	RAUL DEL TORO ET UX
307	Nueces	La Salle	IRR	C3134_1	398	88.86	0	88.86	0	ROCKY COMFORT PARTNERSHIP LTD
308	Nueces	La Salle	IRR	C3121_1	5	100	5	100	5	RUDY & TERESA RODRIGUEZ SR
309	Nueces	La Salle	IRR	C3122_1	30	100	30	100	30	SANTANA A MORIN ET AL
310	Nueces	La Salle	IRR	C3126_1	100	84.66	0	84.66	0	SILLER BROTHERS
311	Nueces	La Salle	IRR	C3126_2	260	63.63	0	63.63	0	SILLER BROTHERS
312	Nueces	La Salle	IRR	C3137_1	84	88.48	0	88.48	0	T G RANKIN
313	Nueces	La Salle	IRR	C3128_1	39	90.45	0	90.45	0	VALDA M GATES
314	Nueces	La Salle	IRR	C3104_1	250	97.84	0.04	97.84	0.04	WAITZ SUPER MARKET INC
315	Nueces	Medina	IRR	C3207_1	2,000	2.22	0	2.22	0	BEXAR - MEDINA - ATASCOSA WCID 1
316	Nueces	Medina	IRR	P4286_1	4	0.96	0	0.96	0	C H PIFER

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317	Nueces	Medina	IRR	P4506_1	40	1.92	0	1.92	0	JAMES THOMAS BAGBY JR
318	Nueces	Medina	IRR	C3191_1	20	16.39	0	16.39	0	L S MOLLERE TRUSTEE
319	Nueces	Medina	IRR	C3189_1	40	8.65	0	8.65	0	RICHARD W SCHWEERS
320	Nueces	Medina	IRR	C3190_1	80	30.88	0	30.88	0	TJ HONDO RANCH LTD
321	Nueces	Medina	RCH	C3192_1	5,998	6.84	0	6.84	0	EDWARDS AQUIFER AUTHORITY
322	Nueces	Medina	RCH	P3745_1	4,141	21.04	0	21.04	0	EDWARDS AQUIFER AUTHORITY
323	Nueces	Medina	RCH	P3806_1	12,000	10.06	0	10.06	0	EDWARDS AQUIFER AUTHORITY
324	Nueces	Uvalde	IND	C3087_1	10	85.94	0	85.94	0	R L WHITE COMPANY
325	Nueces	Uvalde	IRR	C3073_1	22	26.99	0	26.99	0	5653.041 ACRE RANCH LP
326	Nueces	Uvalde	IRR	C3073_2	122	26.85	0	26.85	0	5653.041 ACRE RANCH LP
327	Nueces	Uvalde	IRR	C3064_1	150	31.81	0	31.81	0	ADANA TEAGUE
328	Nueces	Uvalde	IRR	C3173_1	1,000	3.87	0	3.87	0	ALVIN M RIMKUS
329	Nueces	Uvalde	IRR	P3989_1	56	5.67	0	5.67	0	ANTHONY C LEHOSKI ET UX
330	Nueces	Uvalde	IRR	P5241_1	108	3.3	0	3.3	0	BARKAT LAND & CATTLE CO
331	Nueces	Uvalde	IRR	P4238_1	140	3.76	0	3.76	0	CON CAN ENTERPRISES INC
332	Nueces	Uvalde	IRR	P5497_2	15	3.3	0	3.3	0	CONCAN WATER SUPPLY CORPORATION
333	Nueces	Uvalde	IRR	P3990_1	30	1.7	0	1.7	0	DON INMAN
334	Nueces	Uvalde	IRR	C3175_1	9	10.1	0	10.1	0	EL CAMINO GIRL SCOUT COUNCIL
335	Nueces	Uvalde	IRR	C3065_1	720	100	720	100	720	F KENNETH BAILEY JR
336	Nueces	Uvalde	IRR	P5063_1	94	3.52	0	3.52	0	GAFFORD FAMILY PARTNERSHIP
337	Nueces	Uvalde	IRR	P5063_2	6	3.8	0	3.8	0	GAFFORD FAMILY PARTNERSHIP
338	Nueces	Uvalde	IRR	C3194_1	50	3.62	0	3.62	0	GEORGE E LIGOCKY
339	Nueces	Uvalde	IRR	C3194_2	49	3.14	0	3.14	0	GEORGE E LIGOCKY
340	Nueces	Uvalde	IRR	C3066_1	10	30.91	0	30.91	0	GEORGE H MOFF
341	Nueces	Uvalde	IRR	P3988_1	28	3.73	0	3.73	0	GEORGE LIGOCKY
342	Nueces	Uvalde	IRR	C3166_1	35	36.08	0	36.08	0	JOE C KRANZ ET UX
343	Nueces	Uvalde	IRR	C3163_1	113	35.9	0	35.9	0	JOHN HAMMAN JR ESTATE
344	Nueces	Uvalde	IRR	C3163_2	133	3.3	0	3.3	0	JOHN HAMMAN JR ESTATE
345	Nueces	Uvalde	IRR	C3170_1	19	10.58	0	10.58	0	JOHN M & MARY ANN BARKLEY

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346	Nueces	Uvalde	IRR	C3169_1	40	35.51	0	35.51	0	JOHN S GRAVES JR ET AL
347	Nueces	Uvalde	IRR	C3168_1	4	36.01	0	36.01	0	JOHN THOMAS BUCHANAN
348	Nueces	Uvalde	IRR	C3168_2	37	35.54	0	35.54	0	JOHN THOMAS BUCHANAN
349	Nueces	Uvalde	IRR	C3069_1	134	44.54	0	44.54	0	JONATHAN H. WATFORD
350	Nueces	Uvalde	IRR	C3067_1	1,461	88.08	0	88.08	0	JOSEPH M MASSEY ET UX
351	Nueces	Uvalde	IRR	P4352_1	110	14.57	0	14.57	0	LOUIS A WATERS
352	Nueces	Uvalde	IRR	C3167_1	11	36.01	0	36.01	0	MACONDA BROWN O'CONNOR
353	Nueces	Uvalde	IRR	P4177_1	200	3.65	0	3.65	0	MARVIN G VERSTUYFT ET AL
354	Nueces	Uvalde	IRR	P4177_2	795	3.37	0	3.37	0	MARVIN G VERSTUYFT ET AL
355	Nueces	Uvalde	IRR	C3171_1	75	26.55	0	26.55	0	MICHAEL L STONER MARITAL DEDUCTION TRUST
356	Nueces	Uvalde	IRR	C3072_1	200	82.41	0	82.41	0	MIRASOL RANCH FAMILY LTD PARTNERSHIP
357	Nueces	Uvalde	IRR	C3197_1	523	83.66	0	83.66	0	NAJAC PROPERTIES LTD
358	Nueces	Uvalde	IRR	C3197_2	305	81.7	0	81.7	0	NAJAC PROPERTIES LTD
359	Nueces	Uvalde	IRR	C3182_1	40	19.98	0	19.98	0	PAUL G SILBER JR
360	Nueces	Uvalde	IRR	C3174_1	31	12.94	0	12.94	0	RIO GRANDE CHILDRENS HOME INC
361	Nueces	Uvalde	IRR	P5372_1	320	1.6	0	1.6	0	ROBERT LK LYNCH ET AL
362	Nueces	Uvalde	IRR	P5325_1	255	5.71	0	5.71	0	RONALD E LEE JR
363	Nueces	Uvalde	IRR	C3068_1	310	86.38	0	86.38	0	RREP LTD
364	Nueces	Uvalde	IRR	P4305_1	1,140	3.76	0	3.76	0	TED ALLEN SANDERLIN ET AL
365	Nueces	Uvalde	IRR	C3172_1	1,000	3.87	0	3.87	0	THOMAS & GRETEL EKBAUM
366	Nueces	Uvalde	IRR	P3991_1	250	82.27	0	82.27	0	TURNER - PASCHE RANCH LLC
367	Nueces	Uvalde	IRR	C3165_1	86	35.89	0	35.89	0	WALLACE S & ISABEL B WILSON
368	Nueces	Uvalde	MUN	P5497_1	35	1.91	0	1.91	0	CONCAN WATER SUPPLY CORPORATION
369	Nueces	Uvalde	MUN	P4505_1	200	13.71	0	13.71	0	UTOPIA WATER SUPPLY CORP
370	Nueces	Zavala	IRR	C3076_1	200	16.92	0	16.92	0	BAKER CATTLE CO
371	Nueces	Zavala	IRR	C3092_1	684	44.02	0	44.02	0	BAYOU ROUGE LAND & CATTLE
372	Nueces	Zavala	IRR	C3088_1	150	78.92	0	78.92	0	CHAPARROSA RANCHES LTD
373	Nueces	Zavala	IRR	C3198_1	150	7.16	0	7.16	0	DENVER C CARNES

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374	Nueces	Zavala	IRR	C3074_1	200	16.92	0	16.92	0	DONALD R LINDENBORN JR TRUSTEE
375	Nueces	Zavala	IRR	C3080_1	75	9.09	0	9.09	0	F F BONNETT ET UX
376	Nueces	Zavala	IRR	C3091_3	400	62.96	0	62.96	0	FRANK W HARBORTH
377	Nueces	Zavala	IRR	C3078_1	200	16.77	0	16.77	0	JACK E RUTLEDGE ET UX
378	Nueces	Zavala	IRR	C3079_1	313	16.77	0	16.77	0	JACK RUTLEDGE
379	Nueces	Zavala	IRR	C3089_1	206	77.14	0	77.14	0	JAMES R PERLITZ ET AL
380	Nueces	Zavala	IRR	C3090_1	45	43.5	0	43.5	0	JIM G FERGUSON JR
381	Nueces	Zavala	IRR	C3090_2	65	28.77	0	28.77	0	JIM G FERGUSON JR
382	Nueces	Zavala	IRR	C3077_1	200	16.82	0	16.82	0	K & M FARMS
383	Nueces	Zavala	IRR	C3091_1	800	64.93	0	64.93	0	L C ROBBINS, JR
384	Nueces	Zavala	IRR	C3083_1	230	39.12	0	39.12	0	MARIO A ESCOBAR ET UX
385	Nueces	Zavala	IRR	C3091_2	400	63.83	0	63.83	0	NORMAN SCHUETZ
386	Nueces	Zavala	IRR	C3084_1	80	38.86	0	38.86	0	OPAL E C MARBURGER
387	Nueces	Zavala	IRR	C3085_1	320	27.03	0	27.03	0	OWARD L BOX
388	Nueces	Zavala	IRR	C3091_4	498	62.17	0	62.17	0	RICHARD DALE & SHARON HORNSBY LeDOUX
389	Nueces	Zavala	IRR	C3081_1	390	38.36	0	38.36	0	THOREEN LIMITED PARTNERSHIP
390	Nueces	Zavala	IRR	C3075_1	124	16.92	0	16.92	0	WALTER D MOORE
391	Nueces	Zavala	IRR	C3082_1	8,000	61.61	0	61.61	0	ZAVALA - DIMMIT CO WID 1
392	Nueces	Zavala	IRR	C3082_8	19,996	77.28	0	77.28	0	ZAVALA - DIMMIT CO WID 1
393	Nueces	Zavala	IRR	C3082_9	4	60.61	0	60.61	0	ZAVALA - DIMMIT CO WID 1
394	San Antonio	Bandera	IRR	C2135_1	5	96.84	0	96.84	0	KITTIE NELSON FERGUSON
395	San Antonio	Bexar	IND	C2161_1	12,000	95.40	0	95.39	0	CITY OF SAN ANTONIO
396	San Antonio	Bexar	IND	C2162_2	60,000	73.76	0	73.76	0	CITY OF SAN ANTONIO
397	San Antonio	Bexar	IND	C2162_3	36,900	93.59	0	93.49	0	CITY OF SAN ANTONIO
398	San Antonio	Bexar	IND	C2162_5	11	92.46	0	92.34	0	CITY OF SAN ANTONIO
399	San Antonio	Bexar	IND	P5337_1	25	22.02	0	22.02	0	H B ZACHRY CO
400	San Antonio	Bexar	IND	P5469_2	1,500	52.46	0	52.46	0	HAUSMAN ROAD W SC
401	San Antonio	Bexar	IRR	C2150_1	62	97.55	0	97.55	0	ANGELINA BORDANO

No.	Basin	County	Use	Water Right ID No.	Authorized Diversion (acft /yr)	2030 Volume Reliability (%)	2030 Minimum Annual Supply (acft)	2080 Volume Reliability (%)	2080 Minimum Annual Supply (acft)	Owner
402	San Antonio	Bexar	IRR	P4134_1	200	39.96	0	39.96	0	ANITA T WALSH ESTATE
403	San Antonio	Bexar	IRR	P5262_1	250	30.85	0	30.85	0	ANTHONY J GRANIERI
404	San Antonio	Bexar	IRR	C2142_1	197	89.94	0	89.94	0	ANTONIO MARIO FERNANDEZ
405	San Antonio	Bexar	IRR	C2154_2	200	50.01	0	50.01	0	ARNOLD ALBERT
406	San Antonio	Bexar	IRR	C2160_1	116	92.98	0	92.98	0	BEN B MORRIS ESTATE
407	San Antonio	Bexar	IRR	P4135_1	200	40.17	0	40.17	0	BESSIE WALSH
408	San Antonio	Bexar	IRR	P4139_1	200	40.14	0	40.14	0	BESSIE WALSH
409	San Antonio	Bexar	IRR	C2142_2	3	87.84	0	87.84	0	BEXAR , COUNTY OF
410	San Antonio	Bexar	IRR	P5596_1	770	25.28	0	25.28	0	BILLY T MITCHELL
411	San Antonio	Bexar	IRR	C2141_1	75	82.17	0	82.17	0	BIPPERT FARMS
412	San Antonio	Bexar	IRR	C2146_1	215	92.87	0	92.87	0	BURRELL DAY
413	San Antonio	Bexar	IRR	P4497_1	20	65.69	0	65.69	0	CARL RAY DRZYMALLA ET AL
414	San Antonio	Bexar	IRR	C2152_1	409	81.17	0	81.17	0	CAROLYN VANCE COOK
415	San Antonio	Bexar	IRR	C1146_1	26	98.75	0	98.75	0	CIBOLO CREEK MUNICIPAL AUTH
416	San Antonio	Bexar	IRR	P4105_1	150	88.43	0	88.43	0	CITY OF LIVE OAK
417	San Antonio	Bexar	IRR	C2156_1	294	99.04	0	99.04	0	CITY OF SAN ANTONIO
418	San Antonio	Bexar	IRR	C2159_1	60	97.44	0	97.44	0	CITY OF SAN ANTONIO
419	San Antonio	Bexar	IRR	P4187_3	179	5.15	0	5.15	0	CURTIS HARRY MAHLA REVOCABLE TRUST
420	San Antonio	Bexar	IRR	C2148_1	8	92.27	0	92.27	0	DONALD G RAMBIE
421	San Antonio	Bexar	IRR	C1146_2	62	98.22	0	98.22	0	DOUG WISE
422	San Antonio	Bexar	IRR	C1942_1	886	90.85	0	90.85	0	ESPADA DITCH COMPANY
423	San Antonio	Bexar	IRR	P4141_1	20	39.89	0	39.89	0	GULF LAND & INVESTMENT CO INC
424	San Antonio	Bexar	IRR	P4141_2	23	39.89	0	39.89	0	H H GIRDLEY TRUSTEE
425	San Antonio	Bexar	IRR	C1170_1	17	99.82	4	99.82	4	JAMES N EVANS SR ET AL
426	San Antonio	Bexar	IRR	C2145_1	32	89.90	0	89.90	0	JERRY & MARIAM SPEARS
427	San Antonio	Bexar	IRR	C2158_1	24	97.75	0	97.75	0	JOE S GARCIA JR ET UX
428	San Antonio	Bexar	IRR	C1146_3	5	96.40	0	96.40	0	JOHN E NEWTON ET AL
429	San Antonio	Bexar	IRR	P4138_1	126	40.17	0	40.17	0	JOHN H SMALL
430	San Antonio	Bexar	IRR	C1146_4	8	95.45	0	95.45	0	JOHN K KOHLHAAS

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431	San Antonio	Bexar	IRR	C1960_1	20	39.24	0	39.24	0	JOHN O SPICE
432	San Antonio	Bexar	IRR	P4141_3	179	39.89	0	39.89	0	JOHN POWELL WALKER TRUSTEE
433	San Antonio	Bexar	IRR	C2147_1	28	94.12	0	94.12	0	JOSE LUIS AMADOR
434	San Antonio	Bexar	IRR	P4499_1	54	45.10	0	45.10	0	JOSEPH M STANUSH ET AL
435	San Antonio	Bexar	IRR	C1962_1	10	45.00	0	45.00	0	JULIA H. KUSENER JACQUET ET AL
436	San Antonio	Bexar	IRR	C2155_1	240	99.75	0	99.75	0	LES MENDELSOHN
437	San Antonio	Bexar	IRR	C1965_1	300	44.54	0	44.54	0	LOMAS SANTA FE LTD
438	San Antonio	Bexar	IRR	P4187_1	333	40.14	0	40.14	0	LOTTIE WALSH MAHLA ESTATE
439	San Antonio	Bexar	IRR	P4187_2	333	46.31	0	46.31	0	LOTTIE WALSH MAHLA ESTATE
440	San Antonio	Bexar	IRR	C2157_1	50	97.75	0	97.75	0	LOUIS PAWELEK
441	San Antonio	Bexar	IRR	P4294_1	40	91.36	0	91.36	0	MARY HARPER TUDHOPE
442	San Antonio	Bexar	IRR	P5265_1	35	42.19	0	42.19	0	MARY JAKSIK ZIGMOND
443	San Antonio	Bexar	IRR	C1933_1	480	75.79	0	75.79	0	MISSION CEMETERY CO
444	San Antonio	Bexar	IRR	P5503_1	220	50.27	0	50.27	0	O-SPORTS GOLF DEVELOPMENT II
445	San Antonio	Bexar	IRR	P4141_4	77	39.89	0	39.89	0	PEOPLES SAVINGS & LOAN ASSN
446	San Antonio	Bexar	IRR	P5266_1	45	29.72	0	29.72	0	RANDALL K HOOVER ET UX
447	San Antonio	Bexar	IRR	C2149_1	32	98.57	0	98.57	0	RANDALL S PREISSIG TRUSTEE
448	San Antonio	Bexar	IRR	P5577_1	420	53.12	0	53.12	0	ROBERT LG WATSON
449	San Antonio	Bexar	IRR	C1944_1	16	35.92	0	35.92	0	SAN ANTONIO MISSIONS NATL PARK
450	San Antonio	Bexar	IRR	P3476_1	100	74.99	0	74.99	0	SAN ANTONIO RANCH LTD
451	San Antonio	Bexar	IRR	C1931_4	450	79.40	0	79.40	0	SAN ANTONIO RIVER AUTHORITY
452	San Antonio	Bexar	IRR	P4497_2	186	72.50	0	72.50	0	SAN ANTONIO RIVER AUTHORITY
453	San Antonio	Bexar	IRR	P4138_2	23	40.17	0	40.17	0	SAN ANTONIO WATER SYSTEM
454	San Antonio	Bexar	IRR	C1931_1	990	88.24	0	88.24	0	SAN JUAN DITCH WSC
455	San Antonio	Bexar	IRR	P4136_1	124	40.17	0	40.17	0	SAWS
456	San Antonio	Bexar	IRR	P4137_1	34	41.24	0	41.24	0	SAWS
457	San Antonio	Bexar	IRR	C2151_1	1,500	53.58	0	53.58	0	SOUTH LOOP LAND & CATTLE LC
458	San Antonio	Bexar	IRR	P5289_1	300	21.44	0	21.44	0	SOUTHEAST INVESTMENTS INC
459	San Antonio	Bexar	IRR	P3852_1	50	93.55	0	93.55	0	THOMAS A KORZEKWA

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460	San Antonio	Bexar	IRR	P3852_2	25	55.59	0	55.59	0	THOMAS A KORZEKWA
461	San Antonio	Bexar	IRR	P4498_1	83	48.95	0	48.95	0	VIRGINIA JAKSIK
462	San Antonio	Bexar	IRR	P4496_1	30	62.30	0	62.30	0	WILLIAM WALLS JR
463	San Antonio	Bexar	MIN	P4025_1	431	46.07	0	46.07	0	CAPITOL AGGREGATES INC
464	San Antonio	Bexar	MIN	P4025_2	769	45.20	0	45.20	0	CAPITOL AGGREGATES INC
465	San Antonio	Bexar	MIN	P4025_3	3,304	27.22	0	27.22	0	CAPITOL AGGREGATES INC
466	San Antonio	Bexar	MUN	C1959_1	150	90.46	0	90.46	0	BEXAR METROPOLITAN WATER DIST
467	San Antonio	Bexar	MUN	C1966_1	481	94.11	0	94.11	0	BEXAR METROPOLITAN WATER DIST
468	San Antonio	Bexar	MUN	C2144_1	215	94.38	0	94.38	0	BEXAR METROPOLITAN WATER DIST
469	San Antonio	Bexar	MUN	C2144_2	93	93.80	0	93.80	0	BEXAR METROPOLITAN WATER DIST
470	San Antonio	Bexar	MUN	C2144_3	308	28.19	0	28.19	0	BEXAR METROPOLITAN WATER DIST
471	San Antonio	Bexar	MUN	C4768_1	89	99.06	0	99.06	0	BEXAR METROPOLITAN WATER DIST
472	San Antonio	Bexar	MUN	C4768_2	417	98.59	0	98.59	0	BEXAR METROPOLITAN WATER DIST
473	San Antonio	Bexar	MUN	C4768_3	4,494	27.14	0	27.14	0	BEXAR METROPOLITAN WATER DIST
474	San Antonio	Bexar	MUN	P5549_1	2,250	26.29	0	26.29	0	BEXAR METROPOLITAN WATER DIST
475	San Antonio	Bexar	MUN	P4136_2	276	39.48	0	39.48	0	BMWD
476	San Antonio	Bexar	MUN	P4137_2	566	39.17	0	39.17	0	BMWD
477	San Antonio	Bexar	MUN	P4138_3	152	39.24	0	39.24	0	BMWD
478	San Antonio	Bexar	MUN	C2162_4	100	92.37	0	92.17	0	CITY OF SAN ANTONIO
479	San Antonio	Bexar	MUN	P5517_1	7,500	39.18	0	39.18	0	LEON CREEK WSC
480	San Antonio	Bexar	MUN	P5211_1	100	38.10	0	38.10	0	LONE STAR GROWERS CO
481	San Antonio	Bexar	MUN	P5211_2	2,900	25.67	0	25.67	0	LONE STAR GROWERS CO
482	San Antonio	Bexar	MUN	C2140_1	963	78.52	0	78.52	0	METROPOLITAN RESOURCES INC
483	San Antonio	Bexar	REC	C2019_1	241	96.82	0	96.82	0	THE BLUE WING CLUB
484	San Antonio	Bexar	REC	C2019_2	509	96.56	0	96.56	0	THE BLUE WING CLUB
485	San Antonio	Bexar	REC	C2019_3	250	96.43	0	96.43	0	THE BLUE WING CLUB
486	San Antonio	Caldwell	IRR	P3897_1	716	35.12	0	35.12	0	ALFRED J NEWMAN , ET UX
487	San Antonio	De Witt	IRR	P3851_1	50	93.77	0	93.77	0	SAM M. KORZEKWA
488	San Antonio	Goliad	IRR	P5220_1	90	92.25	0	92.25	0	CLARENCE F SCHENDEL ET UX

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489	San Antonio	Goliad	IRR	C2196_1	336	99.04	0	99.04	0	COLETO CATTLE COMPANY
490	San Antonio	Goliad	IRR	P5313_1	100	97.09	0	97.09	0	EDWIN JACOBSON ET AL
491	San Antonio	Goliad	IRR	C2193_1	284	90.66	0	90.66	0	JAMES M PETTUS ET AL
492	San Antonio	Goliad	IRR	C2197_1	86	92.80	0	92.80	0	JAMES M PETTUS II
493	San Antonio	Goliad	IRR	C2195_1	410	97.42	0	97.42	0	JOE F FRENCH
494	San Antonio	Goliad	IRR	P5079_1	114	92.25	0	92.25	0	JOHN C & SHERRY BROOKE
495	San Antonio	Goliad	IRR	C2194_1	1,020	99.25	0	99.25	0	JULIA GANTT NEWTON ET AL
496	San Antonio	Goliad	IRR	P5478_1	300	60.02	0	60.02	0	PATRICIA PITTMAN LIGHT
497	San Antonio	Goliad	IRR	C2199_1	325	99.04	0	99.04	0	SAM HOUSTON CLINTON ET AL
498	San Antonio	Goliad	IRR	C2198_2	333	99.04	0	99.04	0	SAN ANTONIO RIVER AUTHORITY
499	San Antonio	Guadalupe	IRR	P3837_1	21	46.64	0	46.64	0	LAWRENCE R HALLIBURTON ET UX
500	San Antonio	Guadalupe	IRR	P3837_2	29	46.64	0	46.64	0	WH HALLIBURTON , ESTATE OF
501	San Antonio	Hays	IRR	P3888_1	290	47.13	0	47.13	0	ALAN D BARIBEAU ET UX
502	San Antonio	Hays	IRR	P3887_1	50	46.64	0	46.64	0	PATTILLO FAMILY FARMS INC
503	San Antonio	Karnes	IRR	P5062_1	100	92.87	0	92.87	0	ALFRED J RAHE
504	San Antonio	Karnes	IRR	C2188_1	40	93.59	0	93.59	0	ALFRED MOCZYGEMBA
505	San Antonio	Karnes	IRR	P4538_1	150	92.87	0	92.87	0	ALICE P JENDRUSCH ET AL
506	San Antonio	Karnes	IRR	C1168_1	30	98.90	0	98.90	0	ALOYS PAWELEK
507	San Antonio	Karnes	IRR	P3431_1	60	93.05	0	93.05	0	ANDREW RIVES ET UX
508	San Antonio	Karnes	IRR	P5368_1	300	59.40	0	59.36	0	ARTHUR RAY YANTA ET UX
509	San Antonio	Karnes	IRR	C2184_1	120	52.80	0	52.80	0	BONNIE SKLOSS
510	San Antonio	Karnes	IRR	C2184_2	80	46.64	0	46.64	0	BONNIE SKLOSS
511	San Antonio	Karnes	IRR	P4002_1	80	73.67	0	73.67	0	CASPER F MOCZYGEMBA JR ET AL
512	San Antonio	Karnes	IRR	P5044_1	150	92.92	0	92.92	0	CHARLES WAYNE HUBBARD ET AL
513	San Antonio	Karnes	IRR	C2189_1	350	97.82	0	97.82	0	CLEM R CANNON ET AL
514	San Antonio	Karnes	IRR	P4490_1	90	46.64	0	46.64	0	DANIEL RANDERSON ET AL
515	San Antonio	Karnes	IRR	P5455_1	3	59.49	0	59.49	0	DAVID C. " CHARLIE " ZUNKER
516	San Antonio	Karnes	IRR	P5296_1	74	93.56	0	93.56	0	DENNIS J MOY
517	San Antonio	Karnes	IRR	P5532_1	2	55.67	0	55.67	0	FELIX BRONDER

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518	San Antonio	Karnes	IRR	P3767_1	20	93.55	0	93.55	0	FELIX MOCZYGEMBA
519	San Antonio	Karnes	IRR	P3808_1	232	46.64	0	46.64	0	FLAVIAN B MOCZYGEMBA
520	San Antonio	Karnes	IRR	C2190_1	100	100.00	100	100.00	100	FLORENCE S BAUMANN ET AL
521	San Antonio	Karnes	IRR	C2185_1	90	93.43	0	93.43	0	FRANCIS MOY & MARY MOY KOWALIK
522	San Antonio	Karnes	IRR	C1167_1	5	99.26	0	99.26	0	FRANK B KRAWIETZ
523	San Antonio	Karnes	IRR	C2192_1	140	99.04	0	99.04	0	HALLIS DAVENPORT REVC MAN TR
524	San Antonio	Karnes	IRR	P5333_1	90	59.28	0	59.28	0	HECTOR O HERRERA , ET UX
525	San Antonio	Karnes	IRR	P5333_2	300	59.40	0	59.37	0	HECTOR O HERRERA , ET UX
526	San Antonio	Karnes	IRR	P4503_1	55	46.64	0	46.64	0	HENRY D STRINGER JR
527	San Antonio	Karnes	IRR	P5306_1	200	92.51	0	92.51	0	HERBERT JOHN EWALD JR ET AL
528	San Antonio	Karnes	IRR	P5239_1	4	92.66	0	92.66	0	HOLY TRINITY CATHOLIC CHURCH
529	San Antonio	Karnes	IRR	P4536_1	100	92.90	0	92.90	0	JAMES M & NANCY W BAILEY
530	San Antonio	Karnes	IRR	P4536_2	200	92.66	0	92.66	0	JAMES M & NANCY W BAILEY
531	San Antonio	Karnes	IRR	P5622_1	240	53.36	0	53.36	0	JAY E. BAKER ET AL SAN ANT
532	San Antonio	Karnes	IRR	P5043_1	150	92.84	0	92.84	0	MELANIE A JACOBS ET AL
533	San Antonio	Karnes	IRR	P5635_1	55	65.24	0	65.24	0	MICHAEL PAWELEK
534	San Antonio	Karnes	IRR	P4512_1	160	93.59	0	93.59	0	OLIVE L RIDLEY ET AL
535	San Antonio	Karnes	IRR	P3517_2	80	78.74	0	78.74	0	RIDLEY FAMILY RANCHES
536	San Antonio	Karnes	IRR	P4175_1	160	78.81	0	78.81	0	RIDLEY FAMILY RANCHES
537	San Antonio	Karnes	IRR	P4561_1	525	92.64	0	92.64	0	RIO GRANDE RESOURCES CORP
538	San Antonio	Karnes	IRR	P5367_1	300	59.40	0	59.37	0	SUSIE LEE YANTA
539	San Antonio	Karnes	IRR	P4407_1	50	92.87	0	92.87	0	TOMMY NAJVAR ET UX
540	San Antonio	Karnes	IRR	C2186_1	70	93.71	0	93.71	0	VINCENT LABUS JR
541	San Antonio	Karnes	IRR	P5323_1	100	59.28	0	59.28	0	WILLIAM I DUBEL
542	San Antonio	Karnes	IRR	P5002_1	150	92.87	0	92.87	0	WM A JEFFERS JR & ANN JACKSON
543	San Antonio	Kendall	IRR	C1142_1	4	94.23	0	94.23	0	JEB B MAEBIUS JR ET UX
544	San Antonio	Kendall	IRR	C1144_1	48	97.17	0	97.17	0	WILLIS JAY HARPOLE
545	San Antonio	Kendall	IRR	C1144_2	7	97.02	0	97.02	0	WILLIS JAY HARPOLE
546	San Antonio	Kendall	MUN	C1143_1	523	99.14	0	99.14	0	CITY OF BOERNE

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547	San Antonio	Kendall	MUN	C1143_2	310	99.03	0	99.03	0	CITY OF BOERNE
548	San Antonio	Kerr	IRR	P4181_1	86	46.64	0	46.64	0	BERTRAND O BAETZ ESTATE ET AL
549	San Antonio	Kerr	IRR	P4181_2	120	46.43	0	46.43	0	BERTRAND O BAETZ ESTATE ET AL
550	San Antonio	Medina	IRR	C2139_1	112	90.16	0	90.16	0	AL GILLIAM
551	San Antonio	Medina	IRR	SANTE_2	156	38.60	0	38.60	0	ALVIN C SANTLEBEN
552	San Antonio	Medina	IRR	C2130_4	45,856	89.44	0	89.44	0	BEXAR - MEDINA - ATASCOSA COS WCID
553	San Antonio	Medina	IRR	C2134_1	17	92.93	0	92.93	0	GLENNIS W STEIN
554	San Antonio	Medina	IRR	P4149_1	20	38.60	0	38.60	0	GLENNIS W STEIN
555	San Antonio	Medina	IRR	C2133_1	18	89.07	0	89.07	0	HARLEY & DOROTHY TSCHIRHART
556	San Antonio	Medina	IRR	P4159_1	50	38.60	0	38.60	0	J C GRIFFITH
557	San Antonio	Medina	IRR	P4151_1	170	38.60	0	38.60	0	JAMES A OPPELT ET UX
558	San Antonio	Medina	IRR	P4140_1	185	38.60	0	38.60	0	KATHLEEN DAVENPORT CARSKADDEN
559	San Antonio	Medina	IRR	C2136_1	6	90.07	0	90.07	0	KITTIE NELSON FERGUSON
560	San Antonio	Medina	MUN	C2130_1	750	98.38	0	98.38	0	BEXAR - MEDINA - ATASCOSA COS WCID
561	San Antonio	Medina	MUN	C2130_2	170	97.96	0	97.96	0	BEXAR - MEDINA - ATASCOSA COS WCID
562	San Antonio	Medina	MUN	C2130_6	19,974	92.36	0	92.36	0	BEXAR - MEDINA - ATASCOSA COS WCID
563	San Antonio	Medina	RCG	P3220_1	29,652	7.29	0	7.29	0	EDWARDS UNDERGROUND WD
564	San Antonio	Victoria	IRR	P3861_1	200	46.64	0	46.64	0	GEO D POOL & RONALD R STINSON
565	San Antonio	Victoria	IRR	P4117_1	950	92.54	0	92.54	0	JUNE PETTUS
566	San Antonio	Wilson	IRR	C2179_1	47	100.00	47	100.00	47	A D D CORPORATION
567	San Antonio	Wilson	IRR	C2179_2	72	100.00	72	100.00	72	A D D CORPORATION
568	San Antonio	Wilson	IRR	C2179_3	39	100.00	39	100.00	39	A D D CORPORATION
569	San Antonio	Wilson	IRR	C2179_4	467	46.49	0	46.49	0	A D D CORPORATION
570	San Antonio	Wilson	IRR	C1148_1	11	98.75	0	98.75	0	ALLAN G LYNHAM ET UX
571	San Antonio	Wilson	IRR	P5587_1	300	28.99	0	28.99	0	ALOIS D KOLLODZIEJ ET UX
572	San Antonio	Wilson	IRR	C1162_1	2	93.05	0	93.05	0	ALVIN PRUSKI
573	San Antonio	Wilson	IRR	C1162_2	78	73.17	0	73.17	0	ALVIN PRUSKI
574	San Antonio	Wilson	IRR	P4121_1	38	46.64	0	46.64	0	BENITO D. CABRIALES ET UX
575	San Antonio	Wilson	IRR	C2183_2	100	100.00	100	100.00	100	BENJAMIN C PAWELEK

No.	Basin	County	Use	Water Right ID No.	Authorized Diversion (acft /yr)	2030 Volume Reliability (%)	2030 Minimum Annual Supply (acft)	2080 Volume Reliability (%)	2080 Minimum Annual Supply (acft)	Owner
576	San Antonio	Wilson	IRR	C1152_1	35	93.85	0	93.85	0	BILL & MELVIN DEAGEN ET AL
577	San Antonio	Wilson	IRR	P3994_1	1,056	46.22	0	46.22	0	BOENING ENTERPRISES
578	San Antonio	Wilson	IRR	C1151_1	86	99.11	0	99.11	0	CANYON REGIONAL WATER AUTHORITY
579	San Antonio	Wilson	IRR	C2173_1	78	97.82	0	97.82	0	CECIL MARK RICHARDSON ET AL
580	San Antonio	Wilson	IRR	C2163_1	44	99.94	33	99.94	33	CHARLES HONEYCUTT , ET AL
581	San Antonio	Wilson	IRR	C2163_2	256	46.43	0	46.43	0	CHARLES HONEYCUTT , ET AL
582	San Antonio	Wilson	IRR	C2172_1	18	99.49	0	99.49	0	CLYDE R MAHA ET AL
583	San Antonio	Wilson	IRR	C1163_1	80	100.00	80	100.00	80	CYNTHIA A TITZMAN ET VIR
584	San Antonio	Wilson	IRR	C1160_1	140	77.11	0	77.11	0	DDR ROCK RANCH PARTNERS
585	San Antonio	Wilson	IRR	C1159_1	0	93.4	0	93.4	0	DEBORAH M IRWIN ET VIR
586	San Antonio	Wilson	IRR	P4484_1	5	46.64	0	46.64	0	DELBERT J KELLER
587	San Antonio	Wilson	IRR	P4484_2	200	92.95	0	92.95	0	DELBERT J KELLER
588	San Antonio	Wilson	IRR	P4484_3	100	92.84	0	92.84	0	DELBERT J KELLER
589	San Antonio	Wilson	IRR	C2180_1	18	100.00	18	100.00	18	DONALD A OCKER ET AL
590	San Antonio	Wilson	IRR	C2180_2	110	100.00	110	100.00	110	DONALD A OCKER ET AL
591	San Antonio	Wilson	IRR	C2180_3	497	46.46	0	46.46	0	DONALD A OCKER ET AL
592	San Antonio	Wilson	IRR	C2165_1	50	93.45	0	93.45	0	ED WISEMAN MARITAL TRUST
593	San Antonio	Wilson	IRR	C2165_2	70	38.51	0	38.51	0	ED WISEMAN MARITAL TRUST
594	San Antonio	Wilson	IRR	P5611_1	175	48.18	0	48.18	0	ELIAS DUGI , ET UX CIBO
595	San Antonio	Wilson	IRR	C1165_1	4	99.26	0	99.26	0	EMERYK KELLER
596	San Antonio	Wilson	IRR	C2178_1	63	100.00	63	100.00	63	FELIX J JANEK JR ET UX
597	San Antonio	Wilson	IRR	C2178_2	180	100.00	180	100.00	180	FELIX J JANEK JR ET UX
598	San Antonio	Wilson	IRR	C2178_3	500	92.25	0	92.25	0	FELIX J JANEK JR ET UX
599	San Antonio	Wilson	IRR	C2177_1	81	100.00	81	100.00	81	FRANK & JA LABUS
600	San Antonio	Wilson	IRR	P5243_1	54	46.43	0	46.43	0	FRANK R BOLF
601	San Antonio	Wilson	IRR	C2181_1	64	100.00	64	100.00	64	FRED J LYSSY ET AL
602	San Antonio	Wilson	IRR	C2181_2	157	46.64	0	46.64	0	FRED J LYSSY ET AL
603	San Antonio	Wilson	IRR	C2181_3	159	46.64	0	46.64	0	FRED J LYSSY ET AL
604	San Antonio	Wilson	IRR	P5499_1	50	37.51	0	37.51	0	GARY ZOOK , ET UX

No.	Basin	County	Use	Water Right ID No.	Authorized Diversion (acft /yr)	2030 Volume Reliability (%)	2030 Minimum Annual Supply (acft)	2080 Volume Reliability (%)	2080 Minimum Annual Supply (acft)	Owner
605	San Antonio	Wilson	IRR	C1159_2	13	93.40	0	93.40	0	GAYLON T CLICK ET UX
606	San Antonio	Wilson	IRR	C1159_3	16	93.40	0	93.40	0	GAYLONT CLICK ET UX
607	San Antonio	Wilson	IRR	P5202_1	75	46.64	0	46.64	0	GEORGE R GAWLIK ET UX
608	San Antonio	Wilson	IRR	C1166_1	25	93.40	0	93.40	0	GERVAS JASKINIA ESTATE
609	San Antonio	Wilson	IRR	C2168_1	16	95.45	0	95.45	0	H W FINCK
610	San Antonio	Wilson	IRR	P5307_1	300	39.12	0	39.12	0	JAMES R LEININGER
611	San Antonio	Wilson	IRR	P5182_1	100	69.90	0	69.90	0	JAMES T WATSON
612	San Antonio	Wilson	IRR	C1164_1	6	93.40	0	93.40	0	JANE LYSSY OPIELA ET AL
613	San Antonio	Wilson	IRR	C2169_1	29	100.00	29	100.00	29	JIMMY E HOLT ET UX
614	San Antonio	Wilson	IRR	P5194_1	210	46.64	0	46.64	0	JOE R HOLLAWAY JR ET AL
615	San Antonio	Wilson	IRR	C1161_1	15	93.40	0	93.40	0	JOHN DRZYMALA
616	San Antonio	Wilson	IRR	C2164_1	23	100.00	23	100.00	23	JOHN WILLIAM HELTON JR ET UX
617	San Antonio	Wilson	IRR	C2164_2	59	39.22	0	39.22	0	JOHN WILLIAM HELTON JR ET UX
618	San Antonio	Wilson	IRR	P5224_1	60	67.40	0	67.40	0	JOHNNY KOSUB & BETTY KOSUB
619	San Antonio	Wilson	IRR	C1154_1	69	98.75	0	98.75	0	JONAH H WILSON
620	San Antonio	Wilson	IRR	C2182_3	700	93.26	0	93.26	0	LEO V LYSSY ET AL
621	San Antonio	Wilson	IRR	C2182_4	166	39.21	0	39.21	0	LEO V LYSSY ET AL
622	San Antonio	Wilson	IRR	P5264_1	130	39.21	0	39.21	0	LILLIANS WISEMAN TRUST ET AL
623	San Antonio	Wilson	IRR	P5633_1	130	84.71	0	84.71	0	LOUIS T. AND SONIA ROSENBERG
624	San Antonio	Wilson	IRR	P5171_1	200	46.64	0	46.64	0	MESCALERO PROPERTIES
625	San Antonio	Wilson	IRR	C2166_1	105	94.45	0	94.45	0	NICK KOLENDA
626	San Antonio	Wilson	IRR	C2166_2	95	39.21	0	39.21	0	NICK KOLENDA
627	San Antonio	Wilson	IRR	C1150_1	200	98.75	0	98.75	0	PAT HIGGINS ESTATE
628	San Antonio	Wilson	IRR	C1159_4	7	93.40	0	93.40	0	PATRICK NEIDORF
629	San Antonio	Wilson	IRR	C2176_1	105	100.00	105	100.00	105	POTH LAND & CATTLE CO
630	San Antonio	Wilson	IRR	C2176_2	145	39.21	0	39.21	0	POTH LAND & CATTLE CO
631	San Antonio	Wilson	IRR	C2171_1	63	99.11	0.0	99.11	0.00	R C CARROLL
632	San Antonio	Wilson	IRR	P5559_1	99	50.26	0	50.26	0	RALPH MCGREW ET UX
633	San Antonio	Wilson	IRR	C1149_1	62	98.75	0	98.75	0	RAY SMITH ET UX

No.	Basin	County	Use	Water Right ID No.	Authorized Diversion (acft /yr)	2030 Volume Reliability (%)	2030 Minimum Annual Supply (acft)	2080 Volume Reliability (%)	2080 Minimum Annual Supply (acft)	Owner
634	San Antonio	Wilson	IRR	P5395_1	254	38.46	0	38.46	0	RENATO MARTINEZ ET UX
635	San Antonio	Wilson	IRR	P5395_2	450	37.42	0	37.42	0	RENATO MARTINEZ ET UX
636	San Antonio	Wilson	IRR	C2169_2	18	100.00	17.7	100.00	17.66	RICHARD E ULLMANN ET UX
637	San Antonio	Wilson	IRR	C1171_1	80	98.36	0	98.36	0	ROSS OWEN SCULL
638	San Antonio	Wilson	IRR	C1171_2	250	73.90	0	73.90	0	ROSS OWEN SCULL
639	San Antonio	Wilson	IRR	C1171_3	330	68.46	0	68.46	0	ROSS OWEN SCULL
640	San Antonio	Wilson	IRR	P5308_1	100	57.71	0	57.71	0	SAM JARZOMBEK
641	San Antonio	Wilson	IRR	P5320_1	200	38.50	0	38.50	0	SHELBY KOEHLER ET UX
642	San Antonio	Wilson	IRR	C2167_1	17	100.00	17	100.00	17	TOMAS CAVAZOS
643	San Antonio	Wilson	IRR	C1158_1	30	93.40	0	93.40	0	VIVA LEA MILLS
644	San Antonio	Wilson	IRR	C1153_1	100	93.05	0	93.05	0	WAYNE H STROUD ET AL
645	San Antonio	Wilson	IRR	C1156_1	35	98.75	0	98.75	0	WAYNE H STROUD ET AL
646	San Antonio	Wilson	IRR	C2175_2	60	37.50	0	37.50	0	WELMA L R KIRCHOFF ET AL
647	San Antonio	Wilson	IRR	C2175_1	38	99.49	0	99.49	0	WELMA LR KIRCHOFF ET AL
648	San Antonio	Wilson	IRR	P4495_1	50	46.64	0	46.64	0	WILLIAM & IRENE C WALLS JR
649	San Antonio	Wilson	IRR	P5126_1	150	46.64	0	46.64	0	WILLIAM M PAVLISKA
650	San Antonio	Wilson	IRR	P5218_1	360	73.18	0	73.18	0	WILLIAM P REDDICK ET UX
651	San Antonio	Wilson	IRR	C2174_1	14	100.00	14	100.00	14	WILLIE HOSEK ESTATE
652	San Antonio	Wilson	MUN	C1157_2	117	93.35	0	93.35	0	OSCAR SANDERS
653	San Antonio	Wilson	MUN	C1155_1	42	98.86	0	98.86	0	SIESTA CATTLE COMPANY
	Total	**All**	**All**	**All**	**6,500,997**		**86,465.04**		**86,465.04**	

INITIALLY PREPARED PLAN

CHAPTER 4: IDENTIFICATION OF WATER NEEDS

South Central Texas Regional Water Plan

B&V PROJECT NO. 411170

PREPARED FOR

South Central Texas Regional Water Planning Group

3 MARCH 2025

BLACK & VEATCH

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%	Percent
acft/yr	Acre-Foot per Year
DB27	2027 Regional and State Water Planning Database
GBRA	Guadalupe-Blanco River Authority
IH-35	Interstate Highway 35
MUD	Municipal Utility District
MWP	Major Water Provider
Region L	South Central Texas Region
SAWS	San Antonio Water System
SCTRWPA	South Central Texas Regional Water Planning Area
SCTRWPG	South Central Texas Regional Water Planning Group
SUD	Special Utility District
TPWD	Texas Parks and Wildlife Department
TWDB	Texas Water Development Board
WCID	Water Control and Improvement District
WMS	Water Management Strategy
WSC	Water Supply Corporation
WUG	Water User Group
WWP	Wholesale Water Provider

4.0 Identification of Water Needs

4.1 Introduction

This chapter describes the evaluation and results of the water needs (shortages) analysis and secondary needs analysis for water user groups (WUGs) and major water providers (MWPs). In Chapter 5, water management strategies (WMSs) are identified for identified needs within the South Central Texas (Region L) Regional Water Planning Area (SCTRWPA) for decades 2030 to 2080, as required by the regional water planning process.

In Chapter 2, drought-year water demands were identified for all WUGs. In Chapter 3, available drought-year existing water supplies were identified and allocated to WUGs, wholesale water providers (WWPs), and MWPs based on current usage, permits, and contracts. The water needs analysis includes comparison of existing supplies and demands to identify projected surpluses and shortages. Additionally, a secondary or second-tier needs analysis was performed to identify remaining needs after assuming all recommended conservation and direct reuse WMSs are fully implemented.

4.2 Identified Needs

The SCTRWPA consists of 20 full counties and part of Hays County. Table 4-1 summarizes identified water needs and second-tier water needs for the SCTRWPA. Needs are presented in acre-feet per year (acft/yr) [1]. Figure 4-1 provides the identified water needs for the SCTRWPA, shown as a portion of the total regional water demands.

Table 4-1 Total Identified Water Needs and Second-Tier Water Needs for the South Central Texas Region (acft/yr)

Need Type	2030	2040	2050	2060	2070	2080
Identified Needs Total, Region L	185,132	220,629	269,774	350,049	437,358	513,578
Second-Tier Needs Total, Region L	175,863	190,610	206,563	242,055	291,449	318,286

The SCTRWPA has a projected annual water need of 185,132 acft/yr in 2030, increasing to 513,578 acft/yr in 2080. After applying all recommended conservation and direct reuse WMSs, the secondary water needs are 175,863 acft/yr in 2030 and 318,286 acft/yr in 2080. All counties within the SCTRWPA, except DeWitt and Refugio Counties, have identified needs in at least one decade during the 50-year planning horizon.

Projections of identified needs in the SCTRWPA follow similar trends to the water demand projections identified in Chapter 2. In general, identified water needs increase over the planning horizon, with most of the increases attributed to municipal uses and, to a lesser extent, manufacturing uses. Needs for irrigation, livestock, and steam-electric are expected to remain relatively constant over the planning horizon. Mining needs are expected to gradually increase through 2070 because of population increases before decreasing sharply due to expected declines in hydraulic fracturing. Between 2030 and 2080,

[1] One acft is approximately 325,851 gallons.

areas along the Interstate Highway 35 (IH-35) corridor will experience the greatest growth in municipal needs, including Kendall, Hays, Caldwell, Comal, and Guadalupe Counties.

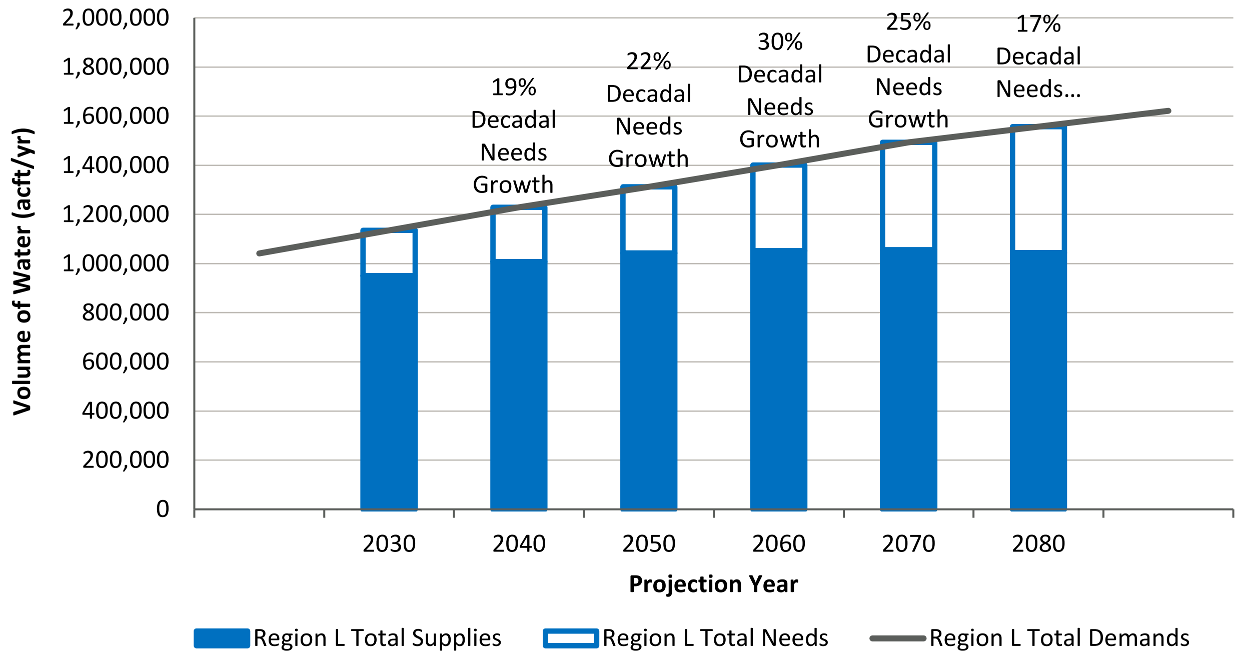

Figure 4-1 Total Identified Water Needs, Shown as a Portion of Total Demands

The Texas Water Development Board (TWDB) distinguishes a WUG's or WWP's supplies, demands, and needs by region, county, and basin. For the purposes of this chapter and needs analysis, any WUG's surplus on the basis of county or basin split was considered as a zero-value. This means that a split-WUG may have a need shown in this chapter but in practice, the WUG may have a surplus in another basin or county that offsets those needs. In other cases, needs may be better supplied near the location of the demand, requiring separate strategies in each basin or county unit. If supply and demand centers are not fully connected across a WUG's or WWP's service area, new interconnections may allow these entities to meet future needs as one system.

The following sections present identified water needs for each planning decade by WUGs, counties, use types, and MWPs.

4.2.1 Water User Groups

Identified needs for each WUG within the SCTRWPA are summarized in Table 4-2. They are also provided in reports from the 2027 Regional and State Water Planning Database (DB27), which are available at https://www3.twdb.texas.gov/apps/SARA/reports/list. Relevant DB27 reports are included in Appendix 4A.

Of the 227 WUGs evaluated in the needs analysis, 96 WUGs have needs in at least one decade during the planning horizon. Of those WUGs with needs, the average need increases from 2,848 acft/yr in 2030 to 5,903 acft/yr in 2080. In 2030, the top five WUGs with the greatest needs include four non-municipal WUGs (Victoria County Manufacturing, Medina County Irrigation, Uvalde County Irrigation, and Zavala County Irrigation) and one municipal WUG (Fort Sam Houston). By 2080, however, the top five WUGs with the greatest needs include three municipal WUGs (New Braunfels, San Antonio Water System [SAWS], and Hays County-Other) and two non-municipal WUGs (Victoria County Manufacturing and Medina County Irrigation).

For WWPs that are also WUGs, needs are shown according to the supplies or portions of supplies that are identified to meet their WUG needs. WWP supplies to other WUGs are included as a supply for that WUG. WWPs without WUG demands do not have identified needs and are not shown in the needs analysis. Several WUGs are split between Region L and other regional water planning areas; needs estimates in this chapter and in DB27 reports are representative of only the portions of WUGs that are located within the SCTRWPA.

Table 4-2 Identified Water Needs for Individual Water User Groups (acft/yr)

No.	Water User Group	2030	2040	2050	2060	2070	2080
1	3009 Water	0	0	0	0	0	0
2	Air Force Village II Inc	0	0	0	0	0	0
3	Alamo Heights	488	483	483	483	483	483
4	Aqua WSC	18	26	33	43	54	67
5	Asherton	0	0	0	0	0	0
6	Atascosa Rural WSC	1,201	1,464	1,706	1,917	2,159	2,436
7	Batesville WSC	0	0	0	0	0	0
8	Benton City WSC	0	27	252	386	539	716
9	Bexar County WCID 10	377	541	691	825	978	1,154
10	Big Wells	0	0	0	0	0	0
11	Boerne	0	760	3,365	6,388	9,850	13,812
12	C Willow Water	0	9	22	33	46	61
13	Canyon Lake Water Service	0	97	2,785	4,528	11,050	18,245
14	Carrizo Hill WSC	0	0	0	12	44	67
15	Carrizo Springs	0	0	0	0	0	0
16	Castroville	533	634	786	999	1,194	1,322
17	Charlotte	0	0	0	0	0	0
18	Cibolo	0	0	93	738	1,476	2,321
19	Clear Water Estates Water System	100	528	1,098	1,822	2,649	3,596
20	Concan WSC	0	0	0	0	0	0
21	Converse	552	538	538	538	538	538
22	Cotulla	0	0	0	0	0	0
23	County Line SUD	0	2,496	6,273	9,169	10,859	11,808
24	County-Other, Atascosa	0	0	0	0	0	0
25	County-Other, Bexar	0	0	0	0	0	0
26	County-Other, Caldwell	0	0	0	0	0	0

No.	Water User Group	2030	2040	2050	2060	2070	2080
27	County-Other, Calhoun	0	0	0	0	0	0
28	County-Other, Comal	79	175	1,492	8,120	12,171	17,204
29	County-Other, DeWitt	0	0	0	0	0	0
30	County-Other, Dimmit	0	0	0	0	0	0
31	County-Other, Frio	0	0	0	0	0	0
32	County-Other, Goliad	0	0	0	0	0	0
33	County-Other, Gonzales	0	0	0	0	0	0
34	County-Other, Guadalupe	0	0	10	174	365	584
35	County-Other, Hays	0	0	406	6,114	12,427	22,488
36	County-Other, Karnes	0	0	0	0	0	0
37	County-Other, Kendall	0	0	30	257	524	926
38	County-Other, La Salle	0	0	0	0	0	0
39	County-Other, Medina	0	0	0	0	0	0
40	County-Other, Refugio	0	0	0	0	0	0
41	County-Other, Uvalde	0	0	0	0	0	0
42	County-Other, Victoria	217	277	297	287	277	265
43	County-Other, Wilson	0	0	0	0	0	0
44	County-Other, Zavala	0	0	0	0	0	0
45	Creedmoor-Maha WSC	0	0	0	351	1,396	2,466
46	Crystal City	0	0	0	0	0	0
47	Crystal Clear SUD	2,859	8,448	10,236	12,243	14,554	17,211
48	Cuero	0	0	0	0	0	0
49	Devine	0	0	0	0	0	0
50	Dilley	0	0	0	0	0	0
51	East Central SUD	3,189	4,035	4,830	5,544	6,355	7,269
52	East Medina County SUD	0	0	0	0	23	58
53	El Oso WSC	0	0	0	0	3	6
54	Elmendorf	0	0	0	40	373	1,016
55	Encinal WSC	0	0	0	0	0	0
56	Fair Oaks Ranch	0	319	565	664	689	689
57	Falls City	0	0	0	0	0	0
58	Fayette WSC	0	0	0	0	0	0
59	Floresville	0	0	0	0	0	0
60	Fort Sam Houston	14,151	14,142	14,142	14,142	14,142	14,142
61	Garden Ridge	1,163	1,635	2,111	2,659	3,310	4,081
62	Goforth SUD	0	0	0	3,305	9,008	15,528
63	Goliad	0	0	0	0	0	0

No.	Water User Group	2030	2040	2050	2060	2070	2080
64	Gonzales	0	0	0	0	0	0
65	Gonzales County WSC	0	0	0	0	0	0
66	Green Valley SUD	0	0	0	0	686	3,381
67	Guadalupe-Blanco River Authority	0	0	0	0	0	0
68	Hondo	288	197	149	160	172	183
69	Irrigation, Atascosa	0	0	0	0	0	0
70	Irrigation, Bexar	0	0	0	0	0	0
71	Irrigation, Caldwell	0	0	0	0	0	0
72	Irrigation, Calhoun	9,173	9,173	9,173	9,173	9,173	9,173
73	Irrigation, Comal	0	0	0	0	0	0
74	Irrigation, DeWitt	0	0	0	0	0	0
75	Irrigation, Dimmit	4,336	4,336	4,336	4,336	4,336	4,336
76	Irrigation, Frio	0	0	0	0	0	0
77	Irrigation, Goliad	184	36	0	0	0	0
78	Irrigation, Gonzales	0	0	0	0	0	0
79	Irrigation, Guadalupe	20	20	20	20	20	20
80	Irrigation, Hays	0	0	0	0	0	0
81	Irrigation, Karnes	185	185	744	744	744	744
82	Irrigation, Kendall	0	0	0	0	0	0
83	Irrigation, La Salle	413	413	413	413	413	413
84	Irrigation, Medina	23,602	23,679	23,762	23,831	23,896	23,948
85	Irrigation, Refugio	0	0	0	0	0	0
86	Irrigation, Uvalde	18,625	18,625	18,625	18,625	18,625	18,625
87	Irrigation, Victoria	200	200	200	200	200	200
88	Irrigation, Wilson	331	331	331	331	331	331
89	Irrigation, Zavala	14,189	14,189	14,189	14,189	14,189	14,189
90	Jourdanton	0	0	0	0	0	0
91	Karnes City	0	0	0	0	0	0
92	Kendall County WCID 1	0	0	0	0	0	0
93	Kendall West Utility	0	0	36	168	318	490
94	Kenedy	0	0	0	0	0	0
95	Kirby	138	248	270	270	270	270
96	Knippa WSC	0	0	0	0	0	0
97	KT Water Development	486	973	1,624	2,448	3,391	4,471
98	Kyle	0	0	8	1,458	1,936	2,287
99	La Coste	3	0	0	1	3	5
100	La Vernia	0	0	0	0	0	0

No.	Water User Group	2030	2040	2050	2060	2070	2080
101	Lackland Air Force Base	0	0	0	0	0	0
102	Leon Valley	763	1,129	1,129	1,129	1,129	1,129
103	Live Oak	211	202	202	202	228	202
104	Livestock, Atascosa	0	0	0	0	0	0
105	Livestock, Bexar	0	0	0	0	0	0
106	Livestock, Caldwell	0	0	0	0	0	0
107	Livestock, Calhoun	0	0	0	0	0	0
108	Livestock, Comal	0	0	0	0	0	0
109	Livestock, DeWitt	0	0	0	0	0	0
110	Livestock, Dimmit	0	0	0	0	0	0
111	Livestock, Frio	0	0	0	0	0	0
112	Livestock, Goliad	0	0	0	0	0	0
113	Livestock, Gonzales	0	0	0	0	0	0
114	Livestock, Guadalupe	0	0	0	0	0	0
115	Livestock, Hays	12	12	12	12	12	12
116	Livestock, Karnes	0	0	0	0	0	0
117	Livestock, Kendall	0	0	0	0	0	0
118	Livestock, La Salle	0	0	0	0	0	0
119	Livestock, Medina	0	0	0	0	0	0
120	Livestock, Refugio	0	0	0	0	0	0
121	Livestock, Uvalde	0	0	0	0	0	0
122	Livestock, Victoria	0	0	0	0	0	0
123	Livestock, Wilson	0	0	0	0	0	0
124	Livestock, Zavala	0	0	0	0	0	0
125	Lockhart	0	0	99	369	639	908
126	Loma Alta Chula Vista Water System	0	0	0	0	0	0
127	Luling	0	0	0	0	0	0
128	Lytle	223	266	309	349	395	447
129	Manufacturing, Atascosa	0	0	0	0	0	0
130	Manufacturing, Bexar	16	338	673	1,020	1,381	1,755
131	Manufacturing, Caldwell	9	10	11	12	13	14
132	Manufacturing, Calhoun	0	28	1,981	4,153	6,405	8,741
133	Manufacturing, Comal	0	0	0	0	0	0
134	Manufacturing, DeWitt	0	0	0	0	0	0
135	Manufacturing, Gonzales	0	0	0	0	0	0

No.	Water User Group	2030	2040	2050	2060	2070	2080
136	Manufacturing, Guadalupe	0	0	0	0	0	0
137	Manufacturing, Hays	0	0	0	0	0	0
138	Manufacturing, Karnes	0	0	0	0	0	0
139	Manufacturing, Kendall	43	45	47	49	51	53
140	Manufacturing, Medina	0	0	0	0	0	0
141	Manufacturing, Victoria	38,960	40,419	41,932	43,501	45,128	46,815
142	Manufacturing, Wilson	5	7	9	11	14	17
143	Manufacturing, Zavala	732	759	787	816	846	877
144	Marion	0	0	0	0	0	0
145	Martindale WSC	0	134	199	269	347	434
146	Maxwell SUD	0	0	224	1,473	3,152	3,838
147	McCoy WSC	0	0	0	48	111	185
148	Medina County WCID 2	0	0	0	0	0	0
149	Medina River West WSC	0	0	0	0	0	0
150	Mining, Atascosa	3,300	3,613	3,919	4,208	4,478	0
151	Mining, Bexar	0	0	0	0	0	0
152	Mining, Caldwell	0	0	0	0	0	0
153	Mining, Comal	2,967	5,084	7,218	9,340	11,386	13,268
154	Mining, DeWitt	0	0	0	0	0	0
155	Mining, Dimmit	5,451	5,451	5,451	5,451	5,451	0
156	Mining, Frio	4,034	4,035	4,035	4,036	4,036	0
157	Mining, Goliad	0	0	0	0	0	0
158	Mining, Gonzales	3,631	3,664	3,702	3,740	3,779	0
159	Mining, Guadalupe	428	428	428	428	428	0
160	Mining, Hays	0	0	0	0	0	0
161	Mining, Karnes	1,440	1,440	1,440	1,440	1,440	0
162	Mining, La Salle	4,867	4,867	4,867	4,867	4,867	0
163	Mining, Medina	3,042	3,436	3,783	4,098	4,375	4,604
164	Mining, Uvalde	1,609	1,828	2,055	2,271	2,479	2,676
165	Mining, Victoria	338	357	374	387	399	408
166	Mining, Wilson	0	0	0	0	0	0
167	Mining, Zavala	3,664	3,664	3,664	3,664	3,664	0
168	Moore WSC	0	0	0	0	0	0
169	Natalia	4	0	7	12	13	8
170	New Braunfels	0	9,440	24,620	43,069	64,186	88,362
171	Nixon	0	0	0	0	0	0
172	Oak Hills WSC	531	678	854	1,058	1,294	1,568

No.	Water User Group	2030	2040	2050	2060	2070	2080
173	Pearsall	250	483	649	677	709	745
174	Picosa WSC	24	72	122	165	215	273
175	Pleasanton	0	0	0	0	0	0
176	Point Comfort	0	0	0	0	0	0
177	Polonia WSC	0	0	0	0	0	0
178	Port Lavaca	0	0	0	0	0	0
179	Port Oconnor Improvement District	0	0	0	0	0	0
180	Poteet	0	0	0	0	0	0
181	Poth	0	0	0	0	0	0
182	Quail Creek MUD	0	0	0	0	0	0
183	Randolph Air Force Base	0	0	0	0	0	0
184	Refugio	0	0	0	0	0	0
185	Runge	0	0	0	0	0	7
186	S S WSC	0	0	0	0	0	0
187	Sabinal	0	0	0	0	0	0
188	San Antonio Water System	0	0	29	12,590	23,709	40,390
189	San Marcos	90	3,560	8,428	12,023	14,166	15,788
190	Schertz	0	1,526	3,351	5,178	7,272	9,676
191	Seadrift	0	0	0	0	0	0
192	Seguin	0	0	0	0	0	234
193	Selma	863	1,418	1,958	2,454	3,024	3,680
194	Shavano Park	48	121	186	245	312	389
195	Smiley	0	0	0	0	0	0
196	South Buda WCID 1	0	169	689	1,392	2,197	3,119
197	Springs Hill WSC	26	1,965	3,085	4,262	5,598	7,115
198	Steam-Electric Power, Atascosa	0	0	0	0	0	0
199	Steam-Electric Power, Bexar	0	0	0	0	0	0
200	Steam-Electric Power, Calhoun	0	0	0	0	0	0
201	Steam-Electric Power, Frio	0	0	0	0	0	0
202	Steam-Electric Power, Goliad	0	0	0	0	0	0
203	Steam-Electric Power, Guadalupe	0	0	0	0	0	0

No.	Water User Group	2030	2040	2050	2060	2070	2080
204	Steam-Electric Power, Hays	0	0	0	0	0	0
205	Steam-Electric Power, Victoria	666	666	666	666	666	666
206	Stockdale	0	0	0	0	0	0
207	Sunko WSC	0	0	0	0	0	0
208	Texas State University	619	613	613	613	613	613
209	The Oaks WSC	47	75	100	123	149	178
210	Three Oaks WSC	0	0	0	0	0	0
211	Tri Community WSC	0	0	0	0	0	0
212	Universal City	0	0	0	0	0	0
213	Uvalde	717	635	530	411	288	164
214	Victoria	8,249	8,455	8,510	8,435	8,350	8,251
215	Victoria County WCID 1	0	0	0	0	0	0
216	Ville Dalsace Water Supply	82	92	99	103	107	113
217	Waelder	0	0	0	0	0	0
218	Water Services	0	0	0	0	0	0
219	West Medina WSC	0	0	0	0	0	0
220	Wimberley WSC	0	95	439	907	1,443	2,056
221	Windmill WSC	0	0	0	0	0	0
222	Wingert Water Systems	71	111	165	175	175	175
223	Woodsboro	0	0	0	0	0	0
224	Yancey WSC	0	0	0	0	0	0
225	Yoakum	0	0	0	0	0	0
226	Yorktown	0	0	0	0	0	0
227	Zavala County WCID 1	0	0	0	0	0	0
	Total	**185,132**	**220,629**	**269,774**	**350,049**	**437,358**	**513,578**

4.2.2 Counties

Identified water needs for the SCTRWPA are summarized by county on Figure 4-2 and in Table 4-3.

The municipal needs distribution is heavily concentrated in Comal, Bexar, Hays, and Guadalupe Counties. As discussed in Chapter 2, these four counties are high population growth areas along the IH-35 corridor. The existing supplies that utilities currently have access to are not sufficient to keep up with the projected growth, hence the large, anticipated future needs. Victoria County also exhibits significant needs; however, most of the needs are for the manufacturing sector, and they do not increase as significantly from 2030-2080 as the municipal needs.

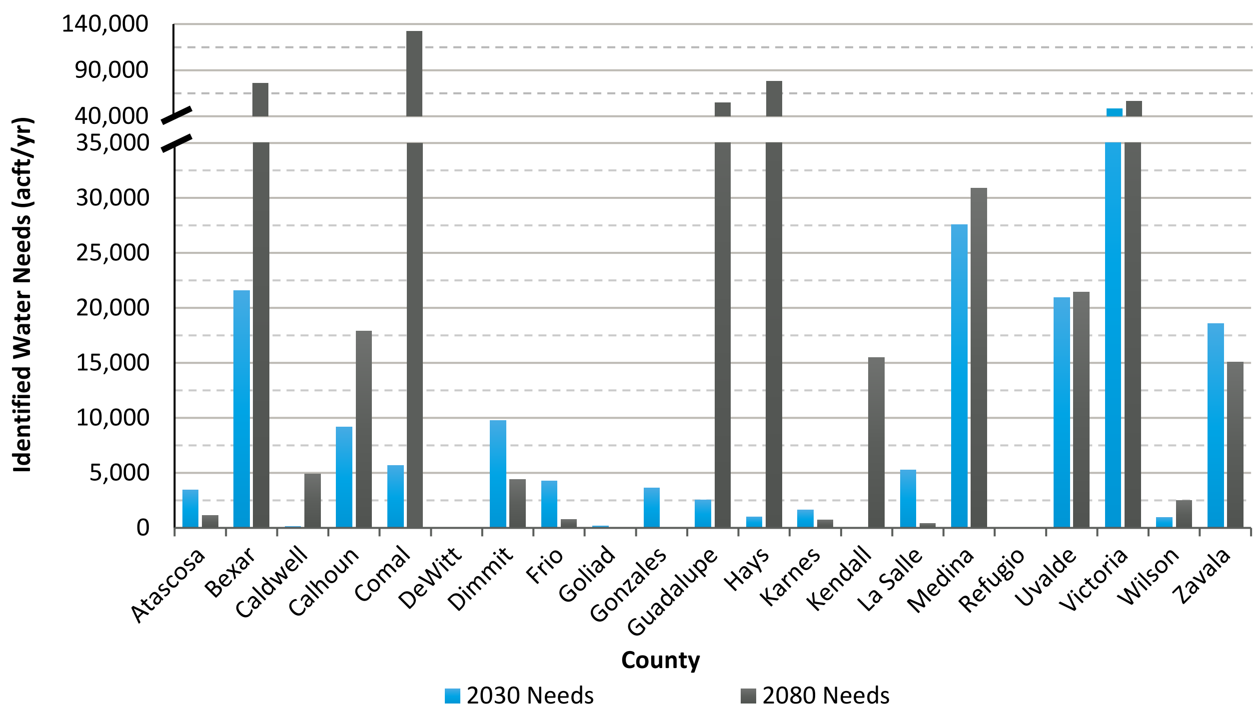

Figure 4-2 Identified Water Needs by County

Table 4-3 Identified Water Needs for Individual Counties (acft/yr)

County	2030	2040	2050	2060	2070	2080
Atascosa	3,469	3,831	4,330	4,824	5,327	1,130
Bexar	21,586	24,580	27,146	41,827	55,731	75,795
Caldwell	117	240	469	1,526	3,343	4,896
Calhoun	9,173	9,201	11,154	13,326	15,578	17,914
Comal	5,701	17,403	36,949	64,141	96,063	132,504
DeWitt	0	0	0	0	0	0
Dimmit	9,787	9,787	9,787	9,799	9,831	4,403
Frio	4,284	4,520	4,703	4,741	4,782	792

County	2030	2040	2050	2060	2070	2080
Goliad	184	36	0	0	0	0
Gonzales	3,631	3,664	3,702	3,740	3,779	0
Guadalupe	2,530	12,081	20,006	29,369	40,566	54,863
Hays (part)*	1,001	8,122	18,397	37,479	56,466	78,116
Karnes	1,625	1,625	2,184	2,184	2,184	751
Kendall	43	898	3,651	7,069	10,959	15,497
La Salle	5,280	5,280	5,280	5,280	5,280	413
Medina	27,593	28,093	28,715	29,523	30,251	30,882
Refugio	0	0	0	0	0	0
Uvalde	20,951	21,088	21,210	21,307	21,392	21,465
Victoria	48,630	50,374	51,979	53,476	55,020	56,605
Wilson	962	1,194	1,472	1,769	2,107	2,486
Zavala	18,585	18,612	18,640	18,669	18,699	15,066
Total	**185,132**	**220,629**	**269,774**	**350,049**	**437,358**	**513,578**
* Hays County is split between Region K and Region L; needs shown above are for Region L.						

4.2.3 Use Types

Water needs are identified and categorized by use type, which includes irrigation, livestock, manufacturing, mining, municipal, and steam-electric power generation. Identified water needs for the SCTRWPA are summarized by use type on Figure 4-3 and in Table 4-4. Table 4-5 summarizes the secondary water needs for individual use types.

In all decades, municipal and irrigation needs make up the majority of identified water needs in the SCTRWPA. In 2030 and 2040, irrigation has the highest needs of the use types; however, by 2050, municipal needs are expected to overtake irrigation and increase exponentially through the end of the planning horizon. Like water demand projections in Chapter 2, the municipal and manufacturing needs are expected to increase over the planning horizon; whereas needs for the irrigation, livestock, and steam-electric power sectors are expected to remain steady from 2030 to 2080. The livestock sector is anticipated to have minimal needs of 12 acft/yr, localized to Hays County. The mining sector is expected to experience a gradual increase in needs between 2030 and 2070 before declining sharply in 2080.

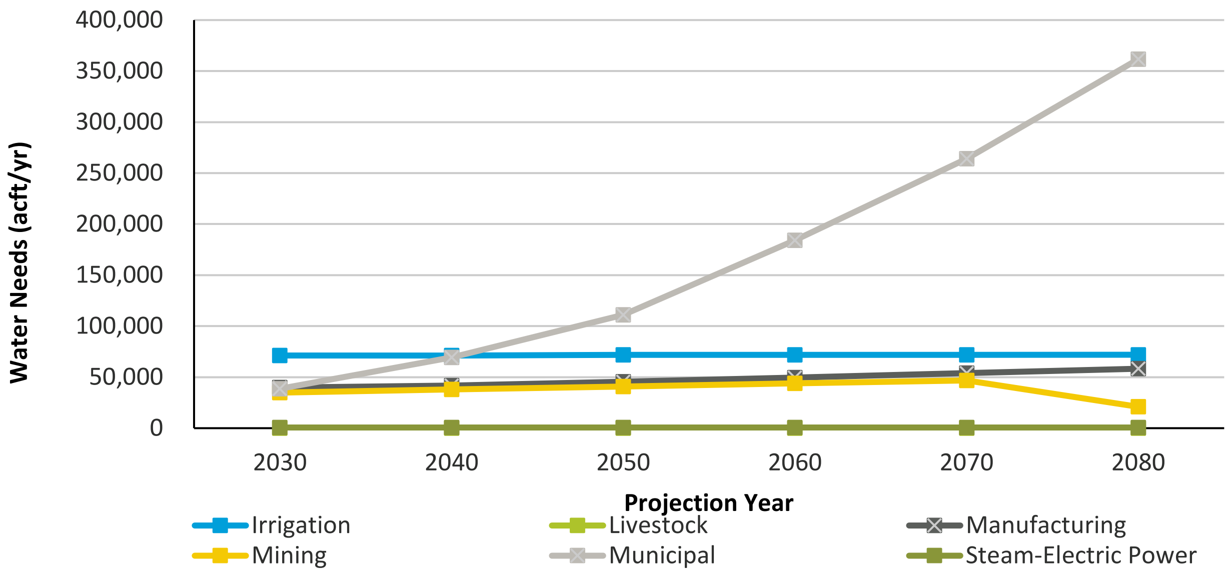

Figure 4-3 Identified Water Needs by Use Type

Table 4-4 Identified Water Needs for Individual Use Types (acft/yr)

Use Type	2030	2040	2050	2060	2070	2080
Irrigation	71,258	71,187	71,793	71,862	71,927	71,979
Livestock	12	12	12	12	12	12
Manufacturing	39,765	41,606	45,440	49,562	53,838	58,272
Mining	34,771	37,867	40,936	43,930	46,782	20,956
Municipal	38,660	69,291	110,927	184,017	264,133	361,693
Steam-Electric Power	666	666	666	666	666	666
Total	**185,132**	**220,629**	**269,774**	**350,049**	**437,358**	**513,578**

Table 4-5 Second-Tier Water Needs for Individual Use Types (acft/yr)

Use Type	2030	2040	2050	2060	2070	2080
Irrigation	71,258	71,187	71,793	71,862	71,927	71,979
Livestock	12	12	12	12	12	12
Manufacturing	39,765	41,606	45,440	49,562	53,838	58,272
Mining	34,771	37,867	40,936	43,930	46,782	20,956
Municipal	29,391	39,272	47,716	76,023	118,224	166,401
Steam-Electric Power	666	666	666	666	666	666
Total	**175,863**	**190,610**	**206,563**	**242,055**	**291,449**	**318,286**

Figure 4-4 demonstrates the proportion of sector-specific water needs to the total water needs in the SCTRWPA. In 2030, the municipal sector will constitute 21 percent (%) of the total region's needs but by 2080, it will rise to 70% of the total needs in the SCTRWPA. Needs for industrial uses in the manufacturing, mining, and steam-electric power sectors represent a combined 40% of the total needs in 2030. Despite increased needs for manufacturing and unchanged needs for mining and steam-electric power uses, the proportion of industrial needs to total water needs in the SCTRWPA declines to 15% by 2080 because of the significant increases in municipal needs.

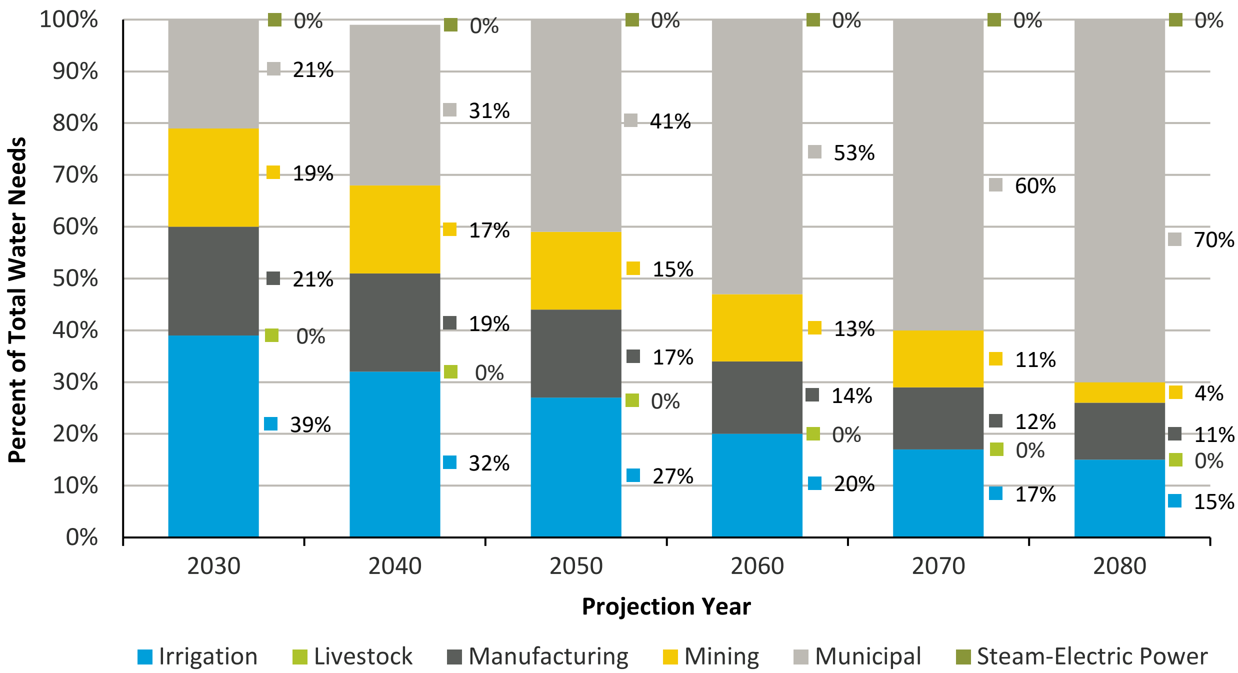

Figure 4-4 Proportion of Total Needs by Use Type

The following sections provide additional information regarding the needs by use type.

4.2.3.1 Irrigation

Irrigation is the second largest water use type in Region L, behind municipal, and has the largest need in 2030. The volume of irrigation needs remains relatively unchanged over the planning horizon, ranging between 71,258 acft/yr in 2040 and 71,979 acft/yr in 2080. These needs represent the extent of water shortages anticipated by farmers in years of limited supply. The portion of irrigation demands that is met and the resulting needs are shown on Figure 4-5. Water conservation and drought management WMSs may alleviate some of the impacts of drought on productivity for farmers. Recommended WMSs are discussed in detail in Chapter 5.

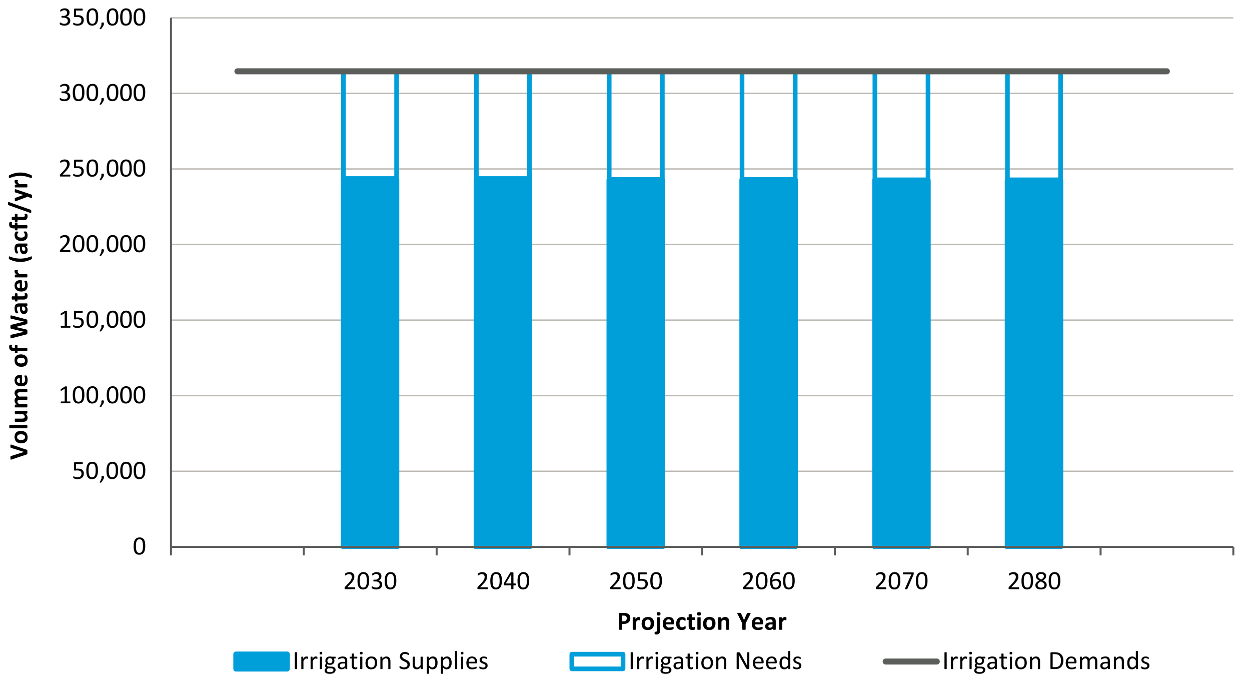

Figure 4-5 Irrigation Needs, Shown as a Portion of Irrigation Demands

Table 4-6 provides the irrigation needs for individual counties in the SCTRWPA. Of the 21 counties in Region L, there are 11 counties with identified needs between 2030 and 2040, and 10 counties with needs between 2050 and 2080. Counties with the greatest irrigation needs are Medina, Uvalde, Zavala, Calhoun, and Dimmit Counties. Although Chapter 2 showed Frio County having the greatest irrigation demands, there are no needs for Frio County because all the demands are met by supplies.

Irrigation needs are summarized by river and coastal basin in Table 4-7. Figure 4-6 demonstrates the proportion of irrigation needs in 2080 by river and coastal basin. In 2080, most of the irrigation needs are in the Nueces River Basin (83%) and in the Lavaca-Guadalupe Coastal Basin (13%).

Table 4-6 Irrigation Needs for Individual Counties (acft/yr)

County	2030	2040	2050	2060	2070	2080
Atascosa	0	0	0	0	0	0
Bexar	0	0	0	0	0	0
Caldwell	0	0	0	0	0	0
Calhoun	9,173	9,173	9,173	9,173	9,173	9,173
Comal	0	0	0	0	0	0
DeWitt	0	0	0	0	0	0
Dimmit	4,336	4,336	4,336	4,336	4,336	4,336
Frio	0	0	0	0	0	0
Goliad	184	36	0	0	0	0

County	2030	2040	2050	2060	2070	2080
Gonzales	0	0	0	0	0	0
Guadalupe	20	20	20	20	20	20
Hays (part)*	0	0	0	0	0	0
Karnes	185	185	744	744	744	744
Kendall	0	0	0	0	0	0
La Salle	413	413	413	413	413	413
Medina	23,602	23,679	23,762	23,831	23,896	23,948
Refugio	0	0	0	0	0	0
Uvalde	18,625	18,625	18,625	18,625	18,625	18,625
Victoria	200	200	200	200	200	200
Wilson	331	331	331	331	331	331
Zavala	14,189	14,189	14,189	14,189	14,189	14,189
Total	**71,258**	**71,187**	**71,793**	**71,862**	**71,927**	**71,979**

* Hays County is split between Region K and Region L; needs shown above are for Region L.

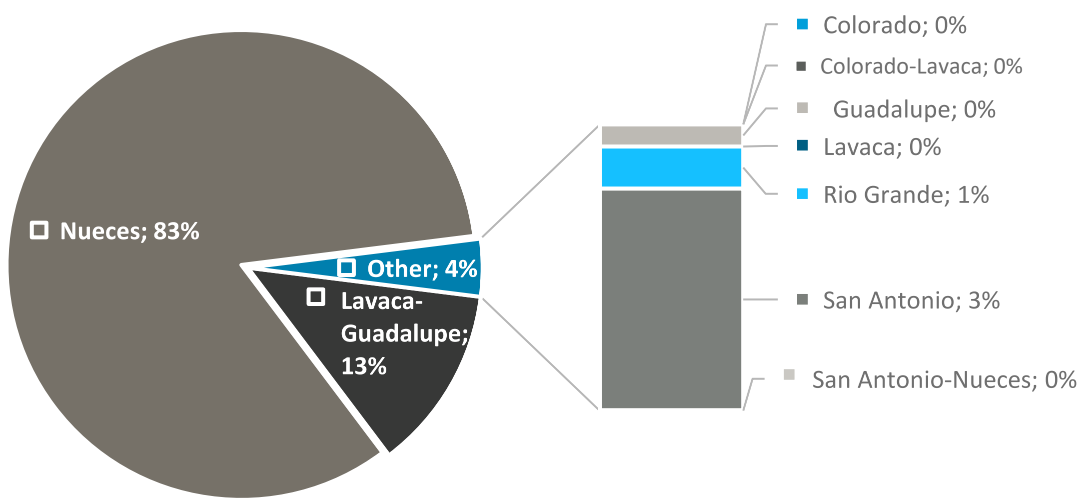

Figure 4-6 Irrigation Needs in 2080 by River and Coastal Basin

Table 4-7 Irrigation Needs for Individual Basins (acft/yr)

Basin	2030	2040	2050	2060	2070	2080
Colorado	0	0	0	0	0	0
Colorado-Lavaca	0	0	0	0	0	0
Guadalupe	220	220	220	220	220	220
Lavaca	0	0	0	0	0	0
Lavaca-Guadalupe	9,173	9,173	9,173	9,173	9,173	9,173
Nueces	59,608	59,685	59,768	59,837	59,902	59,954
Rio Grande	419	419	419	419	419	419
San Antonio	1,831	1,683	2,206	2,206	2,206	2,206
San Antonio-Nueces	7	7	7	7	7	7
Total	**71,258**	**71,187**	**71,793**	**71,862**	**71,927**	**71,979**

4.2.3.2 Livestock

Livestock demands are met by numerous groundwater wells, ephemeral streams, and ponds, as well as surface water diversions, often classified together with lawn watering contracts or referred to here as Livestock Local Supplies. In particular areas, there may be some difficulty providing sufficient water in a drought year, but overall ranchers are expected to manage their livestock within the available supplies.

The livestock sector is anticipated to have minimal needs of 12 acft/yr between 2030 and 2080. The portion of livestock demands that is met and the resulting needs are shown on Figure 4-7.

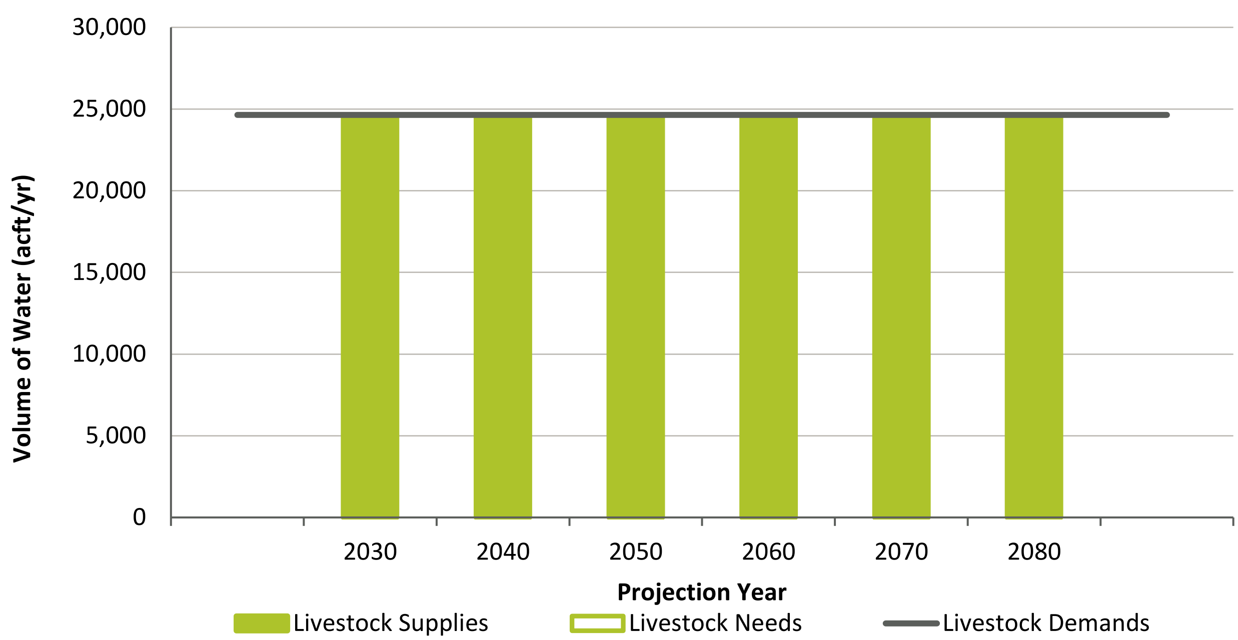

Figure 4-7 Livestock Needs, Shown as a Portion of Livestock Demands

Table 4-8 provides the livestock needs for individual counties in the SCTRWPA. Of the 21 counties in Region L, only Hays County has identified water needs over the planning horizon.

The Texas Parks and Wildlife Department (TPWD) owns and operates the A.E. Wood State Fish Hatchery, which accounts for the majority of livestock demands in Hays County, estimated at 2,432 acft/yr. During typical years, the hatchery relies on surface water from the Guadalupe River and recycled water from their facility. However, water availability modeling for the 2026 Plan indicates that the hatchery's Guadalupe Run-of-River water rights do not have a firm yield during a repeat of the drought of record. During periods of drought, the TPWD would rely on their recycled water or reuse supplies, which would provide 2,420 acft/yr, resulting in a need of 12 acft/yr. This recycled water supply would allow the hatchery to maintain broodstock that are critical to production; however, it will not enable the hatchery to sustain full operating capacity during severe drought. To address the 12 acft/yr of needs for Hays County Livestock, a drought management WMS is included in Chapter 5.

Table 4-8 Livestock Needs for Individual Counties (acft/yr)

County	2030	2040	2050	2060	2070	2080
Atascosa	0	0	0	0	0	0
Bexar	0	0	0	0	0	0
Caldwell	0	0	0	0	0	0
Calhoun	0	0	0	0	0	0
Comal	0	0	0	0	0	0
DeWitt	0	0	0	0	0	0
Dimmit	0	0	0	0	0	0
Frio	0	0	0	0	0	0
Goliad	0	0	0	0	0	0
Gonzales	0	0	0	0	0	0
Guadalupe	0	0	0	0	0	0
Hays (part)*	12	12	12	12	12	12
Karnes	0	0	0	0	0	0
Kendall	0	0	0	0	0	0
La Salle	0	0	0	0	0	0
Medina	0	0	0	0	0	0
Refugio	0	0	0	0	0	0
Uvalde	0	0	0	0	0	0
Victoria	0	0	0	0	0	0
Wilson	0	0	0	0	0	0
Zavala	0	0	0	0	0	0
Total	**12**	**12**	**12**	**12**	**12**	**12**
* Hays County is split between Region K and Region L; needs shown above are for Region L.						

4.2.3.3 Manufacturing

Water demand associated with manufacturing is met by both groundwater and surface water and comprises a relatively small portion of the regional demand and need. Current supplies meet about 64% of 2030 projected manufacturing demands. The need likely results in part due to the fact that manufacturing demands are projected out to 2030 from their baseline date of 2019, assuming that growth in the various manufacturing sectors is similar to historical rates. In addition, Victoria County Manufacturing has a large need of almost 40,000 acft/yr due to the fact that during a drought of record, their run-of-river water right is not firm.

The manufacturing sector is anticipated to have needs of 39,765 acft/yr in 2030, increasing gradually to 58,272 acft/yr in 2080. The portion of manufacturing demands that is met and the resulting needs are shown on Figure 4-8.

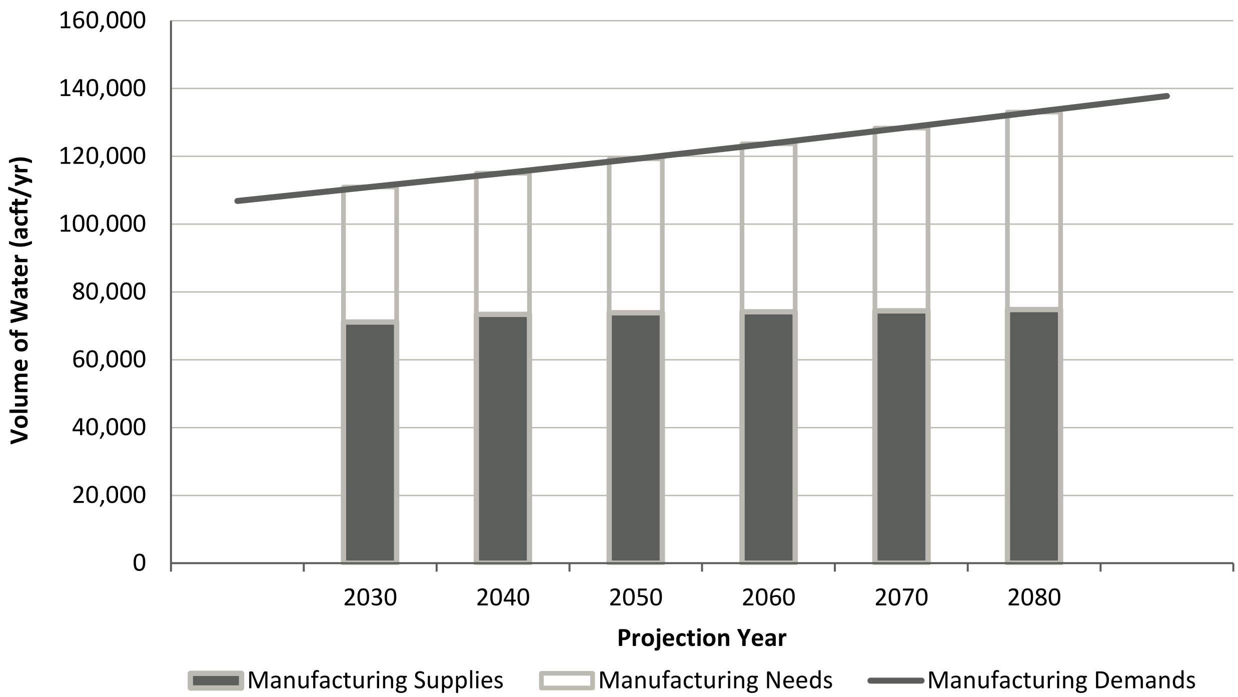

Figure 4-8 Manufacturing Needs, Shown as a Portion of Manufacturing Demands

Table 4-9 provides the manufacturing needs for individual counties in the SCTRWPA. Of the 21 counties in Region L, seven counties have manufacturing water needs over the planning horizon. Needs in the manufacturing water use category will likely require implementation of WMSs, such as increased conservation and water efficiency strategies, new or expanded use of reclaimed water, new or expanded use of groundwater, or a combination of strategies. Because most of the reuse availability is derived from domestic wastewater treatment facilities, increased cooperation with wastewater permittees, such as municipalities and utilities, will likely be necessary. Recommended WMSs are discussed in detail in Chapter 5.

Table 4-9 Manufacturing Needs for Individual Counties (acft/yr)

County	2030	2040	2050	2060	2070	2080
Atascosa	0	0	0	0	0	0
Bexar	16	338	673	1,020	1,381	1,755
Caldwell	9	10	11	12	13	14
Calhoun	0	28	1,981	4,153	6,405	8,741
Comal	0	0	0	0	0	0
DeWitt	0	0	0	0	0	0
Dimmit	0	0	0	0	0	0
Frio	0	0	0	0	0	0
Goliad	0	0	0	0	0	0
Gonzales	0	0	0	0	0	0
Guadalupe	0	0	0	0	0	0
Hays (part)*	0	0	0	0	0	0
Karnes	0	0	0	0	0	0
Kendall	43	45	47	49	51	53
La Salle	0	0	0	0	0	0
Medina	0	0	0	0	0	0
Refugio	0	0	0	0	0	0
Uvalde	0	0	0	0	0	0
Victoria	38,960	40,419	41,932	43,501	45,128	46,815
Wilson	5	7	9	11	14	17
Zavala	732	759	787	816	846	877
Total	**39,765**	**41,606**	**45,440**	**49,562**	**53,838**	**58,272**

* Hays County is split between Region K and Region L; needs shown above are for Region L.

4.2.3.4 Mining

Current mining supplies appear to meet about 52% of the 2030 mining demands. Because of reporting limitations, there may be additional mining supplies from groundwater that would exceed the MAG values for some aquifer/county/river basin areas. The mining sector is anticipated to have demands and needs that increase through the 2070 decade, and then decrease sharply in 2080 due to reductions in hydraulic fracturing uses. The remaining needs in 2080 are from aggregate mining. Aggregate mining tends to occur near the higher population growth areas to bring materials for home building and manufacturing. The portion of mining demands that is met and the resulting needs are shown on Figure 4-9.

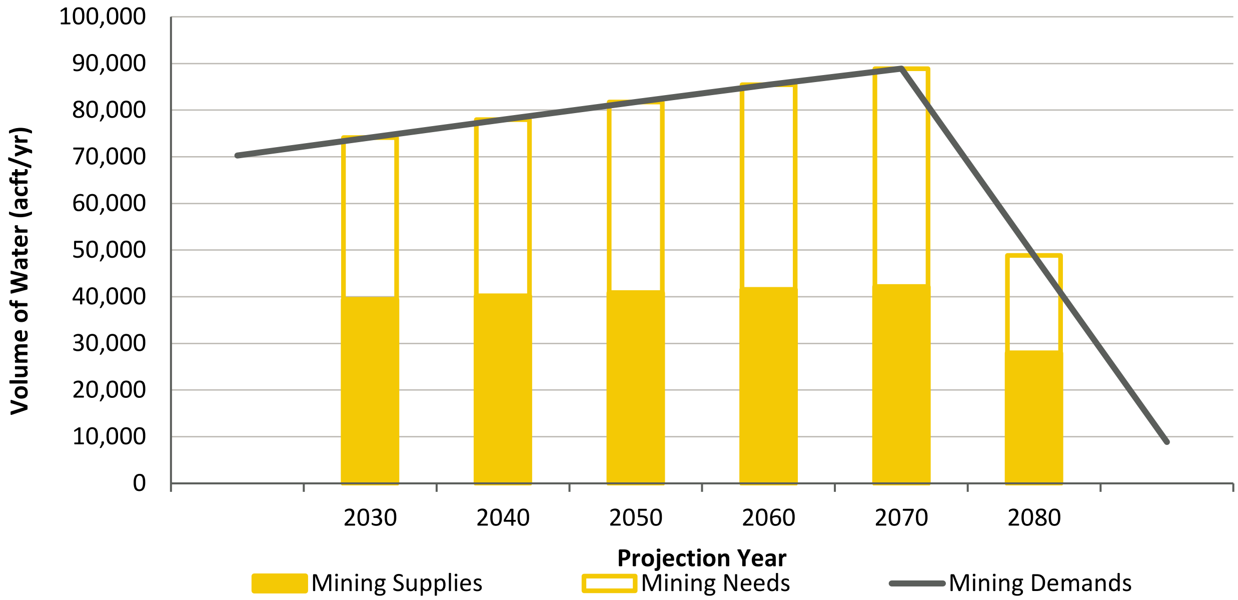

Figure 4-9 Mining Needs, Shown as a Portion of Mining Demands

Table 4-10 provides the mining needs for individual counties in the SCTRWPA. Of the 21 counties in Region L, 12 have mining needs between 2030 and 2070. The largest 2030 need is 5,451 acft/yr in Dimmit County. In 2080, there are only four counties with mining needs, including Comal, Medina, Uvalde, and Victoria Counties. The largest 2080 need is 13,268 acft/yr in Comal County.

Needs in the mining sector will likely require implementation of WMSs, such as increased conservation and water efficiency strategies, new or expanded use of reclaimed water, new or expanded use of groundwater, or a combination of strategies. Because most of the reuse availability is derived from domestic wastewater treatment facilities, increased cooperation with wastewater permittees, such as municipalities and utilities, will likely be necessary. Recommended WMSs are discussed in detail in Chapter 5.

Table 4-10 Mining Needs for Individual Counties (acft/yr))

County	2030	2040	2050	2060	2070	2080
Atascosa	3,300	3,613	3,919	4,208	4,478	0
Bexar	0	0	0	0	0	0
Caldwell	0	0	0	0	0	0
Calhoun	0	0	0	0	0	0
Comal	2,967	5,084	7,218	9,340	11,386	13,268
DeWitt	0	0	0	0	0	0
Dimmit	5,451	5,451	5,451	5,451	5,451	0
Frio	4,034	4,035	4,035	4,036	4,036	0
Goliad	0	0	0	0	0	0

County	2030	2040	2050	2060	2070	2080
Gonzales	3,631	3,664	3,702	3,740	3,779	0
Guadalupe	428	428	428	428	428	0
Hays (part)*	0	0	0	0	0	0
Karnes	1,440	1,440	1,440	1,440	1,440	0
Kendall	0	0	0	0	0	0
La Salle	4,867	4,867	4,867	4,867	4,867	0
Medina	3,042	3,436	3,783	4,098	4,375	4,604
Refugio	0	0	0	0	0	0
Uvalde	1,609	1,828	2,055	2,271	2,479	2,676
Victoria	338	357	374	387	399	408
Wilson	0	0	0	0	0	0
Zavala	3,664	3,664	3,664	3,664	3,664	0
Total	**34,771**	**37,867**	**40,936**	**43,930**	**46,782**	**20,956**
* Hays County is split between Region K and Region L; needs shown above are for Region L.						

4.2.3.5 Municipal

As discussed in Chapter 2, the municipal water demands in the SCTRWPA are expected to increase by 80% over the planning horizon from 530,751 acft/yr in 2030 to 956,362 acft/yr in 2080. Similarly, municipal needs are also projected to rise considerably from 38,660 acft/yr in 2030 to 361,693 acft/yr in 2080, representing an 836% increase over the planning horizon. The portion of municipal demands that is met and the resulting needs are shown on Figure 4-10.

Municipal supplies are estimated to meet approximately 93% of the demands in 2030; however, by 2080, supplies will only meet 62% of the demands. In some cases, drought-year demands exceed normal supplies, and that need can be met by short-term contracts for water. Other municipalities may experience persistent shortage. While one-time purchases of water, are often used as a stopgap measure, this is not a reliable drought year supply strategy for a long-term, sustainable water supply. Chapter 5 recommends WMSs for demand management, expansion of reuse, and development of new sources of supply to address current and future needs of municipal WUGs and WWPs.

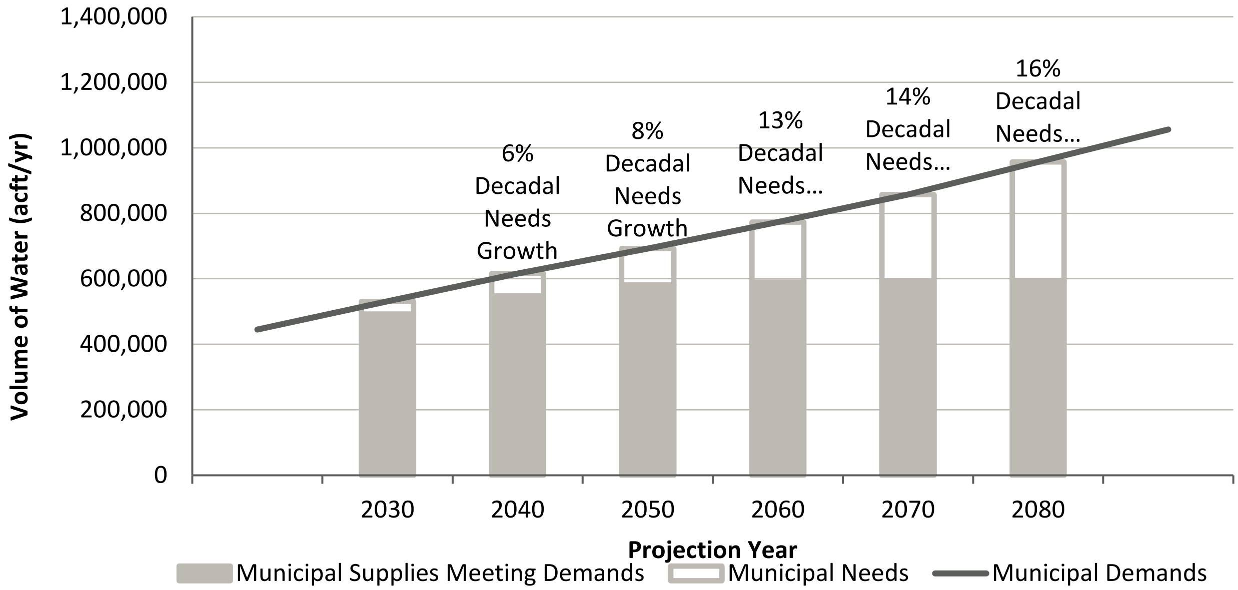

Figure 4-10 Municipal Needs, Shown as a Portion of Municipal Demands

Table 4-11 provides the municipal needs for individual counties in the SCTRWPA. Of the 21 counties in Region L, 14 counties are projected to have at least one WUG with a municipal need during the planning period. The need distribution is heavily concentrated along the IH-35 corridor, including Comal, Bexar, Hays, and Guadalupe Counties, although Victoria County has the second largest need in 2030.

Table 4-11 Municipal Needs for Individual Counties (acft/yr)

County	2030	2040	2050	2060	2070	2080
Atascosa	169	218	411	616	849	1,130
Bexar	21,570	24,242	26,473	40,807	54,350	74,040
Caldwell	108	230	458	1,514	3,330	4,882
Calhoun	0	0	0	0	0	0
Comal	2,734	12,319	29,731	54,801	84,677	119,236
DeWitt	0	0	0	0	0	0
Dimmit	0	0	0	12	44	67
Frio	250	485	668	705	746	792
Goliad	0	0	0	0	0	0
Gonzales	0	0	0	0	0	0
Guadalupe	2,082	11,633	19,558	28,921	40,118	54,843
Hays (part)*	989	8,110	18,385	37,467	56,454	78,104
Karnes	0	0	0	0	0	7
Kendall	0	853	3,604	7,020	10,908	15,444

County	2030	2040	2050	2060	2070	2080
La Salle	0	0	0	0	0	0
Medina	949	978	1,170	1,594	1,980	2,330
Refugio	0	0	0	0	0	0
Uvalde	717	635	530	411	288	164
Victoria	8,466	8,732	8,807	8,722	8,627	8,516
Wilson	626	856	1,132	1,427	1,762	2,138
Zavala	0	0	0	0	0	0
Total	**38,660**	**69,291**	**110,927**	**184,017**	**264,133**	**361,693**
* Hays County is split between Region K and Region L; needs shown above are for Region L.						

4.2.3.6 Steam-Electric Power

Current supplies meet about 99% of the 2030 through 2080 steam-electric power demands. This stems, in part, from the anticipated limited near-term growth of power generation demands in the region and in part from increasingly efficient power generation in terms of consumptive water use. Steam-electric demands occur only in Atascosa, Bexar, Calhoun, Frio, Goliad, Guadalupe, Hays, and Victoria Counties. The portion of steam-electric power demands that is met and the resulting needs are shown on Figure 4-11.

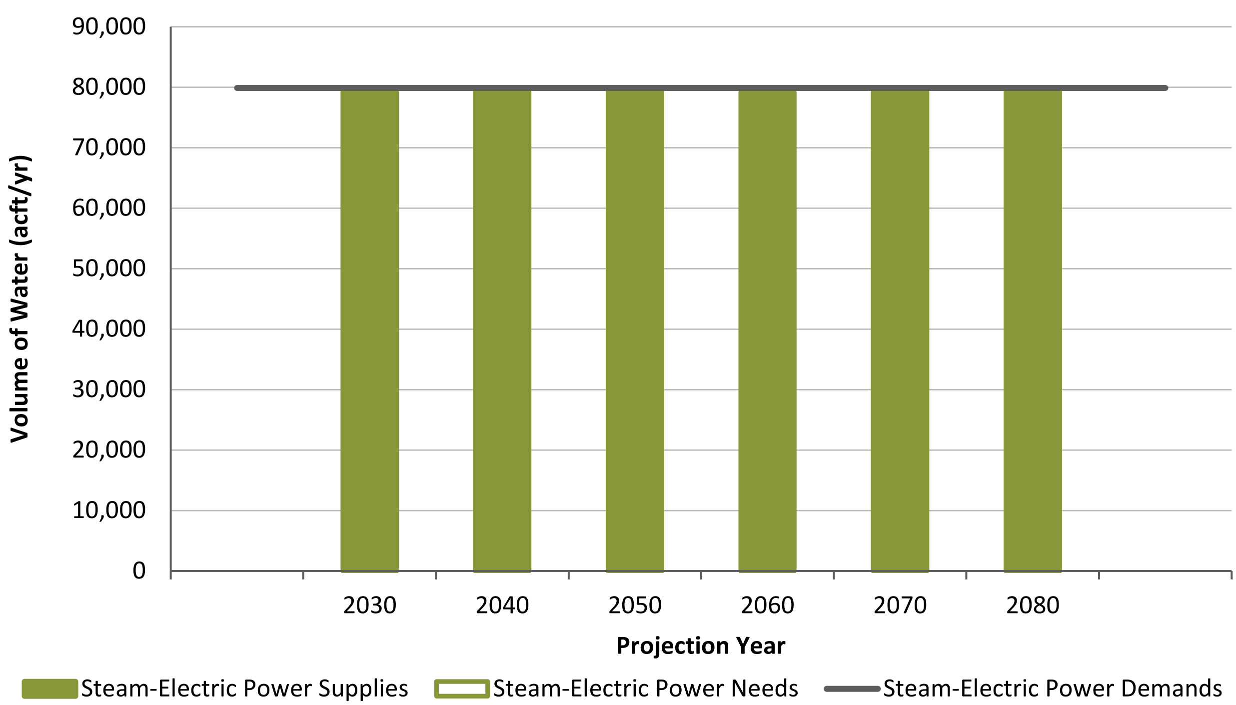

Figure 4-11 Steam-Electric Power Needs, Shown as a Portion of Steam-Electric Power Demands

Table 4-12 provides the steam-electric power needs for individual counties in the SCTRWPA. Of the 21 counties in Region L, only Victoria County has identified water needs over the planning horizon with 666 acft/yr of needs in each decade.

Table 4-12 Steam-Electric Power Needs Projections for Individual Counties (acft/yr)

County	2030	2040	2050	2060	2070	2080
Atascosa	0	0	0	0	0	0
Bexar	0	0	0	0	0	0
Caldwell	0	0	0	0	0	0
Calhoun	0	0	0	0	0	0
Comal	0	0	0	0	0	0
DeWitt	0	0	0	0	0	0
Dimmit	0	0	0	0	0	0
Frio	0	0	0	0	0	0
Goliad	0	0	0	0	0	0
Gonzales	0	0	0	0	0	0
Guadalupe	0	0	0	0	0	0
Hays (part)*	0	0	0	0	0	0
Karnes	0	0	0	0	0	0
Kendall	0	0	0	0	0	0
La Salle	0	0	0	0	0	0
Medina	0	0	0	0	0	0
Refugio	0	0	0	0	0	0
Uvalde	0	0	0	0	0	0
Victoria	666	666	666	666	666	666
Wilson	0	0	0	0	0	0
Zavala	0	0	0	0	0	0
Total	**666**	**666**	**666**	**666**	**666**	**666**

* Hays County is split between Region K and Region L; needs shown above are for Region L.

4.2.4 Major Water Providers

A MWP is defined as a WUG or WWP of particular significance to the region's water supply as determined by the RWPG. This may include public or private entities that provide water for any water use category. At the August 1, 2024, RWPG meeting, the South Central Texas Regional Water Planning Group (SCTRWPG) defined the following entities as MWPs for the sixth cycle of regional water planning:

- Canyon Lake Water Service (Texas Water Company);
- Guadalupe-Blanco River Authority (GBRA);
- New Braunfels;
- SAWS; and
- San Marcos.

Table 4-13 provides the identified water needs for MWPs. Needs are based on the MWP's supplies and WUG demands, if applicable, and the contract demands of customers. MWP supplies are based on what is available for use in terms of water availability and infrastructure capacity or treatment limitations. Water needs for MWPs are summarized by use type in Table 4-14.

Table 4-13 Identified Needs for Major Water Providers (acft/yr)

Major Water Provider	Provider Type	2030	2040	2050	2060	2070	2080
Canyon Lake Water Service (Texas Water Company)	WUG/WWP*	0	97	2,785	4,528	11,050	18,245
GBRA	WUG/WWP	0	0	0	0	0	0
New Braunfels	WUG/WWP	0	9,440	24,620	43,069	64,186	88,362
San Marcos	WUG/WWP	90	3,560	8,428	12,023	14,166	15,788
SAWS	WUG/WWP	0	0	29	12,590	23,709	40,390

*Canyon Lake Water Service (Texas Water Company) is split between Region K and Region L; needs shown above are for Region L only.

Table 4-14 Needs for Major Water Providers by Use Type (acft/yr)

Major Water Provider	Need Type	Use Type	2030	2040	2050	2060	2070	2080
Canyon Lake Water Service (Texas Water Company)	WUG	Municipal	0	97	2,785	4,528	11,050	18,245
Canyon Lake Water Service (Texas Water Company)	Contract	Municipal	0	0	0	0	0	0
GBRA	WUG	Municipal	0	0	0	0	0	0
GBRA	Contract	Irrigation	0	0	0	0	0	0
GBRA	Contract	Manufacturing	0	0	0	0	0	0
GBRA	Contract	Municipal	0	0	0	0	0	0
GBRA	Contract	Steam-Electric	0	0	0	0	0	0
GBRA	Contract	WWP	0	0	0	0	0	0
New Braunfels	WUG	Municipal	0	9,440	24,620	43,069	64,186	88,362
New Braunfels	Contract	Municipal	0	0	0	0	0	0
San Marcos	WUG	Municipal	90	3,560	8,428	12,023	14,166	15,788
San Marcos	Contract	--	0	0	0	0	0	0
SAWS	WUG	Municipal	0	0	29	12,590	23,709	40,390
SAWS	Contract	Municipal	0	0	0	0	0	0
SAWS	Contract	Steam-Electric	0	0	0	0	0	0

1. Canyon Lake Water Service (Texas Water Company) is split between Region K and Region L; water needs shown above are for Region L only. Contract demands are representative of contracts with entities in any region.
2. GBRA WUG demands and needs are all located within Region L; however, contract demands are representative of contracts with entities in any region.

Appendix 4A: Relevant Reports from the 2027 Regional and State Water Planning Database (DB27)

DRAFT Region L Water User Group (WUG) Needs or Surplus

WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The needs shown in the WUG Needs/Surplus report are calculated by first deducting the WUG split's projected demand from its total existing water supply volume. If the WUG split has a greater existing supply volume than projected demand in any given decade, this amount is considered a surplus volume. Surplus volumes are shown as positive values, and needs are shown as negative values in parentheses.

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	County	Basin	2030	2040	2050	2060	2070	2080
Benton City WSC	Atascosa	Nueces	125	(16)	(147)	(228)	(323)	(435)
Charlotte	Atascosa	Nueces	890	909	921	916	911	906
El Oso WSC*	Atascosa	Nueces	7	5	3	0	(3)	(6)
Jourdanton	Atascosa	Nueces	1,220	1,165	1,102	1,040	969	889
Lytle	Atascosa	Nueces	(165)	(195)	(225)	(254)	(289)	(329)
McCoy WSC*	Atascosa	Nueces	93	57	8	(46)	(105)	(174)
Pleasanton	Atascosa	Nueces	2,368	2,139	1,881	1,601	1,296	963
Poteet	Atascosa	Nueces	480	515	540	533	527	521
San Antonio Water System	Atascosa	Nueces	108	32	(10)	(45)	(71)	(110)
County-Other	Atascosa	Nueces	288	252	219	279	323	360
Manufacturing	Atascosa	Nueces	18	16	14	12	10	8
Mining	Atascosa	Nueces	(3,300)	(3,613)	(3,919)	(4,208)	(4,478)	458
Steam Electric Power	Atascosa	Nueces	465	465	465	465	465	465
Livestock	Atascosa	Nueces	0	0	0	0	0	0
Irrigation	Atascosa	Nueces	182	182	182	182	182	182
Benton City WSC	Atascosa	San Antonio	20	(2)	(23)	(36)	(51)	(68)
Lytle	Atascosa	San Antonio	(4)	(5)	(6)	(7)	(7)	(8)
San Antonio Water System	Atascosa	San Antonio	0	0	0	0	0	0
Mining	Atascosa	San Antonio	0	0	0	0	0	0
Livestock	Atascosa	San Antonio	0	0	0	0	0	0
Irrigation	Atascosa	San Antonio	0	0	0	0	0	0
Atascosa Rural WSC	Bexar	Nueces	(75)	(92)	(107)	(120)	(135)	(153)
Lytle	Bexar	Nueces	(15)	(19)	(23)	(27)	(31)	(36)
San Antonio Water System	Bexar	Nueces	161	54	(19)	(75)	(119)	(186)
County-Other	Bexar	Nueces	564	545	540	535	533	538
Manufacturing	Bexar	Nueces	3,935	3,929	3,924	3,918	3,913	3,907
Livestock	Bexar	Nueces	0	0	0	0	0	0
Irrigation	Bexar	Nueces	5,341	5,341	5,341	5,341	5,341	5,341
Air Force Village II Inc	Bexar	San Antonio	130	130	130	130	130	130
Alamo Heights	Bexar	San Antonio	(488)	(483)	(483)	(483)	(483)	(483)

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region L Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Atascosa Rural WSC	Bexar	San Antonio	(1,126)	(1,372)	(1,599)	(1,797)	(2,024)	(2,283)
Bexar County WCID 10	Bexar	San Antonio	(377)	(541)	(691)	(825)	(978)	(1,154)
Converse	Bexar	San Antonio	(552)	(538)	(538)	(538)	(538)	(538)
East Central SUD	Bexar	San Antonio	(3,045)	(3,842)	(4,570)	(5,222)	(5,960)	(6,811)
Elmendorf	Bexar	San Antonio	751	562	306	(40)	(373)	(1,016)
Fair Oaks Ranch	Bexar	San Antonio	94	(166)	(285)	(331)	(342)	(342)
Fort Sam Houston	Bexar	San Antonio	(14,151)	(14,142)	(14,142)	(14,142)	(14,142)	(14,142)
Green Valley SUD	Bexar	San Antonio	282	197	117	48	(20)	(81)
Kirby	Bexar	San Antonio	(138)	(248)	(270)	(270)	(270)	(270)
La Coste	Bexar	San Antonio	0	0	0	0	0	0
Lackland Air Force Base	Bexar	San Antonio	1,103	1,116	1,116	1,116	1,116	1,116
Leon Valley	Bexar	San Antonio	(763)	(1,129)	(1,129)	(1,129)	(1,129)	(1,129)
Live Oak	Bexar	San Antonio	(211)	(202)	(202)	(202)	(228)	(202)
Lytle	Bexar	San Antonio	0	0	(1)	(1)	(1)	(1)
Oak Hills WSC	Bexar	San Antonio	0	0	0	0	0	0
Randolph Air Force Base	Bexar	San Antonio	5,583	8,562	8,562	8,562	8,562	8,562
San Antonio Water System	Bexar	San Antonio	54,070	26,571	8,496	(12,304)	(23,249)	(39,694)
Schertz	Bexar	San Antonio	48	(323)	(772)	(1,216)	(1,733)	(2,335)
Selma	Bexar	San Antonio	(534)	(949)	(1,356)	(1,717)	(2,134)	(2,617)
Shavano Park	Bexar	San Antonio	(48)	(121)	(186)	(245)	(312)	(389)
The Oaks WSC	Bexar	San Antonio	(47)	(75)	(100)	(123)	(149)	(178)
Universal City	Bexar	San Antonio	726	583	525	515	505	493
Water Services	Bexar	San Antonio	199	168	134	101	59	6
County-Other	Bexar	San Antonio	10,025	9,859	9,668	9,625	9,561	9,773
Manufacturing	Bexar	San Antonio	(16)	(338)	(673)	(1,020)	(1,381)	(1,755)
Mining	Bexar	San Antonio	3,643	2,911	2,205	1,553	955	426
Steam Electric Power	Bexar	San Antonio	43,358	43,358	43,358	43,358	43,358	43,358
Livestock	Bexar	San Antonio	0	0	0	0	0	1
Irrigation	Bexar	San Antonio	10,195	10,195	10,195	10,195	10,195	10,195
Creedmoor-Maha WSC*	Caldwell	Colorado	2,900	1,692	670	(351)	(1,396)	(2,466)
Polonia WSC*	Caldwell	Colorado	1	413	343	261	161	43
County-Other	Caldwell	Colorado	0	70	50	62	46	11
Livestock	Caldwell	Colorado	0	0	0	0	0	0

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region L Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Irrigation	Caldwell	Colorado	0	0	0	0	0	0
Aqua WSC*	Caldwell	Guadalupe	(18)	(26)	(33)	(43)	(54)	(67)
County Line SUD	Caldwell	Guadalupe	411	259	153	34	(35)	(73)
Creedmoor-Maha WSC*	Caldwell	Guadalupe	0	0	0	0	0	0
Goforth SUD*	Caldwell	Guadalupe	137	68	15	(27)	(60)	(89)
Gonzales County WSC	Caldwell	Guadalupe	9	9	10	10	11	12
Lockhart	Caldwell	Guadalupe	0	170	(99)	(369)	(639)	(908)
Luling	Caldwell	Guadalupe	0	808	788	762	733	703
Martindale WSC	Caldwell	Guadalupe	20	(110)	(162)	(216)	(274)	(338)
Maxwell SUD	Caldwell	Guadalupe	655	287	(71)	(415)	(779)	(848)
Polonia WSC*	Caldwell	Guadalupe	1	876	728	552	340	90
San Marcos	Caldwell	Guadalupe	(90)	(94)	(93)	(93)	(93)	(93)
Tri Community WSC	Caldwell	Guadalupe	325	318	313	307	298	289
County-Other	Caldwell	Guadalupe	18	251	185	218	171	54
Manufacturing	Caldwell	Guadalupe	(9)	(10)	(11)	(12)	(13)	(14)
Mining	Caldwell	Guadalupe	0	0	0	0	0	350
Livestock	Caldwell	Guadalupe	0	0	0	0	0	0
Irrigation	Caldwell	Guadalupe	0	0	0	0	0	0
Point Comfort	Calhoun	Colorado-Lavaca	123	126	129	131	135	138
County-Other	Calhoun	Colorado-Lavaca	48	44	39	38	33	24
Manufacturing	Calhoun	Colorado-Lavaca	1,492	141	(1,259)	(2,711)	(4,217)	(5,779)
Steam Electric Power	Calhoun	Colorado-Lavaca	0	0	0	0	0	0
Livestock	Calhoun	Colorado-Lavaca	0	0	0	0	0	0
Irrigation	Calhoun	Colorado-Lavaca	175	175	175	175	175	175
Guadalupe-Blanco River Authority	Calhoun	Lavaca-Guadalupe	0	0	0	0	0	0
Port Lavaca	Calhoun	Lavaca-Guadalupe	2,911	2,980	3,056	3,133	3,214	3,300
Port Oconnor Improvement District	Calhoun	Lavaca-Guadalupe	41	44	48	51	54	58
Seadrift	Calhoun	Lavaca-Guadalupe	98	105	113	121	129	138

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DRAFT Region L Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
County-Other	Calhoun	Lavaca-Guadalupe	0	0	0	0	0	0
Manufacturing	Calhoun	Lavaca-Guadalupe	612	(27)	(689)	(1,376)	(2,088)	(2,827)
Livestock	Calhoun	Lavaca-Guadalupe	0	0	0	0	0	0
Irrigation	Calhoun	Lavaca-Guadalupe	(9,173)	(9,173)	(9,173)	(9,173)	(9,173)	(9,173)
County-Other	Calhoun	San Antonio-Nueces	0	0	0	0	0	0
Manufacturing	Calhoun	San Antonio-Nueces	29	(1)	(33)	(66)	(100)	(135)
3009 Water	Comal	Guadalupe	1,235	1,127	983	801	591	351
Canyon Lake Water Service*	Comal	Guadalupe	3,224	(79)	(2,286)	(3,718)	(9,080)	(15,000)
Clear Water Estates Water System	Comal	Guadalupe	(100)	(528)	(1,098)	(1,822)	(2,649)	(3,596)
Crystal Clear SUD	Comal	Guadalupe	(800)	(1,656)	(1,768)	(1,865)	(1,951)	(2,029)
Garden Ridge	Comal	Guadalupe	(661)	(939)	(1,220)	(1,543)	(1,926)	(2,381)
Green Valley SUD	Comal	Guadalupe	209	181	132	68	(30)	(156)
KT Water Development	Comal	Guadalupe	(486)	(973)	(1,624)	(2,448)	(3,391)	(4,471)
New Braunfels	Comal	Guadalupe	1,764	(6,957)	(18,324)	(32,604)	(49,133)	(68,172)
San Antonio Water System	Comal	Guadalupe	31	12	1	(11)	(17)	(24)
Schertz	Comal	Guadalupe	4	(47)	(121)	(216)	(339)	(492)
Wingert Water Systems	Comal	Guadalupe	(71)	(111)	(165)	(175)	(175)	(175)
County-Other	Comal	Guadalupe	735	293	(1,029)	(6,472)	(9,798)	(13,931)
Manufacturing	Comal	Guadalupe	2,218	2,185	2,150	2,114	2,077	2,039
Mining	Comal	Guadalupe	(2,967)	(5,084)	(7,218)	(9,340)	(11,386)	(13,268)
Livestock	Comal	Guadalupe	0	0	0	0	0	0
Irrigation	Comal	Guadalupe	174	174	174	174	174	174
3009 Water	Comal	San Antonio	42	39	34	27	20	12
Canyon Lake Water Service*	Comal	San Antonio	688	(17)	(487)	(793)	(1,938)	(3,202)
Fair Oaks Ranch	Comal	San Antonio	32	(60)	(107)	(126)	(131)	(131)
Garden Ridge	Comal	San Antonio	(502)	(696)	(891)	(1,116)	(1,384)	(1,700)

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DRAFT Region L Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	County	Basin	2030	2040	2050	2060	2070	2080
Guadalupe-Blanco River Authority	Comal	San Antonio	0	0	0	0	0	0
San Antonio Water System	Comal	San Antonio	19	7	2	(7)	(12)	(17)
Selma	Comal	San Antonio	(35)	(81)	(148)	(237)	(350)	(486)
Water Services	Comal	San Antonio	89	65	47	32	17	2
County-Other	Comal	San Antonio	(79)	(175)	(463)	(1,648)	(2,373)	(3,273)
Mining	Comal	San Antonio	0	0	0	0	0	0
Livestock	Comal	San Antonio	0	0	0	0	0	0
Irrigation	Comal	San Antonio	0	0	0	0	0	0
Cuero	DeWitt	Guadalupe	22	30	43	50	59	67
Gonzales County WSC	DeWitt	Guadalupe	13	13	13	14	14	14
Yorktown	DeWitt	Guadalupe	55	56	58	60	61	63
County-Other	DeWitt	Guadalupe	319	323	326	325	323	321
Manufacturing	DeWitt	Guadalupe	5	4	4	4	3	3
Mining	DeWitt	Guadalupe	812	812	812	812	812	2,263
Livestock	DeWitt	Guadalupe	0	0	0	0	0	0
Irrigation	DeWitt	Guadalupe	57	57	57	57	57	57
Yoakum*	DeWitt	Lavaca	0	4	10	18	28	39
County-Other	DeWitt	Lavaca	31	32	31	31	31	31
Manufacturing	DeWitt	Lavaca	127	119	109	99	90	79
Mining	DeWitt	Lavaca	31	31	31	31	31	54
Livestock	DeWitt	Lavaca	0	0	0	0	0	0
Irrigation	DeWitt	Lavaca	189	189	189	189	189	189
County-Other	DeWitt	Lavaca-Guadalupe	0	0	0	0	0	0
Livestock	DeWitt	Lavaca-Guadalupe	0	0	0	0	0	0
Irrigation	DeWitt	Lavaca-Guadalupe	4	4	4	4	4	4
County-Other	DeWitt	San Antonio	0	1	1	1	1	1
Mining	DeWitt	San Antonio	133	133	133	133	133	346
Livestock	DeWitt	San Antonio	0	0	0	0	0	0
Irrigation	DeWitt	San Antonio	23	23	23	23	23	23
Asherton	Dimmit	Nueces	57	64	71	78	86	94
Big Wells	Dimmit	Nueces	103	107	110	114	117	122
Carrizo Hill WSC	Dimmit	Nueces	41	27	9	(12)	(44)	(67)
Carrizo Springs	Dimmit	Nueces	586	644	709	771	836	908

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DRAFT Region L Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
County-Other	Dimmit	Nueces	53	81	110	141	185	261
Mining	Dimmit	Nueces	(4,798)	(4,798)	(4,798)	(4,798)	(4,798)	692
Livestock	Dimmit	Nueces	0	0	0	0	0	0
Irrigation	Dimmit	Nueces	(3,917)	(3,917)	(3,917)	(3,917)	(3,917)	(3,917)
County-Other	Dimmit	Rio Grande	0	0	1	1	2	3
Mining	Dimmit	Rio Grande	(653)	(653)	(653)	(653)	(653)	0
Livestock	Dimmit	Rio Grande	0	0	0	0	0	0
Irrigation	Dimmit	Rio Grande	(419)	(419)	(419)	(419)	(419)	(419)
Benton City WSC	Frio	Nueces	13	(2)	(19)	(28)	(37)	(47)
Dilley	Frio	Nueces	923	630	425	407	387	365
Moore WSC	Frio	Nueces	3,921	3,903	3,890	3,888	3,886	3,884
Pearsall	Frio	Nueces	(250)	(483)	(649)	(677)	(709)	(745)
County-Other	Frio	Nueces	17	268	439	423	405	383
Mining	Frio	Nueces	(4,034)	(4,035)	(4,035)	(4,036)	(4,036)	1,958
Steam Electric Power	Frio	Nueces	70	70	70	70	70	70
Livestock	Frio	Nueces	0	0	0	0	0	0
Irrigation	Frio	Nueces	409	409	385	366	343	343
County-Other	Goliad	Guadalupe	0	10	16	21	29	36
Mining	Goliad	Guadalupe	6	6	6	6	6	6
Steam Electric Power	Goliad	Guadalupe	19,389	19,389	19,389	19,389	19,155	18,895
Livestock	Goliad	Guadalupe	0	0	0	0	0	0
Irrigation	Goliad	Guadalupe	143	143	143	143	143	143
Goliad	Goliad	San Antonio	627	628	628	628	628	628
County-Other	Goliad	San Antonio	69	78	82	88	93	100
Livestock	Goliad	San Antonio	0	0	0	0	0	0
Irrigation	Goliad	San Antonio	(184)	(36)	113	259	408	408
County-Other	Goliad	San Antonio-Nueces	0	2	3	4	5	7
Livestock	Goliad	San Antonio-Nueces	0	0	0	0	0	0
Irrigation	Goliad	San Antonio-Nueces	11	18	24	30	34	34
Fayette WSC*	Gonzales	Guadalupe	0	0	0	0	0	0
Gonzales	Gonzales	Guadalupe	3,330	3,336	3,363	3,392	3,423	3,456

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DRAFT Region L Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Gonzales County WSC	Gonzales	Guadalupe	460	459	476	495	513	532
Luling	Gonzales	Guadalupe	0	7	7	6	6	5
Nixon	Gonzales	Guadalupe	524	526	531	537	544	551
Smiley	Gonzales	Guadalupe	23	24	25	27	29	31
Waelder	Gonzales	Guadalupe	460	461	463	467	470	473
County-Other	Gonzales	Guadalupe	3	5	9	12	18	24
Manufacturing	Gonzales	Guadalupe	501	415	326	234	139	40
Mining	Gonzales	Guadalupe	(3,254)	(3,284)	(3,320)	(3,355)	(3,391)	2,316
Livestock	Gonzales	Guadalupe	0	0	0	0	0	0
Irrigation	Gonzales	Guadalupe	440	440	440	440	440	440
County-Other	Gonzales	Lavaca	0	0	0	1	1	1
Mining	Gonzales	Lavaca	(377)	(380)	(382)	(385)	(388)	39
Livestock	Gonzales	Lavaca	0	0	0	0	0	0
Crystal Clear SUD	Guadalupe	Guadalupe	(1,689)	(5,521)	(6,999)	(8,830)	(10,983)	(13,500)
Gonzales County WSC	Guadalupe	Guadalupe	8	10	13	17	22	27
Green Valley SUD	Guadalupe	Guadalupe	2,190	1,685	1,106	496	(202)	(1,002)
Martindale WSC	Guadalupe	Guadalupe	0	(24)	(37)	(53)	(73)	(96)
New Braunfels	Guadalupe	Guadalupe	621	(2,483)	(6,296)	(10,465)	(15,053)	(20,190)
Schertz	Guadalupe	Guadalupe	15	(125)	(265)	(404)	(561)	(739)
Seguin	Guadalupe	Guadalupe	2,366	1,598	947	564	170	(234)
Springs Hill WSC	Guadalupe	Guadalupe	1,076	(1,874)	(2,892)	(3,964)	(5,180)	(6,562)
Tri Community WSC	Guadalupe	Guadalupe	5	6	6	5	5	5
Water Services	Guadalupe	Guadalupe	11	7	5	3	1	0
County-Other	Guadalupe	Guadalupe	230	123	(10)	(148)	(308)	(491)
Manufacturing	Guadalupe	Guadalupe	604	513	418	298	152	1
Mining	Guadalupe	Guadalupe	(428)	(428)	(428)	(428)	(428)	342
Steam Electric Power	Guadalupe	Guadalupe	73	73	73	73	73	73
Livestock	Guadalupe	Guadalupe	0	0	0	0	0	0
Irrigation	Guadalupe	Guadalupe	(20)	(20)	(20)	(20)	(20)	(20)
Cibolo	Guadalupe	San Antonio	1,046	517	(93)	(738)	(1,476)	(2,321)
East Central SUD	Guadalupe	San Antonio	(99)	(134)	(176)	(213)	(266)	(318)
Green Valley SUD	Guadalupe	San Antonio	4,693	3,606	2,374	1,058	(434)	(2,142)
Marion	Guadalupe	San Antonio	222	236	226	215	202	188
Schertz	Guadalupe	San Antonio	117	(1,031)	(2,193)	(3,342)	(4,639)	(6,110)
Selma	Guadalupe	San Antonio	(294)	(388)	(454)	(500)	(540)	(577)

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DRAFT Region L Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Springs Hill WSC	Guadalupe	San Antonio	209	(53)	(143)	(238)	(346)	(468)
Universal City	Guadalupe	San Antonio	0	0	0	0	0	0
County-Other	Guadalupe	San Antonio	49	28	2	(26)	(57)	(93)
Manufacturing	Guadalupe	San Antonio	100	61	20	0	0	0
Livestock	Guadalupe	San Antonio	0	0	0	0	0	0
Irrigation	Guadalupe	San Antonio	20	20	20	20	20	20
County Line SUD	Hays	Guadalupe	585	(2,496)	(6,273)	(9,169)	(10,824)	(11,735)
Creedmoor-Maha WSC*	Hays	Guadalupe	0	0	0	0	0	0
Crystal Clear SUD	Hays	Guadalupe	(370)	(1,271)	(1,469)	(1,548)	(1,620)	(1,682)
Goforth SUD*	Hays	Guadalupe	7,383	4,880	1,468	(3,278)	(8,948)	(15,439)
Kyle	Hays	Guadalupe	6,045	3,176	(8)	(1,458)	(1,936)	(2,287)
Maxwell SUD	Hays	Guadalupe	734	418	(153)	(1,058)	(2,373)	(2,990)
San Marcos	Hays	Guadalupe	3,080	(3,466)	(8,335)	(11,930)	(14,073)	(15,695)
South Buda WCID 1	Hays	Guadalupe	224	(169)	(689)	(1,392)	(2,197)	(3,119)
Texas State University	Hays	Guadalupe	(619)	(613)	(613)	(613)	(613)	(613)
Wimberley WSC	Hays	Guadalupe	165	(95)	(439)	(907)	(1,443)	(2,056)
County-Other*	Hays	Guadalupe	721	899	(406)	(6,114)	(12,427)	(22,488)
Manufacturing*	Hays	Guadalupe	13	11	9	7	5	3
Mining*	Hays	Guadalupe	41	34	28	20	10	0
Steam Electric Power	Hays	Guadalupe	515	515	515	515	515	515
Livestock*	Hays	Guadalupe	(12)	(12)	(12)	(12)	(12)	(12)
Irrigation*	Hays	Guadalupe	96	96	96	96	96	96
El Oso WSC*	Karnes	Guadalupe	2	2	1	1	0	1
County-Other	Karnes	Guadalupe	2	2	1	1	1	0
Mining	Karnes	Guadalupe	(122)	(122)	(122)	(122)	(122)	0
Livestock	Karnes	Guadalupe	0	0	0	0	0	0
Irrigation	Karnes	Guadalupe	236	236	236	236	236	236
El Oso WSC*	Karnes	Nueces	16	14	13	10	7	4
Three Oaks WSC	Karnes	Nueces	12	13	12	11	9	10
County-Other	Karnes	Nueces	0	0	0	0	0	0
Mining	Karnes	Nueces	(102)	(102)	(102)	(102)	(102)	38
Livestock	Karnes	Nueces	0	0	0	0	0	0
Irrigation	Karnes	Nueces	(78)	(78)	(78)	(78)	(78)	(78)
El Oso WSC*	Karnes	San Antonio	454	397	347	289	214	117
Falls City	Karnes	San Antonio	37	32	26	19	12	3

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DRAFT Region L Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Karnes City	Karnes	San Antonio	191	170	147	121	91	57
Kenedy	Karnes	San Antonio	527	454	380	297	200	90
Runge	Karnes	San Antonio	50	41	31	20	7	(7)
Sunko WSC	Karnes	San Antonio	40	28	20	11	5	2
Three Oaks WSC	Karnes	San Antonio	53	49	45	42	42	36
County-Other	Karnes	San Antonio	78	66	53	38	20	0
Manufacturing	Karnes	San Antonio	15	12	9	6	3	0
Mining	Karnes	San Antonio	(1,216)	(1,216)	(1,216)	(1,216)	(1,216)	438
Livestock	Karnes	San Antonio	0	0	0	0	0	0
Irrigation	Karnes	San Antonio	(100)	(100)	(659)	(659)	(659)	(659)
El Oso WSC*	Karnes	San Antonio-Nueces	5	4	3	3	2	1
County-Other	Karnes	San Antonio-Nueces	0	0	0	0	0	0
Livestock	Karnes	San Antonio-Nueces	0	0	0	0	0	0
Irrigation	Karnes	San Antonio-Nueces	(7)	(7)	(7)	(7)	(7)	(7)
County-Other	Kendall	Colorado	81	58	50	39	27	13
Livestock	Kendall	Colorado	0	0	0	0	0	0
Guadalupe-Blanco River Authority	Kendall	Guadalupe	0	0	0	0	0	0
Kendall County WCID 1	Kendall	Guadalupe	466	447	372	286	188	75
County-Other	Kendall	Guadalupe	2,393	1,530	1,228	854	414	(94)
Manufacturing	Kendall	Guadalupe	(43)	(45)	(47)	(49)	(51)	(53)
Livestock	Kendall	Guadalupe	0	0	0	0	0	0
Irrigation	Kendall	Guadalupe	268	268	268	268	268	268
Boerne	Kendall	San Antonio	1,248	(760)	(3,365)	(6,388)	(9,850)	(13,812)
Fair Oaks Ranch	Kendall	San Antonio	45	(93)	(173)	(207)	(216)	(216)
Guadalupe-Blanco River Authority	Kendall	San Antonio	0	0	0	0	0	0
Kendall West Utility	Kendall	San Antonio	163	77	(36)	(168)	(318)	(490)
Water Services	Kendall	San Antonio	12	8	5	3	2	0
County-Other	Kendall	San Antonio	676	153	(30)	(257)	(524)	(832)
Livestock	Kendall	San Antonio	0	0	0	0	0	0

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DRAFT Region L Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Irrigation	Kendall	San Antonio	4	4	4	4	4	4
Cotulla	La Salle	Nueces	50	70	72	65	44	4
Encinal WSC	La Salle	Nueces	82	74	62	47	27	0
County-Other	La Salle	Nueces	7	3	17	45	82	131
Mining	La Salle	Nueces	(4,867)	(4,867)	(4,867)	(4,867)	(4,867)	529
Livestock	La Salle	Nueces	0	0	0	0	0	0
Irrigation	La Salle	Nueces	(413)	(413)	(413)	(413)	(413)	(413)
Benton City WSC	Medina	Nueces	60	(7)	(63)	(94)	(128)	(166)
Devine	Medina	Nueces	135	130	122	111	98	85
East Medina County SUD	Medina	Nueces	119	70	31	6	(21)	(54)
Hondo	Medina	Nueces	(288)	(197)	(149)	(160)	(172)	(183)
Lytle	Medina	Nueces	(39)	(47)	(54)	(60)	(67)	(73)
Medina County WCID 2	Medina	Nueces	484	487	489	488	488	487
Medina River West WSC	Medina	Nueces	209	205	201	199	197	195
Natalia	Medina	Nueces	(4)	2	(7)	(12)	(13)	(8)
Ville Dalsace Water Supply	Medina	Nueces	(42)	(47)	(51)	(53)	(55)	(58)
West Medina WSC	Medina	Nueces	44	29	26	21	13	26
Yancey WSC	Medina	Nueces	46	43	41	40	38	36
County-Other	Medina	Nueces	906	836	821	871	905	883
Manufacturing	Medina	Nueces	1,569	1,568	1,567	1,566	1,565	1,564
Mining	Medina	Nueces	(2,804)	(3,153)	(3,459)	(3,738)	(3,983)	(4,186)
Livestock	Medina	Nueces	0	0	0	0	0	0
Irrigation	Medina	Nueces	(22,386)	(22,463)	(22,546)	(22,615)	(22,680)	(22,732)
Canyon Lake Water Service*	Medina	San Antonio	16	(1)	(12)	(17)	(32)	(43)
Castroville	Medina	San Antonio	(533)	(634)	(786)	(999)	(1,194)	(1,322)
East Medina County SUD	Medina	San Antonio	10	6	3	1	(2)	(4)
La Coste	Medina	San Antonio	(3)	0	1	(1)	(3)	(5)
Medina River West WSC	Medina	San Antonio	106	104	103	102	100	98
San Antonio Water System	Medina	San Antonio	163	186	32	(148)	(241)	(359)
Ville Dalsace Water Supply	Medina	San Antonio	(40)	(45)	(48)	(50)	(52)	(55)
Yancey WSC	Medina	San Antonio	571	537	508	490	469	445

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DRAFT Region L Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
County-Other	Medina	San Antonio	824	773	760	798	822	807
Mining	Medina	San Antonio	(238)	(283)	(324)	(360)	(392)	(418)
Livestock	Medina	San Antonio	0	0	0	0	0	0
Irrigation	Medina	San Antonio	(1,216)	(1,216)	(1,216)	(1,216)	(1,216)	(1,216)
County-Other	Refugio	San Antonio	10	11	11	11	12	12
Livestock	Refugio	San Antonio	0	0	0	0	0	0
Refugio	Refugio	San Antonio-Nueces	171	178	180	177	164	135
Woodsboro	Refugio	San Antonio-Nueces	6	19	32	45	61	79
County-Other	Refugio	San Antonio-Nueces	14	32	49	63	82	111
Livestock	Refugio	San Antonio-Nueces	0	0	0	0	0	0
Irrigation	Refugio	San Antonio-Nueces	1	1	1	1	1	1
Concan WSC	Uvalde	Nueces	2	4	7	10	13	17
Knippa WSC	Uvalde	Nueces	126	128	132	135	140	145
Sabinal	Uvalde	Nueces	3	11	21	32	45	59
Uvalde	Uvalde	Nueces	(717)	(635)	(530)	(411)	(288)	(164)
Windmill WSC	Uvalde	Nueces	153	182	211	240	273	311
County-Other	Uvalde	Nueces	1,854	1,858	1,867	1,878	1,890	1,904
Mining	Uvalde	Nueces	(1,609)	(1,828)	(2,055)	(2,271)	(2,479)	(2,676)
Livestock	Uvalde	Nueces	0	0	0	0	0	0
Irrigation	Uvalde	Nueces	(18,625)	(18,625)	(18,625)	(18,625)	(18,625)	(18,625)
Quail Creek MUD	Victoria	Guadalupe	1,087	1,083	1,082	1,082	1,083	1,084
Victoria	Victoria	Guadalupe	(5,552)	(5,691)	(5,728)	(5,678)	(5,620)	(5,554)
County-Other	Victoria	Guadalupe	(217)	(277)	(297)	(287)	(277)	(265)
Manufacturing	Victoria	Guadalupe	(38,960)	(40,419)	(41,932)	(43,501)	(45,128)	(46,815)
Mining	Victoria	Guadalupe	(338)	(357)	(374)	(387)	(399)	(408)
Steam Electric Power	Victoria	Guadalupe	(666)	(666)	(666)	(666)	(666)	(666)
Livestock	Victoria	Guadalupe	0	0	0	0	0	0
Irrigation	Victoria	Guadalupe	(200)	(200)	(200)	(200)	(200)	(200)
County-Other	Victoria	Lavaca	13	13	13	13	13	13

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DRAFT Region L Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Livestock	Victoria	Lavaca	0	0	0	0	0	0
Victoria	Victoria	Lavaca-Guadalupe	(2,697)	(2,764)	(2,782)	(2,757)	(2,730)	(2,697)
Victoria County WCID 1	Victoria	Lavaca-Guadalupe	191	187	186	186	186	186
County-Other	Victoria	Lavaca-Guadalupe	51	15	4	9	15	23
Livestock	Victoria	Lavaca-Guadalupe	0	0	0	0	0	0
Irrigation	Victoria	Lavaca-Guadalupe	200	200	200	200	200	200
County-Other	Victoria	San Antonio	200	199	199	199	199	199
Livestock	Victoria	San Antonio	0	0	0	0	0	0
Sunko WSC	Wilson	Guadalupe	5	5	5	6	4	4
County-Other	Wilson	Guadalupe	93	94	95	98	101	104
Livestock	Wilson	Guadalupe	0	0	0	0	0	0
McCoy WSC*	Wilson	Nueces	5	3	1	(2)	(6)	(11)
Picosa WSC	Wilson	Nueces	0	0	0	0	0	0
Three Oaks WSC	Wilson	Nueces	268	261	251	244	235	225
County-Other	Wilson	Nueces	93	93	93	93	93	94
Mining	Wilson	Nueces	278	275	272	270	268	1,601
Livestock	Wilson	Nueces	0	0	0	0	0	0
Irrigation	Wilson	Nueces	417	417	417	417	417	417
C Willow Water	Wilson	San Antonio	4	(9)	(22)	(33)	(46)	(61)
East Central SUD	Wilson	San Antonio	(45)	(59)	(84)	(109)	(129)	(140)
El Oso WSC*	Wilson	San Antonio	14	14	14	13	11	6
Floresville	Wilson	San Antonio	1,119	1,051	977	912	837	752
La Vernia	Wilson	San Antonio	1,685	1,617	1,547	1,486	1,415	1,334
Oak Hills WSC	Wilson	San Antonio	(531)	(678)	(854)	(1,058)	(1,294)	(1,568)
Picosa WSC	Wilson	San Antonio	(24)	(72)	(122)	(165)	(215)	(273)
Poth	Wilson	San Antonio	389	393	396	399	402	405
S S WSC	Wilson	San Antonio	2,349	1,999	1,645	1,332	968	537
Springs Hill WSC	Wilson	San Antonio	(26)	(38)	(50)	(60)	(72)	(85)
Stockdale	Wilson	San Antonio	619	617	613	610	607	603
Sunko WSC	Wilson	San Antonio	822	766	705	650	586	509
Three Oaks WSC	Wilson	San Antonio	762	734	712	691	663	635
County-Other	Wilson	San Antonio	603	619	646	700	763	836
Manufacturing	Wilson	San Antonio	(5)	(7)	(9)	(11)	(14)	(17)
Mining	Wilson	San Antonio	683	676	671	664	659	3,935

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DRAFT Region L Water User Group (WUG) Needs or Surplus

			Water Supply Needs or Surplus (acre-feet per year)					
WUG Name	**County**	**Basin**	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Livestock	Wilson	San Antonio	0	0	0	0	0	0
Irrigation	Wilson	San Antonio	(331)	(331)	(331)	(331)	(331)	(331)
Batesville WSC	Zavala	Nueces	72	76	82	88	94	101
Crystal City	Zavala	Nueces	1,231	1,266	1,314	1,363	1,415	1,468
Loma Alta Chula Vista Water System	Zavala	Nueces	103	105	109	114	118	123
Zavala County WCID 1	Zavala	Nueces	997	1,007	1,021	1,035	1,050	1,066
County-Other	Zavala	Nueces	59	65	72	80	88	97
Manufacturing	Zavala	Nueces	(732)	(759)	(787)	(816)	(846)	(877)
Mining	Zavala	Nueces	(3,664)	(3,664)	(3,664)	(3,664)	(3,664)	1,267
Livestock	Zavala	Nueces	0	0	0	0	0	0
Irrigation	Zavala	Nueces	(14,189)	(14,189)	(14,189)	(14,189)	(14,189)	(14,189)

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

Second-tier needs are WUG split needs adjusted to include the implementation of recommended conservation and direct reuse water management strategies.

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Atascosa County WUG Total	**3,418**	**3,712**	**4,074**	**4,414**	**4,752**	**376**
Atascosa County / Nueces Basin WUG	**3,416**	**3,709**	**4,065**	**4,399**	**4,731**	**344**
Benton City WSC	0	0	36	70	116	177
Charlotte	0	0	0	0	0	0
El Oso WSC*	0	0	0	0	0	0
Jourdanton	0	0	0	0	0	0
Lytle	116	96	110	121	137	154
McCoy WSC*	0	0	0	0	0	13
Pleasanton	0	0	0	0	0	0
Poteet	0	0	0	0	0	0
San Antonio Water System	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	3,300	3,613	3,919	4,208	4,478	0
Steam Electric Power	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Atascosa County / San Antonio Basin WUG	**2**	**3**	**9**	**15**	**21**	**32**
Benton City WSC	0	0	6	11	18	28
Lytle	2	3	3	4	3	4
San Antonio Water System	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Bexar County WUG Total	**16,564**	**15,325**	**14,850**	**14,571**	**14,739**	**15,504**
Bexar County / Nueces Basin WUG	**82**	**95**	**108**	**118**	**130**	**145**
Atascosa Rural WSC	72	87	98	106	116	128
Lytle	10	8	10	12	14	17
San Antonio Water System	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Bexar County / San Antonio Basin WUG	**16,482**	**15,230**	**14,742**	**14,453**	**14,609**	**15,359**
Air Force Village II Inc	0	0	0	0	0	0
Alamo Heights	279	90	0	0	0	0
Atascosa Rural WSC	1,087	1,289	1,458	1,592	1,742	1,913
Bexar County WCID 10	247	266	256	322	398	483
Converse	478	409	339	269	202	135
East Central SUD	768	0	0	0	0	0
Elmendorf	0	0	0	0	179	697
Fair Oaks Ranch	0	0	0	0	0	0
Fort Sam Houston	12,399	10,823	9,405	8,128	6,980	5,946
Green Valley SUD	0	0	0	0	0	9
Kirby	116	205	201	191	191	191
La Coste	0	0	0	0	0	0
Lackland Air Force Base	0	0	0	0	0	0
Leon Valley	719	1,035	984	935	885	838
Live Oak	0	0	0	0	0	0
Lytle	0	0	0	0	0	0

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Bexar County / San Antonio Basin WUG	**16,482**	**15,230**	**14,742**	**14,453**	**14,609**	**15,359**
Oak Hills WSC	0	0	0	0	0	0
Randolph Air Force Base	0	0	0	0	0	0
San Antonio Water System	0	0	0	0	0	0
Schertz	0	47	381	693	1,053	1,459
Selma	348	681	983	1,228	1,508	1,826
Shavano Park	0	1	0	0	0	0
The Oaks WSC	25	46	62	75	90	107
Universal City	0	0	0	0	0	0
Water Services	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Manufacturing	16	338	673	1,020	1,381	1,755
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Caldwell County WUG Total	**84**	**181**	**206**	**625**	**2,051**	**3,186**
Caldwell County / Colorado Basin WUG	**0**	**0**	**0**	**44**	**922**	**1,788**
Creedmoor-Maha WSC*	0	0	0	44	922	1,788
Polonia WSC*	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Caldwell County / Guadalupe Basin WUG	**84**	**181**	**206**	**581**	**1,129**	**1,398**
Aqua WSC*	0	0	0	0	0	0

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Caldwell County / Guadalupe Basin WUG	**84**	**181**	**206**	**581**	**1,129**	**1,398**
County Line SUD	0	0	0	0	0	0
Creedmoor-Maha WSC*	0	0	0	0	0	0
Goforth SUD*	0	0	0	17	42	61
Gonzales County WSC	0	0	0	0	0	0
Lockhart	0	0	0	20	173	318
Luling	0	0	0	0	0	0
Martindale WSC	0	88	124	160	198	248
Maxwell SUD	0	0	5	311	642	698
Polonia WSC*	0	0	0	0	0	0
San Marcos	75	83	66	61	61	59
Tri Community WSC	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Manufacturing	9	10	11	12	13	14
Mining	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Calhoun County WUG Total	**9,173**	**9,201**	**11,154**	**13,326**	**15,578**	**17,914**
Calhoun County / Colorado-Lavaca Basin WUG	**0**	**0**	**1,259**	**2,711**	**4,217**	**5,779**
Point Comfort	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Manufacturing	0	0	1,259	2,711	4,217	5,779
Steam Electric Power	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Calhoun County / Lavaca-Guadalupe Basin WUG	**9,173**	**9,200**	**9,862**	**10,549**	**11,261**	**12,000**
Guadalupe-Blanco River Authority	0	0	0	0	0	0
Port Lavaca	0	0	0	0	0	0
Port Oconnor Improvement District	0	0	0	0	0	0
Seadrift	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Manufacturing	0	27	689	1,376	2,088	2,827
Livestock	0	0	0	0	0	0
Irrigation	9,173	9,173	9,173	9,173	9,173	9,173
Calhoun County / San Antonio-Nueces Basin WUG	**0**	**1**	**33**	**66**	**100**	**135**
County-Other	0	0	0	0	0	0
Manufacturing	0	1	33	66	100	135
Comal County WUG Total	**5,151**	**10,182**	**15,266**	**30,544**	**51,171**	**73,836**
Comal County / Guadalupe Basin WUG	**4,707**	**9,548**	**14,038**	**28,012**	**47,010**	**67,859**
3009 Water	0	0	0	0	0	0
Canyon Lake Water Service*	0	0	1,193	2,133	6,481	11,087
Clear Water Estates Water System	0	242	535	858	1,162	1,451
Crystal Clear SUD	762	1,565	1,618	1,501	1,517	1,508
Garden Ridge	542	663	749	834	923	1,022
Green Valley SUD	0	0	0	0	0	35
KT Water Development	397	712	1,076	1,469	1,839	2,190
New Braunfels	0	1,239	1,162	6,856	16,092	26,561
San Antonio Water System	0	0	0	0	0	0
Schertz	0	0	47	115	207	322
Wingert Water Systems	39	43	53	53	45	38

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Comal County / Guadalupe Basin WUG	**4,707**	**9,548**	**14,038**	**28,012**	**47,010**	**67,859**
County-Other	0	0	387	4,853	7,358	10,377
Manufacturing	0	0	0	0	0	0
Mining	2,967	5,084	7,218	9,340	11,386	13,268
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Comal County / San Antonio Basin WUG	**444**	**634**	**1,228**	**2,532**	**4,161**	**5,977**
3009 Water	0	0	0	0	0	0
Canyon Lake Water Service*	0	0	254	455	1,383	2,367
Fair Oaks Ranch	0	0	0	0	0	0
Garden Ridge	419	503	562	622	686	752
Guadalupe-Blanco River Authority	0	0	0	0	0	0
San Antonio Water System	0	0	0	0	0	0
Selma	7	40	89	160	250	359
Water Services	0	0	0	0	0	0
County-Other	18	91	323	1,295	1,842	2,499
Mining	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
DeWitt County WUG Total	**0**	**0**	**0**	**0**	**0**	**0**
DeWitt County / Guadalupe Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
Cuero	0	0	0	0	0	0
Gonzales County WSC	0	0	0	0	0	0
Yorktown	0	0	0	0	0	0
County-Other	0	0	0	0	0	0

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
DeWitt County / Guadalupe Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
DeWitt County / Lavaca Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
Yoakum*	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
DeWitt County / Lavaca-Guadalupe Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
County-Other	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
DeWitt County / San Antonio Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
County-Other	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Dimmit County WUG Total	**9,787**	**9,787**	**9,787**	**9,787**	**9,793**	**4,345**
Dimmit County / Nueces Basin WUG	**8,715**	**8,715**	**8,715**	**8,715**	**8,721**	**3,926**
Asherton	0	0	0	0	0	0
Big Wells	0	0	0	0	0	0

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Dimmit County / Nueces Basin WUG	**8,715**	**8,715**	**8,715**	**8,715**	**8,721**	**3,926**
Carrizo Hill WSC	0	0	0	0	6	9
Carrizo Springs	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Mining	4,798	4,798	4,798	4,798	4,798	0
Livestock	0	0	0	0	0	0
Irrigation	3,917	3,917	3,917	3,917	3,917	3,917
Dimmit County / Rio Grande Basin WUG	**1,072**	**1,072**	**1,072**	**1,072**	**1,072**	**419**
County-Other	0	0	0	0	0	0
Mining	653	653	653	653	653	0
Livestock	0	0	0	0	0	0
Irrigation	419	419	419	419	419	419
Frio County WUG Total	**4,118**	**4,163**	**4,137**	**4,125**	**4,112**	**69**
Frio County / Nueces Basin WUG	**4,118**	**4,163**	**4,137**	**4,125**	**4,112**	**69**
Benton City WSC	0	0	6	10	13	18
Dilley	0	0	0	0	0	0
Moore WSC	0	0	0	0	0	0
Pearsall	84	128	96	79	63	51
County-Other	0	0	0	0	0	0
Mining	4,034	4,035	4,035	4,036	4,036	0
Steam Electric Power	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Goliad County WUG Total	**184**	**36**	**0**	**0**	**0**	**0**
Goliad County / Guadalupe Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
County-Other	0	0	0	0	0	0

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Goliad County / Guadalupe Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
Mining	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Goliad County / San Antonio Basin WUG	**184**	**36**	**0**	**0**	**0**	**0**
Goliad	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	184	36	0	0	0	0
Goliad County / San Antonio-Nueces Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
County-Other	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Gonzales County WUG Total	**3,631**	**3,664**	**3,702**	**3,740**	**3,779**	**0**
Gonzales County / Guadalupe Basin WUG	**3,254**	**3,284**	**3,320**	**3,355**	**3,391**	**0**
Fayette WSC*	0	0	0	0	0	0
Gonzales	0	0	0	0	0	0
Gonzales County WSC	0	0	0	0	0	0
Luling	0	0	0	0	0	0
Nixon	0	0	0	0	0	0
Smiley	0	0	0	0	0	0
Waelder	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Gonzales County / Guadalupe Basin WUG	**3,254**	**3,284**	**3,320**	**3,355**	**3,391**	**0**
Mining	3,254	3,284	3,320	3,355	3,391	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Gonzales County / Lavaca Basin WUG	**377**	**380**	**382**	**385**	**388**	**0**
County-Other	0	0	0	0	0	0
Mining	377	380	382	385	388	0
Livestock	0	0	0	0	0	0
Guadalupe County WUG Total	**2,265**	**8,504**	**11,650**	**16,275**	**23,190**	**30,949**
Guadalupe County / Guadalupe Basin WUG	**1,994**	**7,865**	**10,036**	**13,409**	**18,669**	**24,216**
Crystal Clear SUD	1,546	5,067	6,198	6,924	8,541	10,424
Gonzales County WSC	0	0	0	0	0	0
Green Valley SUD	0	0	0	0	0	176
Martindale WSC	0	19	28	40	54	74
New Braunfels	0	687	807	2,429	4,931	7,576
Schertz	0	35	139	237	342	458
Seguin	0	0	0	0	0	0
Springs Hill WSC	0	1,609	2,416	3,231	4,124	5,116
Tri Community WSC	0	0	0	0	0	0
Water Services	0	0	0	0	0	0
County-Other	0	0	0	100	229	372
Manufacturing	0	0	0	0	0	0
Mining	428	428	428	428	428	0
Steam Electric Power	0	0	0	0	0	0
Livestock	0	0	0	0	0	0

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Guadalupe County / Guadalupe Basin WUG	**1,994**	**7,865**	**10,036**	**13,409**	**18,669**	**24,216**
Irrigation	20	20	20	20	20	20
Guadalupe County / San Antonio Basin WUG	**271**	**639**	**1,614**	**2,866**	**4,521**	**6,733**
Cibolo	0	0	0	342	1,007	1,775
East Central SUD	27	0	0	0	0	0
Green Valley SUD	0	0	0	0	0	376
Marion	0	0	0	0	0	0
Schertz	0	290	1,153	1,956	2,833	3,788
Selma	244	319	360	379	386	384
Springs Hill WSC	0	30	101	173	253	341
Universal City	0	0	0	0	0	0
County-Other	0	0	0	16	42	69
Manufacturing	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Hays County WUG Total	**398**	**4,074**	**8,206**	**18,982**	**32,955**	**47,763**
Hays County / Guadalupe Basin WUG	**398**	**4,074**	**8,206**	**18,982**	**32,955**	**47,763**
County Line SUD	0	1,435	4,661	6,848	7,965	8,338
Creedmoor-Maha WSC*	0	0	0	0	0	0
Crystal Clear SUD	344	1,193	1,338	1,230	1,242	1,227
Goforth SUD*	0	0	0	1,759	6,397	11,513
Kyle	0	0	0	0	0	0
Maxwell SUD	0	0	0	751	1,957	2,530
San Marcos	0	1,257	1,260	2,366	3,964	4,650
South Buda WCID 1	0	121	579	1,180	1,840	2,567

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Hays County / Guadalupe Basin WUG	**398**	**4,074**	**8,206**	**18,982**	**32,955**	**47,763**
Texas State University	42	0	0	0	0	0
Wimberley WSC	0	56	356	753	1,190	1,669
County-Other*	0	0	0	4,083	8,388	15,257
Manufacturing*	0	0	0	0	0	0
Mining*	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
Livestock*	12	12	12	12	12	12
Irrigation*	0	0	0	0	0	0
Karnes County WUG Total	**1,625**	**1,625**	**2,184**	**2,184**	**2,184**	**744**
Karnes County / Guadalupe Basin WUG	**122**	**122**	**122**	**122**	**122**	**0**
El Oso WSC*	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Mining	122	122	122	122	122	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Karnes County / Nueces Basin WUG	**180**	**180**	**180**	**180**	**180**	**78**
El Oso WSC*	0	0	0	0	0	0
Three Oaks WSC	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Mining	102	102	102	102	102	0
Livestock	0	0	0	0	0	0
Irrigation	78	78	78	78	78	78
Karnes County / San Antonio Basin WUG	**1,316**	**1,316**	**1,875**	**1,875**	**1,875**	**659**
El Oso WSC*	0	0	0	0	0	0

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Karnes County / San Antonio Basin WUG	**1,316**	**1,316**	**1,875**	**1,875**	**1,875**	**659**
Falls City	0	0	0	0	0	0
Karnes City	0	0	0	0	0	0
Kenedy	0	0	0	0	0	0
Runge	0	0	0	0	0	0
Sunko WSC	0	0	0	0	0	0
Three Oaks WSC	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	1,216	1,216	1,216	1,216	1,216	0
Livestock	0	0	0	0	0	0
Irrigation	100	100	659	659	659	659
Karnes County / San Antonio-Nueces Basin WUG	**7**	**7**	**7**	**7**	**7**	**7**
El Oso WSC*	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	7	7	7	7	7	7
Kendall County WUG Total	**43**	**45**	**47**	**945**	**3,193**	**5,953**
Kendall County / Colorado Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
County-Other	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Kendall County / Guadalupe Basin WUG	**43**	**45**	**47**	**49**	**51**	**53**
Guadalupe-Blanco River Authority	0	0	0	0	0	0
Kendall County WCID 1	0	0	0	0	0	0
County-Other	0	0	0	0	0	0

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Kendall County / Guadalupe Basin WUG	**43**	**45**	**47**	**49**	**51**	**53**
Manufacturing	43	45	47	49	51	53
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Kendall County / San Antonio Basin WUG	**0**	**0**	**0**	**896**	**3,142**	**5,900**
Boerne	0	0	0	650	2,570	4,965
Fair Oaks Ranch	0	0	0	0	0	0
Guadalupe-Blanco River Authority	0	0	0	0	0	0
Kendall West Utility	0	0	0	107	225	356
Water Services	0	0	0	0	0	0
County-Other	0	0	0	139	347	579
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
La Salle County WUG Total	**5,280**	**5,280**	**5,280**	**5,280**	**5,280**	**413**
La Salle County / Nueces Basin WUG	**5,280**	**5,280**	**5,280**	**5,280**	**5,280**	**413**
Cotulla	0	0	0	0	0	0
Encinal WSC	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Mining	4,867	4,867	4,867	4,867	4,867	0
Livestock	0	0	0	0	0	0
Irrigation	413	413	413	413	413	413
Medina County WUG Total	**27,237**	**27,605**	**28,154**	**28,687**	**29,190**	**29,587**
Medina County / Nueces Basin WUG	**25,331**	**25,675**	**26,084**	**26,444**	**26,790**	**27,094**
Benton City WSC	0	0	18	31	47	65
Devine	0	0	0	0	0	0
East Medina County SUD	0	0	0	0	21	54

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Medina County / Nueces Basin WUG	**25,331**	**25,675**	**26,084**	**26,444**	**26,790**	**27,094**
Hondo	77	0	0	0	0	0
Lytle	28	24	28	30	32	33
Medina County WCID 2	0	0	0	0	0	0
Medina River West WSC	0	0	0	0	0	0
Natalia	0	0	0	0	0	0
Ville Dalsace Water Supply	36	35	33	30	27	24
West Medina WSC	0	0	0	0	0	0
Yancey WSC	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Mining	2,804	3,153	3,459	3,738	3,983	4,186
Livestock	0	0	0	0	0	0
Irrigation	22,386	22,463	22,546	22,615	22,680	22,732
Medina County / San Antonio Basin WUG	**1,906**	**1,930**	**2,070**	**2,243**	**2,400**	**2,493**
Canyon Lake Water Service*	0	0	7	11	22	29
Castroville	417	397	492	628	743	803
East Medina County SUD	0	0	0	0	2	4
La Coste	0	0	0	0	0	0
Medina River West WSC	0	0	0	0	0	0
San Antonio Water System	0	0	0	0	0	0
Ville Dalsace Water Supply	35	34	31	28	25	23
Yancey WSC	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Mining	238	283	324	360	392	418

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Medina County / San Antonio Basin WUG	**1,906**	**1,930**	**2,070**	**2,243**	**2,400**	**2,493**
Livestock	0	0	0	0	0	0
Irrigation	1,216	1,216	1,216	1,216	1,216	1,216
Refugio County WUG Total	**0**	**0**	**0**	**0**	**0**	**0**
Refugio County / San Antonio Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
County-Other	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Refugio County / San Antonio-Nueces Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
Refugio	0	0	0	0	0	0
Woodsboro	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Uvalde County WUG Total	**20,564**	**20,453**	**20,680**	**20,896**	**21,104**	**21,301**
Uvalde County / Nueces Basin WUG	**20,564**	**20,453**	**20,680**	**20,896**	**21,104**	**21,301**
Concan WSC	0	0	0	0	0	0
Knippa WSC	0	0	0	0	0	0
Sabinal	0	0	0	0	0	0
Uvalde	330	0	0	0	0	0
Windmill WSC	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Mining	1,609	1,828	2,055	2,271	2,479	2,676
Livestock	0	0	0	0	0	0
Irrigation	18,625	18,625	18,625	18,625	18,625	18,625

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Victoria County WUG Total	**46,948**	**47,179**	**47,376**	**47,641**	**48,086**	**49,429**
Victoria County / Guadalupe Basin WUG	**44,786**	**45,433**	**46,058**	**46,737**	**47,554**	**48,997**
Quail Creek MUD	0	0	0	0	0	0
Victoria	4,448	3,591	2,710	1,856	1,086	882
County-Other	174	200	176	127	75	26
Manufacturing	38,960	40,419	41,932	43,501	45,128	46,815
Mining	338	357	374	387	399	408
Steam Electric Power	666	666	666	666	666	666
Livestock	0	0	0	0	0	0
Irrigation	200	200	200	200	200	200
Victoria County / Lavaca Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
County-Other	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Victoria County / Lavaca-Guadalupe Basin WUG	**2,162**	**1,746**	**1,318**	**904**	**532**	**432**
Victoria	2,162	1,746	1,318	904	532	432
Victoria County WCID 1	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Victoria County / San Antonio Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
County-Other	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Wilson County WUG Total	**808**	**982**	**1,170**	**1,364**	**1,593**	**1,851**
Wilson County / Guadalupe Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
Sunko WSC	0	0	0	0	0	0

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Wilson County / Guadalupe Basin WUG	**0**	**0**	**0**	**0**	**0**	**0**
County-Other	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Wilson County / Nueces Basin WUG	**0**	**0**	**0**	**0**	**0**	**1**
McCoy WSC*	0	0	0	0	0	1
Picosa WSC	0	0	0	0	0	0
Three Oaks WSC	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Wilson County / San Antonio Basin WUG	**808**	**982**	**1,170**	**1,364**	**1,593**	**1,850**
C Willow Water	0	0	0	0	5	11
East Central SUD	0	0	0	0	0	0
El Oso WSC*	0	0	0	0	0	0
Floresville	0	0	0	0	0	0
La Vernia	0	0	0	0	0	0
Oak Hills WSC	432	544	670	812	974	1,156
Picosa WSC	16	65	114	156	206	262
Poth	0	0	0	0	0	0
S S WSC	0	0	0	0	0	0
Springs Hill WSC	24	35	46	54	63	73
Stockdale	0	0	0	0	0	0
Sunko WSC	0	0	0	0	0	0
Three Oaks WSC	0	0	0	0	0	0

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DRAFT Region L Water User Group (WUG) Second-Tier Identified Water Needs

	WUG Second-Tier Needs (acre-feet per year)					
	2030	2040	2050	2060	2070	2080
Wilson County / San Antonio Basin WUG	**808**	**982**	**1,170**	**1,364**	**1,593**	**1,850**
County-Other	0	0	0	0	0	0
Manufacturing	5	7	9	11	14	17
Mining	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	331	331	331	331	331	331
Zavala County WUG Total	**18,585**	**18,612**	**18,640**	**18,669**	**18,699**	**15,066**
Zavala County / Nueces Basin WUG	**18,585**	**18,612**	**18,640**	**18,669**	**18,699**	**15,066**
Batesville WSC	0	0	0	0	0	0
Crystal City	0	0	0	0	0	0
Loma Alta Chula Vista Water System	0	0	0	0	0	0
Zavala County WCID 1	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Manufacturing	732	759	787	816	846	877
Mining	3,664	3,664	3,664	3,664	3,664	0
Livestock	0	0	0	0	0	0
Irrigation	14,189	14,189	14,189	14,189	14,189	14,189
Region L Second-Tier Needs Total	**175,863**	**190,610**	**206,563**	**242,055**	**291,449**	**318,286**

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INITIALLY PREPARED PLAN

CHAPTER 5: EVALUATION AND RECOMMENDATION OF WATER MANAGEMENT STRATEGIES

South Central Texas Regional Water Plan

B&V PROJECT NO. 411170

PREPARED FOR

South Central Texas Regional Water Planning Group

3 MARCH 2025

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Chapter 5: Evaluation and Recommendation of Water Management Strategies

APPENDICES

List of Abbreviations

%	Percent
acft	Acre-Feet
acft/yr	Acre-Feet per Year
ACT	Antiquities Code of Texas
AMI	Advanced Metering Infrastructure
ANSI	American National Standards Institute
ANWR	Aransas National Wildlife Refuge
ASME	American Society of Mechanical Engineers
ARWA	Alliance Regional Water Authority
ASR	Aquifer Storage and Recovery
BFZ	Balcones Fault Zone
BMP	Best Management Practice
BOD_5	Five-Day Biochemical Oxygen Demand
BSEACD	Barton Springs Edwards Aquifer Conservation District
BVRT	BVRT Utility Holding Company
CA	Certificate of Adjudication
$CBOD_5$	Five-Day Carbonaceous Biochemical Oxygen Demand
CCMA	Cibolo Creek Municipal Authority
CD	Conservation District
cfs	Cubic Feet per Second
CFU	Colony Forming Units
CLSUD	County Line SUD
CPM	Critical Period Management
CPS	City Public Services
CRWA	Canyon Regional Water Authority
CVLGC	Cibolo Valley Local Government Corporation
DB27	2027 Regional and State Water Planning Database
DCP	Drought Contingency Plan
DFC	Desired Future Condition
DPR	Direct Potable Reuse
EAA	Edwards Aquifer Authority
EAHCP	Edwards Aquifer Habitat Conservation Plan
EDYS	Ecological Dynamics Simulation
EMST	Ecological Mapping System of Texas

EQIP	Environmental Quality Incentive Program
EST	Elevated Storage Tank
ET	Evapotranspiration
FARM	Financial and Risk Management
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FM	Farm-to-Market
FRAT	Flow Regime Application Tool
GAM	Groundwater Availability Model
GBRA	Guadalupe-Blanco River Authority
GCD	Groundwater Conservation District
GIS	Geographic Information System
GLO	General Land Office
GMA	Groundwater Management Area
GPCD	Gallons per Capita per Day
gpd	Gallons per Day
gpm	Gallons per Minute
GSA WAM	Guadalupe-San Antonio River Basin Water Availability Model
GST	Ground Storage Tank
HB	House Bill
HCP	Habitat Conservation Plan
HSPS	High Service Pump Station
Hwy	Highway
IH	Interstate Highway
IPaC	Information for Planning and Consultation
IRP	Initial Regular Permit
MAG	Modeled Available Groundwater
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Level
MG	Million Gallon
mg/L	Milligrams per Liter
MGD	Million Gallons per Day
mL	Milliliter
MUD	Municipal Utility District
NHD	National Hydrography Dataset
NBU	New Braunfels Utilities

NETR	Nationwide Environmental Title Research
NHPA	National Historic Preservation Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Unit
NWI	National Wetlands Inventory
O&M	Operation and Maintenance
OCR	Off-Channel Reservoir
OTHM	Official Texas Historical Marker
PDSI	Palmer Drought Severity Index
psi	Pounds per Square Inch
PHS	Potential Historical Structures
Region L	South Central Texas Region
RO	Reverse Osmosis
RWP	Regional Water Plan
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SAL	State Antiquities Landmark
SAWS	San Antonio Water System
SB	Senate Bill
SCTRWP	South Central Texas Regional Water Plan
SCTRWPA	South Central Texas Regional Water Planning Area
SCTRWPG	South Central Texas Regional Water Planning Group
SCUCISD	Schertz-Cibolo-Universal City Independent School District
SGCN	Species of Greatest Conservation Need
SH	State Highway
SHPO	State Historic Preservation Office
SJR	Senate Joint Resolution
SSLGC	Schertz-Seguin Local Government Corporation
SUD	Special Utility District
SWCDs	Soil and Water Conservation Districts
SWIFT	State Water Implementation Fund for Texas
SWP	State Water Plan
SWTP	Surface Water Treatment Plant
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality

TDA	Texas Department of Agriculture
TDS	Total Dissolved Solids
TxDOT	Texas Department of Transportation
THC	Texas Historical Commission
TML	Texas Municipal League
TPWD	Texas Parks and Wildlife Department
TSSWCB	Texas State Soil and Water Conservation Board
TWC	Texas Water Code
TWDB	Texas Water Development Board
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
U.S. EPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UWCD	Underground Water Conservation District
VISPO	Voluntary Irrigation Suspension Program Option
WAM	Water Availability Model
WCAC	Water Conservation Advisory Council
WCID	Water Control and Improvement District
WMS	Water Management Strategy
WMSP	Water Management Strategy Project
WRC	Water Recycling Center
WSEP	Water Supply Enhancement Program
WQMP	Water Quality Management Plan
WRC	Water Recycling Center
WSC	Water Supply Corporation
WTP	Water Treatment Plant
WUG	Water User Group
WWP	Wholesale Water Provider
WWTP	Wastewater Treatment Plants

5.0 Evaluation and Recommendation of Water Management Strategies

The purpose of this chapter is to provide information on the identification and evaluation of water management strategies (WMSs) for the 2026 South Central Texas (Region L) Regional Water Plan (SCTRWP). A WMS is a plan to meet an identified need for additional water by an entity, which can mean increasing the total water supply or maximizing an existing supply, including through reducing demands. A water management strategy project (WMSP) is a water project that has a non-zero capital cost and is developed to implement one or more WMSs. When a WMSP is implemented, it is intended to develop, deliver, and/or treat additional water supply volumes, or conserve water for one or more entities. A WMS may or may not require the development of an associated WMSP for strategy implementation and one WMSP may be associated with multiple WMSs.

Chapter 5 is organized into three subchapters, summarized as follows:

- **Subchapter 5.1: Potentially Feasible Water Management Strategies.** Describes the process to identify potentially feasible WMSs, which strategies were identified as potentially feasible, which strategies were Recommended, and the implementation status of certain Recommended WMSs.
- **Subchapter 5.2: Water Management Strategy Evaluations.** Summarizes methodology and results of water management strategy evaluations for the 2026 SCTRWP, including a quantitative reporting for each WMS of the net quantity of water, reliability, financial costs, effects on environmental factors and agricultural resources
- **Subchapter 5.3: Water Conservation Information and Recommendations.** Consolidates and presents conservation-related recommendations.

5.1 Potentially Feasible Water Management Strategies

This subchapter includes descriptions of the process to identify WMSs, the WMSs designated by the South Central Texas Regional Water Planning Group (SCTRWPG) as Recommended, and the implementation status of certain recommended WMSs.

5.1.1 Process to Identify Potentially Feasible WMSs

The process for identification of potentially feasible WMSs was approved at a regular meeting of the SCTRWPG on November 2, 2023. The approved, documented process is as follows:

1. WMSs from the 2021 SCTRWP will be considered to determine if they are appropriate for inclusion in the 2026 SCTRWP.
2. Current water planning information, including specific WMSs of interest, will be solicited from water user groups (WUGs) and wholesale water providers (WWPs) within the South Central Texas (Region L) Regional Water Planning Area (SCTRWPA), including rural entities.
    a. Solicitation of planning information (to be initiated in 4th quarter 2023) will include a list of WMSs from the 2021 SCTRWP to determine whether the project sponsor wishes to include the WMSs in the 2026 SCTRWP.
    b. The solicitation will also request whether there are additional WMSs desired for inclusion in the 2026 SCTRWP.
3. In accordance with Statute (Texas Water Code [TWC] §16.053[e][5]) and rules (Title 31 of the Texas Administrative Code [TAC] §357.34, the SCTRWPG must consider certain types of WMSs for all identified water needs.
4. Information gathered from the solicitation and input from WUGs will be considered during development of a list of Potentially Feasible WMSs. The Potentially Feasible WMSs will be prepared and presented to the SCTRWPG at a regularly scheduled meeting (1st quarter 2024). Additional information may follow in subsequent SCTRWPG meetings.
5. Additional WMSs may be brought forth to the SCTRWPG for consideration and inclusion. The deadline for providing an additional WMS for inclusion in the 2026 SCTRWP is the 2nd quarter 2024 meeting, usually held in May.
6. The list of Potentially Feasible WMSs will be further considered to identify "potentially feasible" or "not potentially feasible" WMSs for WUGs and WWPs with identified water needs.
7. The SCTRWPG will reference and follow the SCTRWPG Bylaws and Guiding Principles, specifically Guiding Principle VII regarding "Minimum Standards for Water Management Strategies," Guiding Principle VIII regarding "Designation of Recommended and Alternative Strategies," and Guiding Principle IX regarding "Establishment of Management Supply."

Item No. 7 of the above process identifies three SCTRWPG Guiding Principles for use in the development of the 2026 SCTRWP. The Guiding Principles are provided in Appendix 5A.

5.1.2 Potentially Feasible Strategies for the 2026 South Central Texas Regional Water Plan

Using the documented process identified above, the SCTRWPG identified potentially feasible WMSs for the 2026 SCTRWP. This list of potentially feasible strategies includes the following:

- Municipal Water Conservation
- Non-municipal Water Conservation
- Drought Management
- Edwards Transfers
- Fresh Groundwater Development
- Brackish Groundwater Development
- Groundwater Conversions
- Facilities Expansion
- Recycled Water
- Brush Management
- Rainwater Harvesting
- Surface Water Rights
- Balancing Storage
- Alliance Regional Water Authority (ARWA) Carrizo-Wilcox Project (Phase 2)
- ARWA Direct Potable Reuse (DPR) Project (Phase 3)
- Canyon Regional Water Authority (CRWA) Expanded Brackish Carrizo-Wilcox Project
- CRWA Siesta Project
- CRWA Wells Ranch (Phase 3) Project
- Cibolo Valley Local Government Corporation (CVLGC) Carrizo Project
- Guadalupe Blanco River Authority (GBRA) Lower Basin New Appropriation
- GBRA WaterSECURE
- Medina County Regional Aquifer Storage and Recovery (ASR)
- New Braunfels Utilities (NBU) ASR
- NBU Trinity Well Field Expansion
- San Antonio Water System (SAWS) Expanded Local Carrizo Project
- SAWS Expanded Brackish Groundwater Project
- SAWS Regional Wilcox Project
- Schertz-Seguin Local Government Corporation (SSLGC) Expanded Brackish Wilcox Project
- SSLGC Expanded Carrizo Project
- Victoria ASR
- Victoria Groundwater-Surface Water Exchange
- Weather Modification

Evaluations for each of these potentially feasible WMSs can be found in Subchapter 5.2.

Appendix 5B provides a list of potentially feasible WMSs for WUGs with identified water needs (refer to Chapter 4: Identification of Water Needs). Several WUGs with identified needs do not have a potentially feasible WMS identified and are listed below. Sufficient data are not currently available for manufacturing, steam-electric power, and mining use categories for the South Central Texas Region to enable accurate demand reduction volumes and costs. However, the SCTRWPG strongly supports and recommends implementation of water conservation efforts for all WUGs.

- Manufacturing, Bexar
- Manufacturing, Caldwell
- Manufacturing, Calhoun
- Manufacturing, Kendall
- Manufacturing, Victoria
- Manufacturing, Wilson
- Manufacturing, Zavala
- Mining, Atascosa

- Mining, Comal
- Mining, Dimmit
- Mining, Frio
- Mining, Gonzales
- Mining, Guadalupe
- Mining, Karnes
- Mining, La Salle
- Mining, Medina
- Mining, Victoria
- Mining, Zavala
- Steam-Electric Power, Victoria

5.1.2.1 Recommended Strategies

On November 7, 2024, the SCTRWPG convened at a regularly-scheduled meeting to review evaluations of the potentially feasible WMSs. At this meeting, the SCTRWPG considered the potentially feasible WMSs and took action to identify certain strategies as Recommended or Alternative. Table 5.1-1 includes a summary of the Recommended WMSs, along with a cross reference to the section that describes each WMS evaluation.

Table 5.1-1 Recommended Water Management Strategies

Recommended Water Management Strategies	Strategy Evaluation Section Reference
Municipal Water Conservation	5.2.1
Non-municipal Water Conservation	5.2.2
Drought Management	5.2.3
Edwards Transfers	5.2.4
Fresh Groundwater Development	5.2.5
Brackish Groundwater Development	5.2.6
Facilities Expansion	5.2.8
Recycled Water	5.2.9
Rainwater Harvesting	5.2.11
ARWA Carrizo-Wilcox Project (Phase 2)	5.2.14
ARWA DPR Project (Phase 3)	5.2.15
CRWA Expanded Brackish Carrizo-Wilcox Project	5.2.16
CRWA Siesta Project	5.2.17
CRWA Wells Ranch (Phase 3) Project	5.2.18
CVLGC Carrizo Project	5.2.19
GBRA Lower Basin New Appropriation	5.2.20
GBRA WaterSECURE	5.2.21
Medina County Regional ASR Project	5.2.22
NBU ASR Project	5.2.23
NBU Trinity Well Field Expansion	5.2.24
SAWS Expanded Local Carrizo Project	5.2.25

Recommended Water Management Strategies	Strategy Evaluation Section Reference
SAWS Expanded Brackish Groundwater Project	5.2.26
SAWS Regional Wilcox Project	5.2.27
SSLGC Expanded Brackish Wilcox Project	5.2.28
SSLGC Expanded Carrizo Project	5.2.29
Victoria ASR Project	5.2.30
Victoria Groundwater-Surface Water Exchange	5.2.31
Weather Modification	5.2.32

Table 5.1-2 provides water supply plans for each WUG and WWP relying on the Recommended WMSs and WMSPs.

Table 5.1-2 Water Supply Plans for WUGs and WWPs Relying on Recommended Water Management Strategies

No.	Water User Group or Wholesale Water Provider	Water Management Strategy or Water Management Strategy Project	Strategy Evaluation Section Reference
1	3009 Water	Municipal Conservation	5.2.1
2	Air Force Village II Inc	Municipal Conservation	5.2.1
	Air Force Village II Inc	Drought Management	5.2.3
3	Alamo Heights	Municipal Conservation	5.2.1
	Alamo Heights	Drought Management	5.2.3
	Alamo Heights	Edwards Transfers	5.2.4
4	Alliance Regional Water Authority	ARWA Carrizo-Wilcox Project (Phase 2)	5.2.14
	Alliance Regional Water Authority	ARWA DPR Project (Phase 3)	5.2.15
5	Aqua Water Supply Corporation (WSC)	Municipal Conservation	5.2.1
	Aqua WSC	Drought Management	5.2.3
6	Asherton	Municipal Conservation	5.2.1
7	Atascosa Rural WSC	Municipal Conservation	5.2.1
	Atascosa Rural WSC	Drought Management	5.2.3
	Atascosa Rural WSC	Fresh Groundwater Development	5.2.5
8	Batesville WSC	Municipal Conservation	5.2.1
9	Benton City WSC	Municipal Conservation	5.2.1
	Benton City WSC	Drought Management	5.2.3
	Benton City WSC	Fresh Groundwater Development	5.2.5
	Benton City WSC	Medina County Regional ASR Project	5.2.22

No.	Water User Group or Wholesale Water Provider	Water Management Strategy or Water Management Strategy Project	Strategy Evaluation Section Reference
10	Bexar County Water Control and Improvement District (WCID) 10	Municipal Conservation	5.2.1
	Bexar County WCID 10	Drought Management	5.2.3
	Bexar County WCID 10	Edwards Transfers	5.2.4
11	Big Wells	Municipal Conservation	5.2.1
12	Boerne	Municipal Conservation	5.2.1
	Boerne	Drought Management	5.2.3
	Boerne	Recycled Water	5.2.9
	Boerne	Rainwater Harvesting	5.2.11
	Boerne	GBRA WaterSECURE	5.2.21
13	Buda	ARWA Carrizo-Wilcox Project (Phase 2)	5.2.14
	Buda	ARWA DPR Project (Phase 3)	5.2.15
	Buda	GBRA WaterSECURE	5.2.21
14	C Willow Water	Municipal Conservation	5.2.1
	C Willow Water	Drought Management	5.2.3
15	Canyon Lake Water Service (Texas Water Company)	Municipal Conservation	5.2.1
	Canyon Lake Water Service (Texas Water Company)	Drought Management	5.2.3
	Canyon Lake Water Service (Texas Water Company)	GBRA WaterSECURE	5.2.21
16	Canyon Regional Water Authority	Facilities Expansion	5.2.8
	Canyon Regional Water Authority	CRWA Expanded Brackish Carrizo-Wilcox Project	5.2.16
	Canyon Regional Water Authority	CRWA Siesta Project	5.2.17
	Canyon Regional Water Authority	CRWA Wells Ranch (Phase 3) Project	5.2.18
	Canyon Regional Water Authority	GBRA WaterSECURE	5.2.21
17	Carrizo Hill WSC	Municipal Conservation	5.2.1
	Carrizo Hill WSC	Drought Management	5.2.3
18	Carrizo Springs	Municipal Conservation	5.2.1
19	Castroville	Municipal Conservation	5.2.1
	Castroville	Drought Management	5.2.3
	Castroville	Edwards Transfers	5.2.4
	Castroville	Medina County Regional ASR Project	5.2.22
20	Charlotte	Municipal Conservation	5.2.1

No.	Water User Group or Wholesale Water Provider	Water Management Strategy or Water Management Strategy Project	Strategy Evaluation Section Reference
21	Cibolo	Municipal Conservation	5.2.1
	Cibolo	Drought Management	5.2.3
	Cibolo	CVLGC Carrizo Project	5.2.19
22	Cibolo Valley Local Government Corporation	CVLGC Carrizo Project	5.2.19
23	Clear Water Estates Water System (Texas Water Company)	Municipal Conservation	5.2.1
	Clear Water Estates Water System (Texas Water Company)	Drought Management	5.2.3
	Clear Water Estates Water System (Texas Water Company)	Fresh Groundwater Development	5.2.5
24	Concan WSC	Municipal Conservation	5.2.1
25	Converse	Municipal Conservation	5.2.1
	Converse	Drought Management	5.2.3
	Converse	Edwards Transfers	5.2.4
	Converse	CRWA Wells Ranch (Phase 3) Project	5.2.18
26	Cotulla	Municipal Conservation	5.2.1
27	County Line SUD	Municipal Conservation	5.2.1
	County Line SUD	Drought Management	5.2.3
	County Line SUD	County Line SUD Trinity Project	5.2.6
	County Line SUD	County Line SUD - Brackish Edwards Project	5.2.6
	County Line SUD	Caldwell Brackish Partnership Project	5.2.6
	County Line SUD	Gonzales & Guadalupe Brackish Partnership Project	5.2.6
	County Line SUD	Facilities Expansion	5.2.8
	County Line SUD	Recycled Water	5.2.9
	County Line SUD	ARWA Carrizo-Wilcox Project (Phase 2)	5.2.14
	County Line SUD	ARWA DPR Project (Phase 3)	5.2.15
	County Line SUD	GBRA WaterSECURE	5.2.21
28	County-Other, Atascosa	Municipal Conservation	5.2.1
	County-Other, Atascosa	Rainwater Harvesting	5.2.11
29	County-Other, Bexar	Municipal Conservation	5.2.1
	County-Other, Bexar	Rainwater Harvesting	5.2.11

No.	Water User Group or Wholesale Water Provider	Water Management Strategy or Water Management Strategy Project	Strategy Evaluation Section Reference
30	County-Other, Caldwell	Municipal Conservation	5.2.1
	County-Other, Caldwell	Caldwell Brackish Partnership Project	5.2.6
	County-Other, Caldwell	Gonzales & Guadalupe Brackish Partnership Project	5.2.6
	County-Other, Caldwell	Rainwater Harvesting	5.2.11
	County-Other, Caldwell	GBRA WaterSECURE	5.2.21
31	County-Other, Calhoun	Municipal Conservation	5.2.1
	County-Other, Calhoun	Rainwater Harvesting	5.2.11
32	County-Other, Comal	Municipal Conservation	5.2.1
	County-Other, Comal	Rainwater Harvesting	5.2.11
33	County-Other, DeWitt	Municipal Conservation	5.2.1
	County-Other, DeWitt	Rainwater Harvesting	5.2.11
34	County-Other, Dimmit	Municipal Conservation	5.2.1
	County-Other, Dimmit	Rainwater Harvesting	5.2.11
35	County-Other, Frio	Municipal Conservation	5.2.1
	County-Other, Frio	Rainwater Harvesting	5.2.11
36	County-Other, Goliad	Municipal Conservation	5.2.1
	County-Other, Goliad	Rainwater Harvesting	5.2.11
37	County-Other, Gonzales	Municipal Conservation	5.2.1
	County-Other, Gonzales	Rainwater Harvesting	5.2.11
38	County-Other, Guadalupe	Municipal Conservation	5.2.1
	County-Other, Guadalupe	Rainwater Harvesting	5.2.11
39	County-Other, Hays	Municipal Conservation	5.2.1
	County-Other, Hays	Rainwater Harvesting	5.2.11
	County-Other, Hays	GBRA WaterSECURE	5.2.21
40	County-Other, Karnes	Municipal Conservation	5.2.1
	County-Other, Karnes	Rainwater Harvesting	5.2.11
41	County-Other, Kendall	Municipal Conservation	5.2.1
	County-Other, Kendall	Rainwater Harvesting	5.2.11
	County-Other, Kendall	GBRA WaterSECURE	5.2.21
42	County-Other, La Salle	Municipal Conservation	5.2.1
	County-Other, La Salle	Rainwater Harvesting	5.2.11

No.	Water User Group or Wholesale Water Provider	Water Management Strategy or Water Management Strategy Project	Strategy Evaluation Section Reference
43	County-Other, Medina	Municipal Conservation	5.2.1
	County-Other, Medina	Rainwater Harvesting	5.2.11
44	County-Other, Refugio	Municipal Conservation	5.2.1
	County-Other, Refugio	Rainwater Harvesting	5.2.11
45	County-Other, Uvalde	Municipal Conservation	5.2.1
	County-Other, Uvalde	Rainwater Harvesting	5.2.11
46	County-Other, Victoria	Municipal Conservation	5.2.1
	County-Other, Victoria	Rainwater Harvesting	5.2.11
	County-Other, Victoria	Fresh Groundwater Development	5.2.5
47	County-Other, Wilson	Municipal Conservation	5.2.1
	County-Other, Wilson	Rainwater Harvesting	5.2.11
48	County-Other, Zavala	Municipal Conservation	5.2.1
	County-Other, Zavala	Rainwater Harvesting	5.2.11
49	Creedmoor-Maha WSC	Municipal Conservation	5.2.1
	Creedmoor-Maha WSC	Drought Management	5.2.3
	Creedmoor-Maha WSC	GBRA WaterSECURE	5.2.21
50	Crystal City	Municipal Conservation	5.2.1
51	Crystal Clear SUD	Municipal Conservation	5.2.1
	Crystal Clear SUD	Drought Management	5.2.3
	Crystal Clear SUD	Fresh Groundwater Development	5.2.5
	Crystal Clear SUD	Facilities Expansion	5.2.8
	Crystal Clear SUD	ARWA Carrizo-Wilcox Project (Phase 2)	5.2.14
	Crystal Clear SUD	ARWA DPR Project (Phase 3)	5.2.15
	Crystal Clear SUD	CRWA Wells Ranch (Phase 3) Project	5.2.18
	Crystal Clear SUD	Entity Purchase to Meet Shortages	5.2.33
52	Cuero	Municipal Conservation	5.2.1
	Cuero	Drought Management	5.2.3
53	Devine	Municipal Conservation	5.2.1
	Devine	Medina County Regional ASR Project	5.2.22
54	Dilley	Municipal Conservation	5.2.1
55	East Central SUD	Municipal Conservation	5.2.1
	East Central SUD	Drought Management	5.2.3

No.	Water User Group or Wholesale Water Provider	Water Management Strategy or Water Management Strategy Project	Strategy Evaluation Section Reference
	East Central SUD	Recycled Water	5.2.9
	East Central SUD	Entity Purchase to Meet Shortages	5.2.33
56	East Medina County SUD	Municipal Conservation	5.2.1
	East Medina County SUD	Drought Management	5.2.3
	East Medina County SUD	Medina County Regional ASR Project	5.2.22
57	El Oso WSC	Municipal Conservation	5.2.1
	El Oso WSC	Drought Management	5.2.3
58	Elmendorf	Municipal Conservation	5.2.1
	Elmendorf	Drought Management	5.2.3
	Elmendorf	Fresh Groundwater Development	5.2.5
	Elmendorf	Entity Purchase to Meet Shortages	5.2.33
59	Encinal WSC	Municipal Conservation	5.2.1
60	Fair Oaks Ranch	Municipal Conservation	5.2.1
	Fair Oaks Ranch	Drought Management	5.2.3
	Fair Oaks Ranch	Recycled Water	5.2.9
	Fair Oaks Ranch	GBRA WaterSECURE	5.2.21
61	Falls City	Municipal Conservation	5.2.1
62	Fayette WSC	Municipal Conservation	5.2.1
	Fayette WSC	Drought Management	5.2.3
63	Floresville	Municipal Conservation	5.2.1
64	Fort Sam Houston	Municipal Conservation	5.2.1
	Fort Sam Houston	Drought Management	5.2.3
	Fort Sam Houston	Edwards Transfers	5.2.4
65	Garden Ridge	Municipal Conservation	5.2.1
	Garden Ridge	Drought Management	5.2.3
	Garden Ridge	Fresh Groundwater Development	5.2.5
66	Goforth SUD	Municipal Conservation	5.2.1
	Goforth SUD	Drought Management	5.2.3
	Goforth SUD	GBRA WaterSECURE	5.2.21
	Goforth SUD	Entity Purchase to Meet Shortages	5.2.33
67	Goliad	Municipal Conservation	5.2.1
68	Gonzales	Municipal Conservation	5.2.1
	Gonzales	Drought Management	5.2.3

No.	Water User Group or Wholesale Water Provider	Water Management Strategy or Water Management Strategy Project	Strategy Evaluation Section Reference
69	Gonzales County WSC	Municipal Conservation	5.2.1
70	Green Valley SUD	Municipal Conservation	5.2.1
	Green Valley SUD	Drought Management	5.2.3
	Green Valley SUD	ARWA Carrizo-Wilcox Project (Phase 2)	5.2.14
	Green Valley SUD	ARWA DPR Project (Phase 3)	5.2.15
	Green Valley SUD	GBRA WaterSECURE	5.2.21
71	Guadalupe-Blanco River Authority	Municipal Conservation	5.2.1
	Guadalupe-Blanco River Authority	Drought Management	5.2.3
	Guadalupe-Blanco River Authority	Facilities Expansion	5.2.8
	Guadalupe-Blanco River Authority	Recycled Water	5.2.9
	Guadalupe-Blanco River Authority	GBRA Lower Basin New Appropriation	5.2.20
	Guadalupe-Blanco River Authority	GBRA WaterSECURE	5.2.21
72	Hondo	Municipal Conservation	5.2.1
	Hondo	Drought Management	5.2.3
	Hondo	Edwards Transfers	5.2.4
	Hondo	Medina County Regional ASR Project	5.2.22
73	Irrigation, Atascosa	Non-Municipal Conservation	5.2.2
	Irrigation, Atascosa	Weather Modification	5.2.32
74	Irrigation, Bexar	Non-Municipal Conservation	5.2.2
	Irrigation, Bexar	Weather Modification	5.2.32
75	Irrigation, Caldwell	Non-Municipal Conservation	5.2.2
76	Irrigation, Calhoun	Non-Municipal Conservation	5.2.2
77	Irrigation, Comal	Non-Municipal Conservation	5.2.2
78	Irrigation, Dimmit	Non-Municipal Conservation	5.2.2
79	Irrigation, Frio	Weather Modification	5.2.32
80	Irrigation, Goliad	Non-Municipal Conservation	5.2.2
81	Irrigation, Guadalupe	Non-Municipal Conservation	5.2.2
82	Irrigation, Karnes	Non-Municipal Conservation	5.2.2
	Irrigation, Karnes	Weather Modification	5.2.32
83	Irrigation, La Salle	Non-Municipal Conservation	5.2.2
84	Irrigation, Medina	Non-Municipal Conservation	5.2.2
	Irrigation, Medina	Weather Modification	5.2.32

No.	Water User Group or Wholesale Water Provider	Water Management Strategy or Water Management Strategy Project	Strategy Evaluation Section Reference
85	Irrigation, Uvalde	Non-Municipal Conservation	5.2.2
	Irrigation, Uvalde	Weather Modification	5.2.32
86	Irrigation, Victoria	Non-Municipal Conservation	5.2.2
87	Irrigation, Wilson	Non-Municipal Conservation	5.2.2
	Irrigation, Wilson	Weather Modification	5.2.32
88	Irrigation, Zavala	Non-Municipal Conservation	5.2.2
89	Jourdanton	Municipal Conservation	5.2.1
90	Karnes City	Municipal Conservation	5.2.1
	Karnes City	Drought Management	5.2.3
91	Kendall County WCID 1	Municipal Conservation	5.2.1
92	Kendall West Utility	Municipal Conservation	5.2.1
	Kendall West Utility	Drought Management	5.2.3
	Kendall West Utility	Fresh Groundwater Development	5.2.5
93	Kenedy	Municipal Conservation	5.2.1
94	Kirby	Municipal Conservation	5.2.1
	Kirby	Drought Management	5.2.3
	Kirby	Edwards Transfers	5.2.4
	Kirby	Rainwater Harvesting	5.2.11
95	Knippa WSC	Municipal Conservation	5.2.1
96	KT Water Development	Municipal Conservation	5.2.1
	KT Water Development	Drought Management	5.2.3
	KT Water Development	Fresh Groundwater Development	5.2.5
97	Kyle	Municipal Conservation	5.2.1
	Kyle	Drought Management	5.2.3
	Kyle	Recycled Water	5.2.9
	Kyle	Rainwater Harvesting	5.2.11
	Kyle	ARWA Carrizo-Wilcox Project (Phase 2)	5.2.14
	Kyle	ARWA DPR Project (Phase 3)	5.2.15
	Kyle	GBRA WaterSECURE	5.2.21
98	La Coste	Municipal Conservation	5.2.1
	La Coste	Drought Management	5.2.3
	La Coste	Medina County Regional ASR Project	5.2.22
99	La Vernia	Municipal Conservation	5.2.1

No.	Water User Group or Wholesale Water Provider	Water Management Strategy or Water Management Strategy Project	Strategy Evaluation Section Reference
100	Lackland Air Force Base	Municipal Conservation	5.2.1
101	Leon Valley	Municipal Conservation	5.2.1
	Leon Valley	Drought Management	5.2.3
	Leon Valley	Edwards Transfers	5.2.4
	Leon Valley	Rainwater Harvesting	5.2.11
102	Live Oak	Municipal Conservation	5.2.1
	Live Oak	Drought Management	5.2.3
	Live Oak	Recycled Water	5.2.9
103	Lockhart	Municipal Conservation	5.2.1
	Lockhart	Drought Management	5.2.3
	Lockhart	GBRA WaterSECURE	5.2.21
104	Loma Alta Chula Vista Water System	Municipal Conservation	5.2.1
105	Luling	Municipal Conservation	5.2.1
	Luling	Drought Management	5.2.3
	Luling	GBRA WaterSECURE	5.2.21
106	Lytle	Municipal Conservation	5.2.1
	Lytle	Drought Management	5.2.3
	Lytle	Edwards Transfers	5.2.4
	Lytle	Medina County Regional ASR Project	5.2.22
107	Manufacturing, Caldwell	GBRA WaterSECURE	5.2.21
108	Marion	Municipal Conservation	5.2.1
	Marion	CRWA Wells Ranch (Phase 3) Project	5.2.18
109	Martindale WSC	Municipal Conservation	5.2.1
	Martindale WSC	Drought Management	5.2.3
	Martindale WSC	Fresh Groundwater Development	5.2.5
	Martindale WSC	CRWA Wells Ranch (Phase 3) Project	5.2.18
	Martindale WSC	GBRA WaterSECURE	5.2.21
110	Maxwell SUD	Municipal Conservation	5.2.1
	Maxwell SUD	Drought Management	5.2.3
	Maxwell SUD	Maxwell SUD - Trinity Project	5.2.6
	Maxwell SUD	Caldwell Brackish Partnership Project	5.2.6

No.	Water User Group or Wholesale Water Provider	Water Management Strategy or Water Management Strategy Project	Strategy Evaluation Section Reference
	Maxwell SUD	Gonzales & Guadalupe Brackish Partnership Project	5.2.6
	Maxwell SUD	GBRA WaterSECURE	5.2.21
111	McCoy WSC	Municipal Conservation	5.2.1
	McCoy WSC	Drought Management	5.2.3
112	Medina County WCID 2	Municipal Conservation	5.2.1
113	Medina River West WSC	Municipal Conservation	5.2.1
114	Mining, Uvalde	Fresh Groundwater Development	5.2.5
115	Moore WSC	Municipal Conservation	5.2.1
116	Natalia	Municipal Conservation	5.2.1
	Natalia	Drought Management	5.2.3
	Natalia	Medina County Regional ASR Project	5.2.22
117	New Braunfels	Municipal Conservation	5.2.1
	New Braunfels	Drought Management	5.2.3
	New Braunfels	Facilities Expansion	5.2.8
	New Braunfels	Recycled Water	5.2.9
	New Braunfels	NBU ASR Project	5.2.23
	New Braunfels	NBU Trinity Well Field Expansion	5.2.24
118	Nixon	Municipal Conservation	5.2.1
119	Oak Hills WSC	Municipal Conservation	5.2.1
	Oak Hills WSC	Drought Management	5.2.3
	Oak Hills WSC	Fresh Groundwater Development	5.2.5
120	Pearsall	Municipal Conservation	5.2.1
	Pearsall	Drought Management	5.2.3
	Pearsall	Fresh Groundwater Development	5.2.5
121	Picosa WSC	Municipal Conservation	5.2.1
	Picosa WSC	Drought Management	5.2.3
	Picosa WSC	Fresh Groundwater Development	5.2.5
122	Pleasanton	Municipal Conservation	5.2.1
	Pleasanton	Drought Management	5.2.3
123	Point Comfort	Municipal Conservation	5.2.1
124	Polonia WSC	Municipal Conservation	5.2.1

No.	Water User Group or Wholesale Water Provider	Water Management Strategy or Water Management Strategy Project	Strategy Evaluation Section Reference
125	Port Lavaca	Municipal Conservation	5.2.1
	Port Lavaca	Drought Management	5.2.3
	Port Lavaca	Rainwater Harvesting	5.2.11
126	Port Oconnor Improvement District	Municipal Conservation	5.2.1
127	Poteet	Municipal Conservation	5.2.1
	Poteet	Rainwater Harvesting	5.2.11
128	Poth	Municipal Conservation	5.2.1
129	Quail Creek Municipal Utility District (MUD)	Municipal Conservation	5.2.1
130	Randolph Air Force Base	Municipal Conservation	5.2.1
131	Refugio	Municipal Conservation	5.2.1
132	Runge	Municipal Conservation	5.2.1
	Runge	Drought Management	5.2.3
133	S S WSC	Municipal Conservation	5.2.1
	S S WSC	Drought Management	5.2.3
	S S WSC	S S WSC - Brackish Carrizo-Wilcox Project	5.2.6
134	Sabinal	Municipal Conservation	5.2.1
135	San Antonio Water System	Municipal Conservation	5.2.1
	San Antonio Water System	Drought Management	5.2.3
	San Antonio Water System	Facilities Expansion	5.2.8
	San Antonio Water System	Recycled Water	5.2.9
	San Antonio Water System	SAWS Expanded Local Carrizo Project	5.2.25
	San Antonio Water System	SAWS Expanded Brackish Groundwater Project	5.2.26
	San Antonio Water System	SAWS Regional Wilcox Project	5.2.27
136	San Marcos	Municipal Conservation	5.2.1
	San Marcos	Drought Management	5.2.3
	San Marcos	Recycled Water	5.2.9
	San Marcos	ARWA Carrizo-Wilcox Project (Phase 2)	5.2.14
	San Marcos	ARWA DPR Project (Phase 3)	5.2.15
137	Schertz	Municipal Conservation	5.2.1
	Schertz	Drought Management	5.2.3
	Schertz	CVLGC Carrizo Project	5.2.19

No.	Water User Group or Wholesale Water Provider	Water Management Strategy or Water Management Strategy Project	Strategy Evaluation Section Reference
	Schertz	SSLGC Expanded Brackish Wilcox Project	5.2.28
	Schertz	SSLGC Expanded Carrizo Project	5.2.29
138	Schertz-Seguin Local Government Corporation	SSLGC Expanded Brackish Wilcox Project	5.2.28
	Schertz-Seguin Local Government Corporation	SSLGC Expanded Carrizo Project	5.2.29
139	Seadrift	Municipal Conservation	5.2.1
140	Seguin	Municipal Conservation	5.2.1
	Seguin	Drought Management	5.2.3
	Seguin	SSLGC Expanded Brackish Wilcox Project	5.2.28
	Seguin	SSLGC Expanded Carrizo Project	5.2.29
141	Selma	Municipal Conservation	5.2.1
	Selma	Drought Management	5.2.3
	Selma	Edwards Transfers	5.2.4
142	Shavano Park	Municipal Conservation	5.2.1
	Shavano Park	Drought Management	5.2.3
143	Smiley	Municipal Conservation	5.2.1
144	South Buda WCID 1	Municipal Conservation	5.2.1
	South Buda WCID 1	Drought Management	5.2.3
	South Buda WCID 1	Entity Purchase to Meet Shortages	5.2.33
145	Springs Hill WSC	Municipal Conservation	5.2.1
	Springs Hill WSC	Drought Management	5.2.3
	Springs Hill WSC	Fresh Groundwater Development	5.2.5
	Springs Hill WSC	Facilities Expansion	5.2.8
146	Steam-Electric Power, Bexar	Facilities Expansion	5.2.8
147	Stockdale	Municipal Conservation	5.2.1
148	Sunko WSC	Municipal Conservation	5.2.1
149	Texas State University	Municipal Conservation	5.2.1
	Texas State University	Drought Management	5.2.3
	Texas State University	Entity Purchase to Meet Shortages	5.2.33
150	The Oaks WSC	Municipal Conservation	5.2.1
	The Oaks WSC	Drought Management	5.2.3
	The Oaks WSC	Entity Purchase to Meet Shortages	5.2.33
151	Three Oaks WSC	Municipal Conservation	5.2.1

No.	Water User Group or Wholesale Water Provider	Water Management Strategy or Water Management Strategy Project	Strategy Evaluation Section Reference
152	Tri Community WSC	Municipal Conservation	5.2.1
153	Universal City	Municipal Conservation	5.2.1
	Universal City	Drought Management	5.2.3
	Universal City	Recycled Water	5.2.9
154	Uvalde	Municipal Conservation	5.2.1
	Uvalde	Drought Management	5.2.3
	Uvalde	Edwards Transfers	5.2.4
155	Victoria	Municipal Conservation	5.2.1
	Victoria	Drought Management	5.2.3
	Victoria	GBRA WaterSECURE	5.2.21
	Victoria	Victoria ASR Project	5.2.30
	Victoria	Victoria Groundwater-Surface Water Exchange	5.2.31
156	Victoria County WCID 1	Municipal Conservation	5.2.1
	Victoria County WCID 1	Drought Management	5.2.3
157	Ville Dalsace Water Supply	Municipal Conservation	5.2.1
	Ville Dalsace Water Supply	Drought Management	5.2.3
	Ville Dalsace Water Supply	Edwards Transfers	5.2.4
158	Waelder	Municipal Conservation	5.2.1
159	Water Services	Municipal Conservation	5.2.1
	Water Services	Drought Management	5.2.3
160	West Medina WSC	Municipal Conservation	5.2.1
	West Medina WSC	Medina County Regional ASR Project	5.2.22
161	Wimberley WSC	Municipal Conservation	5.2.1
	Wimberley WSC	Drought Management	5.2.3
	Wimberley WSC	Entity Purchase to Meet Shortages	5.2.33
162	Windmill WSC	Municipal Conservation	5.2.1
163	Wingert Water Systems	Municipal Conservation	5.2.1
	Wingert Water Systems	Drought Management	5.2.3
	Wingert Water Systems	Fresh Groundwater Development	5.2.5
164	Woodsboro	Municipal Conservation	5.2.1
165	Yancey WSC	Municipal Conservation	5.2.1
	Yancey WSC	Drought Management	5.2.3
	Yancey WSC	Medina County Regional ASR Project	5.2.22

No.	Water User Group or Wholesale Water Provider	Water Management Strategy or Water Management Strategy Project	Strategy Evaluation Section Reference
165	Yoakum	Municipal Conservation	5.2.1
166	Yorktown	Municipal Conservation	5.2.1
167	Zavala County WCID 1	Municipal Conservation	5.2.1

5.1.2.2 Alternative Strategies

On November 7, 2024, the SCTRWPG reviewed and considered potentially feasible WMS evaluations and designated strategies as Recommended, Alternative, or neither. For the 2026 SCTRWP, the SCTRWPG identified one WMS as Alternative, as shown in Table 5.1-3. At the request of SAWS, the SCTRWPG designated the Recycled Water – SAWS DPR Project as Alternative.

Table 5.1-3 Alternative Water Management Strategies

Alternative Water Management Strategy	Strategy Evaluation Section Reference
Recycled Water – SAWS DPR Project	5.2.9

5.1.2.3 Strategies Considered but Not Recommended or Alternative

The following sections summarize the strategies that were considered but not identified by the SCTRWPG as Recommended or Alternative strategies.

5.1.2.3.1 Groundwater Conversions

The SCTRWPG identified the Groundwater Conversions WMS as a potentially feasible strategy. However, for the 2026 SCTRWP, the SCTRWPG evaluated and considered the WMS but did not identify it as a Recommended strategy. For more information, refer to Section 5.2.7.

The SCTRWPG includes WMSs in the SCTRWP at the request of a WUG or WWP sponsors. For the 2026 SCTRWP, the Groundwater Conversions WMS was not included as a Recommended WMS because it was not requested for inclusion by any sponsoring entity.

5.1.2.3.2 Brush Management

The SCTRWPG identified the Brush Management WMS as a potentially feasible strategy. However, for the 2026 SCTRWP, the SCTRWPG evaluated and considered the WMS but did not identify it as a Recommended strategy. For more information, refer to Section 5.2.10.

The evaluation of brush management as a WMS included review of existing brush control studies localized within the SCTRWPA. The evaluation also included coordination with the Texas State Soil and Water Conservation Board (TSSWCB), Edwards Aquifer Authority (EAA), Evergreen Underground Water Conservation District (UWCD), and Nueces River Authority. While the SCTRWPG supports the practice of brush management, it was not designated as a Recommended strategy in the 2026 SCTRWP because available studies within the SCTRWPA demonstrate zero firm yield during drought of record conditions. Specifically, the Nueces River Authority, EAA and Poteet expressed interest in inclusion of brush management as a WMS. Support for the practice is expressed in Chapter 8 under Assistance for Alternative Rangeland Management.

5.1.2.3.3 Surface Water Rights

The SCTRWPG identified the Surface Water Rights WMS as a potentially feasible strategy. However, for the 2026 SCTRWP, the SCTRWPG evaluated and considered the WMS but did not identify it as a Recommended strategy. For more information, refer to Section 5.2.12.

The SCTRWPG includes WMSs in the SCTRWP at the request of a WUG or WWP sponsor. For the 2026 SCTRWP, the Surface Water Rights WMS was not included as a Recommended WMS because it was not requested for inclusion by any sponsoring entity.

5.1.2.3.4 Balancing Storage

The SCTRWPG identified the Balancing Storage WMS as a potentially feasible strategy. However, for the 2026 SCTRWP, the SCTRWPG evaluated and considered the WMS but did not identify it as a Recommended strategy. For more information, refer to Section 5.2.13.

The SCTRWPG includes WMSs in the SCTRWP at the request of a WUG or WWP sponsor. For the 2026 SCTRWP, the Balancing Storage WMS was not included as a Recommended WMS because it was not requested for inclusion by any sponsoring entity.

5.1.2.3.5 Seawater Desalination

Sea Water Desalination was considered, but not identified as a potentially feasible WMS. As discussed previously, the SCTRWPG includes WMSs in the SCTRWP at the request of a WUG or WWP sponsor. For the 2026 SCTRWP, seawater desalination was not included as a potentially feasible WMS because it was not requested for inclusion by any WUGs or WWPs. Furthermore, the majority of needs in the SCTRWPA can be met by fresh water, groundwater, brackish groundwater, reuse, and conservation WMSs.

There are several seawater desalination facilities currently being planned within Texas; seawater desalination may become a feasible and cost-effective strategy for entities within the SCTRWPA in the future.

5.1.3 Potential for Aquifer Storage and Recovery Projects to Meet Significant Identified Needs

In accordance with 31 TAC §357.34(h), if a Regional Water Planning Area (RWPA) has significant identified water needs, the Regional Water Planning Group (RWPG) shall provide a specific assessment of the potential for ASR projects to meet those needs. At the August 1, 2024, SCTRWPG meeting, the SCTRWPG defined the threshold of significant identified water needs to be a WUG, not including County-Other, with an identified municipal need of 10,000 acre-feet per year (acft/yr) [1] or greater during any decade of the planning horizon (2030 to 2080). WUGs meeting this definition in the 2026 SCTRWP include Boerne, Canyon Lake Water Service (Texas Water Company), County Line Special Utility District (SUD), Crystal Clear SUD, Fort Sam Houston, Goforth SUD, New Braunfels, San Antonio Water System (SAWS), and San Marcos. The following provides a summary of the potential for ASR projects to meet significant identified water needs in the SCTRWPA:

- Boerne: The 2026 SCTRWP includes the GBRA WaterSECURE Project, which includes an ASR component. Boerne will purchase water from GBRA's WaterSECURE Project. An evaluation of the GBRA WaterSECURE Project can be found in Section 5.2.21.

[1] One acft is approximately 325,851 gallons.

- Canyon Lake Water Service (Texas Water Company): The 2026 SCTRWP includes the GBRA WaterSECURE Project, which includes an ASR component. Canyon Lake Water Service (Texas Water Company) will purchase water from GBRA's WaterSECURE Project. An evaluation of the GBRA WaterSECURE Project can be found in Section 5.2.21.
- County Line SUD: The 2026 SCTRWP includes the GBRA WaterSECURE Project, which includes an ASR component. County Line SUD will purchase water from GBRA's WaterSECURE Project. An evaluation of the GBRA WaterSECURE Project can be found in Section 5.2.21.
- Crystal Clear SUD: A full strategy evaluation of the potential for ASR projects to meet Crystal Clear SUD's significant identified water needs because implementation of ASR may be considered cost-prohibitive compared to the cost of surface water and/or groundwater projects. A portion of their needs have been met through a variety of cost-effective WMSs, which are listed in Table 5.1-2.
- Fort Sam Houston: A full strategy evaluation of the potential for ASR projects to meet Fort Sam Houston's significant identified water needs was not conducted because a portion of their needs have been met through a variety of cost-effective WMSs, which are listed in Table 5.1-2.
- Goforth SUD: The 2026 SCTRWP includes the GBRA WaterSECURE Project, which includes an ASR component. Goforth SUD will purchase water from GBRA's WaterSECURE Project. An evaluation of the GBRA WaterSECURE Project can be found in Section 5.2.21.
- New Braunfels: To meet New Braunfels' significant identified needs, the 2026 SCTRWP includes the NBU ASR Project as a Recommended strategy. An evaluation of the NBU ASR Project can be found in Section 5.2.23.
- San Antonio Water System: SAWS already has an ASR system in operation, including a water treatment plant (WTP) called the H2Oaks Center. The 2026 SCTRWP includes an expansion of the H2Oaks Center as a Recommended WMS under Facilities Expansion. The WMS evaluation for the Facilities Expansion – SAWS Expanded ASR Treatment Plant can be found in Section 5.2.8.
- San Marcos: A full strategy evaluation of the potential for ASR projects to meet San Marcos' significant identified water needs was not conducted because their needs have been met through a variety of cost-effective WMSs, including Municipal Water Conservation, Drought Management, ARWA Carrizo-Wilcox Project (Phase 2), ARWA DPR Project (Phase 3), and Recycled Water. Given the location and aquifer characteristics in the area, an ASR project could potentially be developed to meet additional needs for San Marcos in the future.

5.1.4 Strategies with Flood Mitigation Benefits

This section is a new requirement for inclusion in the 2026 Regional Water Plans (RWPs). The purpose of this new section is to consider whether any of the identified potentially feasible WMSs could, in addition to providing water supply, potentially provide non-trivial flood mitigation benefits or be potential candidates for exploring ways that WMSs might be combined with flood mitigation features to leverage planning efforts to achieve potential cost savings or other combined water supply and flood mitigation benefits. Infrastructure that may provide additional water supply and mitigates non-trivial flooding may include projects or strategies that contribute to aquifer recharge and additional surface water inflows directed to reservoirs.

The identification of these WMSs was based on a high-level, qualitative assessment that did not require modeling or other additional technical analyses. In 2024, the Texas Water Development Board (TWDB) adopted the state's first 2024 State Flood Plan. Similar to the regional water planning process, the State

Flood Plan is compiled from multiple Regional Flood Plans that were developed by the state's 15 Regional Flood Planning Groups. The 2024 State Flood Plan includes numerous flood mitigation projects, of which some may also provide water supply benefits. The SCTRWPG reviewed the 2024 State Water Plan Flood and did not identify any Flood Management Strategies or Flood Management Projects that were identified as potentially feasible WMSs in the 2026 SCTRWP. Furthermore, the SCTRWPG did not receive any requests from WUGs or WWPs to sponsor a WMS in the 2026 SCTRWPG that has potential for non-trivial flood mitigation.

5.1.5 Implementation Status of Certain Recommended Water Management Strategies

This section is a new requirement for inclusion in the 2026 RWPs. The purpose of this new section is to document the implementation status of certain Recommended WMSs to demonstrate the feasibility of each recommended strategy to be fully implemented by the online decade in the Regional Water Plan (RWP).

The implementation status must be documented for the following types of Recommended WMSs with any online planning decade:

- All reservoir strategies (including major and minor reservoirs);
- All seawater desalination strategies;
- Direct potable reuse strategies that provide greater than 5,000 acre-feet per year (acft/yr) of supply;
- Brackish groundwater strategies that provide greater than 10,000 acft/yr of supply;
- Aquifer storage and recovery strategies that provide greater than 10,000 acft/yr;
- All water transfers from out of state; and
- Any other innovative technology projects the RWPG considers appropriate.

The implementation status includes key milestones achieved, such as when a WMS sponsor took an affirmative vote or other action to make expenditures necessary to apply for permits and/or perform planning, design, or construction. Appendix 5C includes a table that documents these key milestones. The appendix also includes graphical timelines of the full planning horizon for each of the relevant WMSs and their major anticipated, future implementation milestones. The strategies that meet the above requirements include the following:

- ARWA - DPR Phase 3;
- BVRT, County Line SUD, and Maxwell SUD - Caldwell Brackish Partnership Project;
- BVRT, County Line SUD, and Maxwell SUD - Gonzales & Guadalupe Brackish Partnership Project;
- CRWA - Expanded Brackish Carrizo-Wilcox Project;
- GBRA - Lower Basin New Appropriation;
- GBRA – WaterSECURE;
- Medina County - Regional ASR;
- NBU - Potable Reuse; and
- SAWS - Expanded Brackish Groundwater Project.

5.2 Water Management Strategy Evaluations

The purpose of Subchapter 5.2 is to provide the methodology and results of the evaluations of potentially feasible WMSs for the 2026 SCTRWP. Each potentially feasible WMS was evaluated in accordance with TWDB rules in 31 TAC §357.34, which requires analysis of a WMS' net quantity of water, reliability, financial costs, effects on environmental factors and agricultural resources.

The following provides information and methodologies used in this plan to evaluate the WMSs. The WMS evaluation summaries are included in subsequent sections.

Resources and Methodology

Evaluations of potentially feasible WMSs and associated WMSPs were performed uniformly and consistently to enable an equitable comparison among the WMSs and WMSPs within this plan and with other RWPs.

Net Quantity of Water

Analyses of each WMS' net quantity of water were performed under drought of record conditions, taking into account and reporting anticipated strategy water losses. Available yields for WMSs considered water availability volumes and other recommended WMSs to ensure that no WMSs relied on the same water availability volume or rendered multiple WMSs mutually exclusive.

The TWDB prohibits exceedances and overallocations of water availability. In instances where the sum of supplies (existing and future from WMSs) exceeds a source's availability, available yields for WMSs were reduced in an equitable and proportional way to prevent an overallocation of the water source. Strategies with yield reductions are described within each WMS evaluation, as applicable.

Surface Water

Each WMS' available yield considered Senate Bill (SB) 3 environmental flow standards adopted in 30 TAC §298. Future supplies associated with surface water WMSs were estimated using water availability models (WAMs) from the Texas Commission on Environmental Quality (TCEQ). For applicable river basins, SCTRWPG used the TCEQ-approved WAM Run 3, which assumes full exercise of existing surface water rights and zero effluent discharges, unless specifically required by a surface water right. This method reflects conditions under which an associated permit application would be evaluated. The TWDB granted a hydrologic variance to Region L to use the Flow Regime Application Tool (FRAT) in conjunction with the TCEQ-approved WAMs to evaluate environmental flows for new surface water WMSs (refer to Appendix 3B for more information regarding hydrologic assumptions and variances). Table 5.2-1 summarizes the hydrologic models used for the surface water availabilities and existing supplies analysis, including the model name, version date, model input/output files used, date model used and any relevant comments.

Table 5.2-1 Hydrologic Models Used for Water Management Strategy Analyses

Model Name	Version Date	Input/Output Files Used	Date Model Used	Comments
TCEQ Full Authorization WAM for the Guadalupe-San Antonio River Basin	10/1/2023	WRAP SIM input file extensions: DAT, DIS, FLO, EVA, FAD, HIS WRAP SIM output file extensions: OUT WRAP TAB input file extensions: TIN WRAP TAB output file extensions: TOU	October, 2024	N/A – None
Flow Regime Application Tool (FRAT) v4.0.xlsb	1/13/2012	Inputs: WAM generated regulated and available flows qnday daily disaggregation of monthly flows Pulse Translation Output: Project Depletions Monthly e-flow pass-through requirements	October, 2024	N/A – None

Groundwater

Available yields associated with new groundwater WMSs in the Carrizo-Wilcox, Trinity, Gulf Coast, and other minor aquifers were determined in accordance with groundwater availability estimates. As discussed in Chapter 3, the majority of the groundwater availabilities in Region L are derived from Modeled Available Groundwater (MAG) estimates calculated by the TWDB on or before April 12, 2023.

For most aquifers in the region, Groundwater Conservation Districts (GCDs) have adopted desired future conditions (DFCs). In some GCDs, full use of all groundwater supplies (permitted, grandfathered and exempt) may result in non-achievement of the DFCs for an aquifer. To ensure consistency with the DFCs, TWDB requires that groundwater availability for each aquifer be limited to the MAG for the discrete geographic-aquifer unit (i.e., aquifer/county/basin unit). In some instances, the sum of existing supplies and future supplies (as groundwater-based WMSs) are greater than the MAG or groundwater availability for a discrete geographic-aquifer unit. This has resulted, for regional water planning purposes only, in adjustments to available yields shown in this plan, and a lack of firm water available for future projects in this plan for some areas for certain time periods. This should not be construed as recommending or requiring that GCDs make these adjustments, or deny future permit applications. As described in Guiding Principle V (refer to Appendix 5A), this is not intended to influence or interfere with the regulatory decisions made by the governing boards of permitting entities. The SCTRWPG recognizes and supports the ability of permit holders to exercise their rights to groundwater use in accordance with their permits and it recognizes and supports a GCD’s discretion to issue permits and grandfather historical users for amounts in excess of the MAG. The SCTRWPG may not modify groundwater permits that GCDs have already issued or limit future permits that GCDs may issue. If MAG estimates are modified during or after this planning cycle, the SCTRWPG may amend this plan to adjust WMS supply volumes that are affected by the modified MAG estimate(s). Supplemental groundwater may be obtained under existing permits through the Groundwater Conversions WMS.

Water Management Strategy Water Loss

Each WMS evaluation considered potential strategy water loss, which can affect the net quantity of water or available yield. Unless otherwise specified in a particular WMS evaluation, WMSs evaluated in the 2026 Region L Regional Water Plan used the following water loss assumptions:

- Municipal Conservation: Water conservation strategies are assumed to have no associated water losses. In some instances, projects are intended to decrease the water loss for existing infrastructure.
- Non-Municipal Conservation: Water conservation strategies are assumed to have no associated water losses. In some instances, projects are intended to decrease the water loss for existing infrastructure.
- Drought Management: Drought management strategies are assumed to have no associated water losses.
- Edwards Transfers: Strategies involving transfers of water rights are assumed to have no additional water losses associated with the use of existing infrastructure.
- Fresh Groundwater Development: Groundwater expansion strategies that assume additional yield from existing infrastructure have no additional water losses associated with them. Groundwater expansion, development, and importation strategies that require new infrastructure are assumed to have no water losses.
- Brackish Groundwater Development: Brackish groundwater desalination strategies include 20% water loss associated with desalination treatment technologies and disposal of brine concentrate, unless otherwise stated in the WMS.
- Fresh Groundwater Conversions: Strategies involving conversions of a groundwater permit type (i.e., irrigation, public water supply, etc.) are assumed to have no additional water losses associated with the use of existing infrastructure.
- Facilities Expansion: Facilities expansion or new infrastructure such as pump stations and transmission pipelines are assumed to have no water losses.
- Recycled Water:
    - Direct, Non-Potable Reuse: Direct reuse or recycled water strategies are assumed to have no water losses.
    - Direct, Potable Reuse: DPR strategies typically use reverse osmosis (RO) technologies that generate a brine concentrate stream that requires disposal. DPR strategies are assumed to have a calculated percent water loss of 80%, which is attributed to the nature of RO treatment processes and disposal of brine concentrate.
    - Indirect, Potable and Non-Potable Reuse: Indirect reuse requiring a bed and banks permit is assumed to have water losses associated with transportation, evaporation, seepage, and channel or other associated carriage losses. For strategies with existing bed and banks permits, the WMS evaluation was assumed to have no water losses since the yield already incorporates associated water losses. For strategies without an existing bed and banks permit, the water losses are accounted for by the WAM's channel loss factors which represent estimates of all carriage losses along the stream segments within the basin.

- Brush Management: Brush Management strategies are assumed to have no associated water losses.
- Rainwater Harvesting: Rainwater Harvesting strategies are assumed to have no associated water losses.
- Surface Water Rights: Strategies involving transfers of water rights are assumed to have no additional water losses associated with the use of existing infrastructure.
- Balancing Storage: Recommended and alternative surface water strategies such as new reservoirs have water losses associated with evaporation. ASR reduces the water losses associated with evaporation from a reservoir, but there can be water losses due to recovery efficiency from the aquifer. Migration rates vary depending on the aquifer used for storage, and impacts will depend on how long the stored water remains in the aquifer. Recovery efficiency will have some impacts on water volume but are assumed to have no impacts on the firm yield volumes.
- Aquifer Storage and Recovery: ASR strategies have losses due to recovery efficiency from the aquifer. WMS evaluations are assumed to have an estimated percent water loss between 90-95 percent (%).
- Off-channel Reservoirs: Surface water strategies that include new off-channel reservoirs (OCRs) have water losses associated with evaporation. If water is transmitted via open channel canals, there are also water losses associated with evaporation.

Reliability

Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all of the time, then the strategy has a high reliability. Reliability is not intended as a measure of a strategy's likelihood of being implemented or securing necessary permits. If the quantity of water is contingent on other factors, reliability will be lower. The SCTRWPG developed a reliability evaluation matrix (Table 5.2-2) that was used in conjunction with other implementation considerations to quantify the reliability of WMSs. Table 5.2-3 summarizes the reliability scores for the potentially feasible WMSs evaluated in the 2026 SCTRWP.

Table 5.2-2 Strategy Reliability Evaluation Matrix

Reliability Score	Reliability
1	Low
2	Low to Medium
3	Medium
4	Medium to High
5	High

Table 5.2-3 Reliability Assessment for Potentially Feasible Strategies

WMS No.	WMS Name	Reliability Score	Reliability Considerations
1	Municipal Water Conservation	5	Since this strategy is a demand reduction, the reliability is high.
2	Non-municipal Water Conservation	5	Since this strategy is a demand reduction, the reliability is high.
3	Drought Management	5	Since this strategy is a demand reduction, the reliability is high.
4	Edwards Transfers	4	The reliability is considered to be medium to high, as the yields were developed in accordance with full implementation of the Edwards Aquifer Habitat Conservation Plan (EAHCP). Reliability may be impacted by changes to rules and/or requirements of the EAHCP when it is renewed periodically.
5	Fresh Groundwater Development	4	Reliability is considered to be medium to high, as the yields were developed within the MAG. Reliability may be impacted by well production volumes, produced water quality, impacts to natural resources, and user competition. Reliability can also be impacted by rules and management policies of the respective GCD, which regulates production, well spacing, and other activities.
6	Brackish Groundwater Development	4	Reliability is considered to be medium to high, as the yields were developed within the MAG. Reliability may be impacted because of differing well production volumes, produced water quality, impacts to natural resources, and user competition. Reliability can also be impacted by rules and management policies of the respective GCD, which regulates production, well spacing, and other activities.
7	Groundwater Conversions	4	The reliability is considered to be medium to high, as the yields were developed within the MAG. Reliability may be impacted by well production volumes, produced water quality, impacts to natural resources, and user competition. Reliability can also be impacted by rules and management policies of the respective GCD, which regulates production, well spacing, and other activities.
8	Facilities Expansion	5	Reliability is considered high, as the expanded infrastructure will help to improve efficiency and/or treat or distribute additional supplies.
9	Recycled Water	5	Reliability is considered to be high, as the supplies for this strategy are based on estimates of water use and related return flows to specific wastewater treatment plants (WWTPs).

WMS No.	WMS Name	Reliability Score	Reliability Considerations
10	Brush Management	1	This strategy is considered low reliability because there is no demonstrated firm yield during a repeat of the drought of record.
11	Rainwater Harvesting	2	This strategy is considered to have low to medium reliability because of uncertainties of precipitation frequency and intensity.
12	Surface Water Rights	3	This supply is considered medium reliability because of uncertainty involved in negotiations between willing buyers and sellers of existing water rights.
13	Balancing Storage	5	Storage options, such as ASR or OCRs are considered to have a reliability rating of high.
14	ARWA Carrizo-Wilcox Project (Phase 2)	4	Reliability is considered medium to high, as the hydrogeology has already been validated through implementation of Phase 1. Reliability may be impacted by well production volumes, produced water quality, impacts to natural resources, and user competition. Reliability can also be impacted by rules and management policies of the respective GCD, which regulates production, well spacing, and other activities.
15	ARWA DPR Project (Phase 3)	5	Reliability is considered to be high, as the supplies for this strategy are based on estimates of water use and related return flows to specific WWTPs.
16	CRWA Expanded Brackish Carrizo-Wilcox Project	4	Reliability is considered medium to high, as the hydrogeology has already been validated through implementation of initial project phases. Blending of Carrizo-Wilcox Aquifer water is considered to be as reliable as the fresh water source. Reliability may be impacted by well production volumes, produced water quality, impacts to natural resources, and user competition. Reliability can also be impacted by rules and management policies of the respective GCD, which regulates production, well spacing, and other activities.
17	CRWA Siesta Project	4	Reliability is considered medium to high, as the hydrology has already been validated using the WAM.
18	CRWA Wells Ranch (Phase 3) Project	4	Reliability is considered medium to high, as the hydrogeology has already been validated from existing, nearby wells. Reliability may be impacted by well production volumes, produced water quality, impacts to natural resources, and user competition. Reliability can also be impacted by rules and management policies of the respective GCD, which regulates production, well spacing, and other activities.
19	CVLGC Carrizo Project	4	Reliability is considered medium to high, as the hydrogeology has already been validated from existing,

WMS No.	WMS Name	Reliability Score	Reliability Considerations
			nearby wells. Reliability may be impacted by well production volumes, produced water quality, impacts to natural resources, and user competition. Reliability can be impacted by ability to secure necessary permits because of competition for limited groundwater supplies within Wilson County. Reliability can also be impacted by rules and management policies of the respective GCD, which regulates production, well spacing, and other activities.
20	GBRA Lower Basin New Appropriation	5	Reliability is considered high, as the hydrology has already been validated using the WAM and the strategy includes a storage reservoir to firm up supplies.
21	GBRA WaterSECURE	5	The reliability of the water supplies is considered high, as the surface water rights have already been secured and successful ASR development is highly reliable. While a small portion of the overall yield, the reliability of the brackish groundwater component could be considered medium to high because of the potential for differing well production volumes, produced water quality, impacts to natural resources, and user competition. Reliability can be impacted by the ability to secure necessary permits because of competition for limited groundwater supplies within Gonzales County. Reliability can also be impacted by rules and management policies of the respective GCD, which regulates production, well spacing, and other activities.
22	Medina County Regional ASR Project	5	Successful ASR development is highly reliable. It is normally possible to achieve 90-95% recovery efficiency
23	NBU ASR Project	5	Successful ASR development is highly reliable. It is normally possible to achieve 90-95% recovery efficiency.
24	NBU Trinity Well Field Expansion	4	Reliability is considered medium to high. Reliability may be impacted by well production volumes, produced water quality, impacts to natural resources, and user competition. Reliability can also be impacted by rules and management policies of the respective GCD, which regulates production, well spacing, and other activities.
25	SAWS Expanded Local Carrizo Project	4	Reliability is considered medium to high, as the hydrogeology has already been validated through implementation of initial project phases. Reliability may be impacted by well production volumes, produced water quality, impacts to natural resources, and user competition. Reliability can also be impacted by rules and management policies of the respective GCD, which regulates production, well spacing, and other activities.
26	SAWS Expanded Brackish Groundwater Project	4	Reliability is considered medium to high, as the hydrogeology has already been validated from existing, nearby wells. Reliability may be impacted by well

WMS No.	WMS Name	Reliability Score	Reliability Considerations
			production volumes, produced water quality, impacts to natural resources, and user competition. Reliability can be impacted by ability to secure necessary permits because of competition for limited groundwater supplies within Wilson County. Reliability can also be impacted by rules and management policies of the respective GCD, which regulates production, well spacing, and other activities.
27	SAWS Regional Wilcox Project	4	Reliability is considered medium to high, as the hydrogeology has already been validated from existing, nearby wells. Reliability may be impacted by well production volumes, produced water quality, impacts to natural resources, and user competition. Reliability can be impacted by ability to secure necessary permits because of competition for limited groundwater supplies within Wilson County. Reliability can also be impacted by rules and management policies of the respective GCD, which regulates production, well spacing, and other activities.
28	SSLGC Expanded Brackish Wilcox Project	4	Reliability is considered medium to high, as the hydrogeology has already been validated through implementation of initial project phases. Blending of Carrizo-Wilcox Aquifer water is considered to be as reliable as the fresh water source. Reliability may be impacted by well production volumes, produced water quality, impacts to natural resources, and user competition. Reliability can also be impacted by rules and management policies of the respective GCD, which regulates production, well spacing, and other activities.
29	SSLGC Expanded Carrizo Project	4	Reliability is considered medium to high, as the hydrogeology has already been validated through implementation of initial project phases. Reliability may be impacted by well production volumes, produced water quality, impacts to natural resources, and user competition. Reliability can also be impacted by rules and management policies of the respective GCD, which regulates production, well spacing, and other activities.
30	Victoria ASR Project	5	Successful ASR development is highly reliable. It is normally possible to achieve 90-95% recovery efficiency
31	Victoria Groundwater-Surface Water Exchange	4	Reliability is considered medium to high, as the hydrology has already been validated using the WAM.
32	Weather Modification	2	Reliability is considered low to medium, as the strategy is dependent on the presence of clouds capable of producing precipitation.

Financial Costs

Financial costs were evaluated using the TWDB Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. All costs included in the 2026 Regional Water Plan are shown in September 2023 dollars.

Costs do not include costs of infrastructure associated with distribution of water within a WUG after treatment, except for specific, limited allowances for direct reuse and conservation WMSs. Infrastructure was sized to deliver the sponsor's requested yield; however, MAG-limited WMSs include annual unit costs that were calculated using the available yield in the first decade of implementation.

The Uniform Costing Model generates cost estimate summaries that include costs associated with capital expenditures, operation and maintenance (O&M), contingency, debt service, and unit costs. Certain WMSs were evaluated using alternative financial cost methodologies, as follows:

- Drought Management (Refer to Section 5.2.3): Costs were evaluated using the TWDB Drought Management Costing Tool, which estimates the economic costs of foregone water use.
- Brush Management (Refer to Section 5.2.10): Texas A&M University provided a cost estimate for brush control as well as a cost for the associated monitoring program. The costs, updated to September 2023 dollars, assume initial clearing costs to be $304/acre and maintenance clearing costs to be $7.61/acre/year.

Environmental Factors

This subchapter includes a quantitative reporting of the effects of potentially feasible WMSs on environmental factors, which includes environmental water needs (including effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico), agricultural resources, wildlife habitats, and cultural resources. WMS evaluations in Subchapter 5.2 include an Environmental Factors section, which is further organized into sections for Environmental Considerations and Cultural Considerations.

Environmental Considerations

Environmental considerations were evaluated for each potentially feasible WMS based on information provided by sponsors, available published information, maps, and recent aerial photography, including available geographic information system (GIS) shapefiles. The project locations shown on maps in this chapter are conceptual in nature and are not meant to represent actual locations of facilities. Siting of facilities are subject to studies, designs, engineering, and/or contract negotiations to be determined by the project's sponsor later. Therefore, as projects enter the detailed design phases, it should be noted that potential environmental impacts identified in this analysis could be avoided or reduced through such approaches as facility layout or alignment adjustments, changes in construction methods, and construction timing.

Data were obtained from various reference sources and compiled into GIS using ArcGIS software. Environmental datasets were overlaid on defined conceptual project boundaries or alignments for each WMS to determine potential project effects on (1) vegetation , land use, and agricultural resources; (2) aquatic resources; and (3) threatened, endangered, and species of concern. Data were obtained from the following sources:

- Aerial Photography: ESRI ArcGIS Online Basemap Map Services and Google Earth;
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM);

- TCEQ 2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d);
- Texas Parks and Wildlife Department (TPWD) Ecological Mapping Systems of Texas (EMST) of Vegetation Maps;
- TPWD Wildlife Division, Diversity and Habitat Assessment Programs. TPWD County Lists of Protected Species and Species of Greatest Conservation Need (SGCN) (2024 August 22).
- TPWD Wildlife Diversity Program of Texas Parks & Wildlife Department. Texas Natural Diversity Database (2019);
- TPWD Coastal Fisheries Division: Water Resources Branch. Ecologically Significant River and Stream Segments of Region L (South Central) Regional Water Planning Area (2005);
- U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS): Soil Data Mart, Web Soil Survey and PLANTS Database;
- U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) Resource List of Critical Habitat Maps and County Threatened and Endangered Species Lists;
- USFWS Karst Invertebrate Zone Maps;
- USFWS National Wetland Inventory (NWI) Maps;
- U.S. Geological Survey (USGS) 7.5-Minute Topographic Quadrangle Maps; and
- USGS National Hydrography Dataset (NHD) Maps.

Evaluations of WMS impacts to threatened and endangered species and SGCN included in this regional water plan used information and data sources that were current as of the time of writing. The TPWD county species lists used for the evaluation of environmental factors were published on August 22, 2024. The TPWD's county species lists were subsequently updated on January 15, 2025, which was after the SCTRWPG performed the WMS evaluations. Most of the updates included in the January 15, 2025, version of the TPWD county species lists reflect additions, deletions, or revisions of SGCN, and the monarch butterfly (migratory) was added as a federal candidate species for each project county evaluated in this plan. Project implementation would require independent review of impacts to threatened and endangered species and SGCN as part of the regulatory permitting for the project.

Cultural Resources

Cultural resources were evaluated for each potentially feasible WMS using a cultural resources background literature review and probability modeling analysis to estimate the potential of a WMS project for containing cultural resources.

A background literature review was conducted by examining records from the Texas Historical Commission's (THC) Texas Historic and Archeology Sites Atlas (Atlas) online-restricted cultural resources database and the Texas Department of Transportation (TxDOT) Historic Resources Aggregator. Cemetery locations were identified using historically relevant locations listed on the Texas Freedom Colonies Project database and using the online database from Find a Grave. These sources provide information on the nature and location of previously conducted cultural resources surveys, previously recorded archaeological sites, National Historic Landmarks, National Registered Historic Places (NRHP)-listed or -eligible districts and properties, State Antiquities Landmarks (SALs), Recorded Texas Historic Landmarks, historical markers, cemeteries, Texas Freedom Colonies, and local neighborhood surveys.

For regional analysis, each WMS project area (e.g., polygon or large area) was examined for the presence of previously recorded cultural resources, and each WMS project alignment (e.g., line or pipeline) was examined for the presence of previously recorded cultural resources in additional to a 300-foot radius from the project alignment.

An analysis of historical maps was also performed as part of the background literature review to determine whether any historic-age (built in 1980 [45 years] or earlier) resources or potential historical structures (PHSs) were located within the WMS project. The review included historical topographic maps available on the USGS TopoView website, and historical aerial photography contained on the Nationwide Environmental Title Research (NETR) Historic Aerials website.

To conduct the probability modeling analysis, the SCTRWPG used TxDOT's Potential Archaeological Liability Maps and Hybrid Potential Archaeological Liability Maps systems, which use a geoarchaeological approach to determine where deeply buried archaeological sites may be preserved with sufficient integrity to warrant further study. The model also assigns higher scores to locales that possess or have a statistically greater likelihood of containing intact archaeological deposits in accordance with certain attributes. These attributes include proximity to natural water sources, soils and stratigraphic integrity, and areas with buildings, roads, or trails that have the potential to be historical in age. The overall potential integrity of deeply buried archaeological resources was assessed for each WMS on a scale of low, medium, and high potential. According to the scale, each WMS project received a mean score.

Results of the cultural resources background literature review and probability modeling analyses were collated to generate a baseline cultural resource assessment score. These scores were determined by the number and types of known cultural resources identified, and the mean score of the probability model. The previously recorded cultural resources within WMS projects were evaluated according to their NRHP eligibility and SAL designation, allowing for a tabular evaluation. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts and properties or archaeological sites, SALs, and cemeteries, which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 points. In addition, Recorded Texas Historical Landmarks, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. The frequency of cultural resource sites combined with the project's mean archaeological probability generated the final cultural resource assessment scores presented for each WMS. When viewed as a series, a higher cultural resource assessment score indicates greater archaeological probability for known and unknown cultural resources sites to be within a WMS project's footprint. As the WMS boundaries remain in the conceptual stage, a more precise evaluation of cultural resources impacts would require the project footprint to be fully defined.

5.2.1 Municipal Water Conservation

The SCTRWPG identified the Municipal Water conservation as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.1.1 Description of Water Management Strategy

Water conservation measures are defined as practices, techniques, programs, and technologies that will protect water resources, reduce consumption of water, reduce the loss or waste of water, or improve the efficiency in the use of water so that a water supply is made available for future or alternative uses. The goal of this WMS is to increase water conservation and thereby reduce freshwater use within the South Central Texas Region. The general methods to accomplish this objective are to (1) reduce per capita water use in the municipal water use category; (2) recycle and reuse water and substitute reclaimed water (treated municipal and industrial wastewater) for use in some industries, steam-electric power generation, and mining; and (3) improve irrigation efficiencies to reduce the quantity of water use in agriculture per acre irrigated.

Best Management Practices (BMPs) for water conservation are also included in this WMS evaluation [1]. In addition, the WMS includes estimates of potential water conservation demand reductions and associated costs of water conservation for municipal WUGs. This WMS is considered for implementation beginning in the 2030 decade.

5.2.1.1.1 Municipal Water Conservation

For regional water planning purposes, municipal water use is defined as residential and commercial water use. Municipal water supply is used primarily for drinking, sanitation, cleaning, cooling, fire protection, and landscape watering for residential, commercial, and institutional establishments. Such water is supplied by both public and private utilities and, in areas not served by water utilities, is supplied by individual households. A key parameter of municipal water use within a typical city or water service area is the number of gallons used per person per day (per capita water use), measured as gallons per capita per day (GPCD). The objective of municipal water conservation programs is to reduce the per capita water use parameter without adversely affecting the quality of life of the people involved. This can be achieved through the following:

- Use of low flow plumbing fixtures (e.g., toilets, shower heads, and faucets that are designed for low quantities of flow per unit of use);
- Selection and use of more efficient water-using appliances (e.g., clothes washers and dishwashers);
- Modification and/or installation of lawn and landscaping systems to use grass and plants that require less water;
- Repair of plumbing and water-using appliances to reduce leaks; and
- Modification of personal behavior that controls the use of plumbing fixtures, appliances, and lawn watering methods.

Expected water-efficiency savings, or passive water savings, are incorporated into the current TWDB municipal water demand projections (refer to Chapter 2) and include estimated or anticipated savings due to state and federal specifications for fixture and appliance design. The savings projected by the

[1] Water Conservation Implementation Task Force. Report to the 79th Legislature, Texas Water Development Board, Special Report. Austin, Texas. November 2004.

TWDB includes complete replacement of existing plumbing fixtures to water-efficient fixtures by the year 2045. The projections also assume that all new construction includes water-efficient plumbing fixtures.

The 1991 State Water Efficient Plumbing Act established minimum standards for plumbing fixtures sold in Texas. The standards for new plumbing fixtures, as specified by the State Water Efficient Plumbing Act and updated by the TCEQ, are shown in Table 5.2.1-1. The TCEQ has established rules requiring the labeling of both plumbing fixtures and water-using appliances sold in Texas. The labels must specify the rates of flow for plumbing fixtures and lawn sprinklers, and the amounts of water used per cycle for clothes washers and dishwashers.

In 2009, the Texas Legislature enacted House Bill (HB) 2667, establishing new minimum standards for plumbing fixtures sold in Texas beginning in 2014. HB 2667 clarifies and sets out the national standards of the American Society of Mechanical Engineers (ASME) and American National Standards Institute (ANSI) by which plumbing fixtures will be produced and tested. This bill establishes a phase-in of high efficiency plumbing fixtures brought into Texas, which allowed manufacturers the time to change their production and retailers the opportunity to turn over their inventory. HB 2667 creates an exemption for those manufacturers that volunteer to register their products with the United States Environmental Protection Agency's (U.S. EPA's) WaterSense Program, which should result in additional water savings. This bill also repeals the TCEQ certification process for plumbing fixtures since the plumbing fixtures must meet national certification and testing procedures.

The TCEQ has established rules to reflect this relatively recent change in statute. The 2009 law required that by January 2014, all toilets use no more than 1.28 gallons per flush (20% savings from the 1991, 1.6 gallons per flush standard). Assuming an average frequency of per-person toilet use in households of 5.1 and a per-use savings of 0.32 gallons per use, the supplementary savings of adopting high-efficiency toilets is 1.63 GPCD. This change is also reflected in Table 5.2.1-1.

Table 5.2.1-1 Standards for Plumbing Fixtures [2]

Fixture	Standard
Toilets*	1.28 gallons per flush
Shower Heads	2.50 gallons per minute (gpm) at 80 pounds per square inch (psi)
Urinals	0.50 gallons per flush
Faucet Aerators	2.20 gpm at 60 psi
Drinking Water Fountains	Self-closing valve
*HB 2667 of the 81st Texas Legislature, 2009.	

The TWDB estimates that new plumbing fixtures in dwellings, offices, and public places will be a reduction in per capita water use, in comparison to what would have occurred with previous generations of plumbing fixtures found in Table 5.2.1-2.

[2] Title 30 of the Texas Administrative Code (TAC) §290.252; 30 TAC §290, Subchapter G; and Texas Health and Safety Code 372.

Table 5.2.1-2 Water Conservation Potentials of Low Flow Plumbing Fixtures (GPCD)

Plumbing Fixture	Pre-1995 Average Use to 1995 Standard	Pre-1995 Average Use to 1995 Standard	Pre-1995 Average Use to 1995 Standard
Showerheads*	13.0	NA	1.86
Toilets - residential	10.5	12.1	1.6
Toilets & urinals – commercial**	7.06	8.41	1.35
Showerheads*	13.0	NA	1.86

* Savings values shown assume 8 minutes per shower and 6.5 showers per person per week

** Savings values shown assume state-level gender employee proportions and 6 days per week use for commercial toilet and urinal use

In 2001, the Texas Legislature amended the TWC to require RWPGs to consider water conservation and drought management measures for each WUG with an identified need (projected water shortage). Beginning in 2004, the Water Conservation Implementation Task Force initially provided a BMP guide for use by RWPGs [3]. In 2007, the Task Force was succeeded by the Water Conservation Advisory Council (WCAC), enacted by the 80th Texas Legislature with the passage of SB 3 and HB 4. The council's primary roles include monitoring trends in water conservation implementation and technologies for potential inclusion as BMPs. Since its inception, WCAC has continually worked with TWDB and TCEQ to update the "Best Management Practices Guide."

A variety of conservation measures are recommended as described in the WCAC BMP Guide [4], any combination of which can be used to meet the specific goals for a municipality or utility. Conservation can be achieved using a variety of strategies, including the following:

- **Conservation Analysis and Planning**
  - Conservation Coordinator
  - Cost-Effectiveness Analysis
  - Water Survey for Single-Family and Multi-Family Customers
  - Customer Characterization
- **Financial**
  - Water Conservation Pricing
  - Wholesale Agency Assistance Programs
- **System Operations**
  - Metering of all New Connections and Retrofitting of Existing Connections
  - System Water Audit and Water Loss

[3] Water Conservation Implementation Task Force. Report to the 79th Legislature, Texas Water Development Board, Special Report. Austin, Texas. November 2004.

[4] "Best Management Practices for Municipal Water Users." Texas Water Development Board. Austin, Texas. May 2019.

- **Landscaping**
  - Athletic Field Conservation
  - Golf Course Conservation
  - Landscape Irrigation Conservation and Incentives
  - Park Conservation
  - Residential Landscape Irrigation Evaluations
  - Outdoor Watering Schedule
- **Education and Public Awareness**
  - Public Information
  - School Education
  - Public Outreach and Education
  - Partnerships with Nonprofit Organizations
- **Rebate, Retrofit, and Incentive Programs**
  - Conservation Programs for Industrial, Commercial, and Institutional Accounts
  - Residential Clothes Washer Incentive Program
  - Residential Toilet Replacement Programs
  - Showerhead, Aerator, and Toilet Flapper Retrofit Program
  - Water-Wise Landscape Design and Conversion Programs
  - Customer Conservation Rebates
  - Plumbing Assistance Programs for Economically Disadvantaged Customers
- **Conservation Technology**
  - New Construction Graywater
  - Rainwater Harvesting and Condensate Reuse [5]
  - Reuse of Reclaimed Water[6]
- **Regulatory Enforcement**
  - Prohibition of Wasting Water
  - Conservation Ordinance Planning and Development

[5] While Rainwater Harvesting, Condensate Reuse, and Reuse of Reclaimed Water are included in the WCAC Municipal BMP Guide as water conservation measures, they are not classified as water conservation measures by the TWDB for regional water planning purposes or in 2027 Regional and State Water Planning Database.

Entities must submit a water conservation plan if they meet one or more of the following conditions [6]:

- The entity is a retail public water supplier with 3,300 or more connections;
- The entity is applying to the TWDB for financial assistance of more than $500,000; or
- The entity has certain surface water rights through the TCEQ.

Submitted water conservation plans must meet certain minimum requirements and be updated every five years. The water conservation plans should include a utility profile, an evaluation of the applicant's water and wastewater system and customer use characteristics, to identify water conservation opportunities. The plans should also set specific and quantifiable five-year and ten-year conservation goals for water loss programs and municipal and residential uses in GPCD with a schedule. More information and resources to develop water conservation plans can be found on the TWDB website [7].

In addition to the BMP Guide and required water conservation plans, the WCAC recommends use of a standardized methodology to determine per capita municipal water use. A standardized methodology would allow consistent evaluations and comparisons of water conservation measures' effectiveness among cities located in different climates and parts of Texas. The WCAC further recommends GPCD targets and goals that should be considered by retail public water suppliers, as follows:

- "All public water suppliers that are required to prepare and submit water conservation plans should establish targets for water conservation, including specific goals for per capita water use and for water loss programs using appropriate water conservation BMPs;" and
- "Municipal Water Conservation Plans required by the state shall include per capita water-use goals, with targets and goals established by an entity giving consideration to a minimum annual reduction of 1% in total GPCD, based upon a five-year moving average, until such time as the entity achieves a total GPCD of 140 GPCD or less."

The Texas WCAC provides information on best management practices and continuing development of water conservation resources, expertise, and progress evaluation. More information is available on the WCAC website at www.savetexaswater.org. The SCTRWPG considered these recommendations and incorporated them into the Region L Municipal Water Conservation Goals.

Anticipated per capita water use for Region L WUGs as a result of passive water conservation is shown in Table 5.2.1-3, which represents the effects of low flow plumbing fixtures. These per capita water use estimates were used to project water demands for each municipal WUG (See Chapter 2). The table includes a list of 144 municipal WUGs in the SCTRWPA, arranged in order of lowest to highest per capita water use in year 2011 (baseline). Projected per capita water use represents the anticipated impacts of low flow plumbing fixtures for each decade from 2030 through 2080. **For most WUGs, additional GPCD savings are expected when the Municipal Water Conservation strategy goals are applied** (refer to Section 5.2.1.2, Available Yield for a description of Municipal Water Conservation GPCD goals and accompanying yield or savings).

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[6] "Evaluation of Best Management Practices in Certain Water Conservation Plans," Biennial Report to the Texas Legislature, 85th Legislative Session. Texas Water Development Board, 2017.
[7] Texas Water Development Board (TWDB), Water Conservation Plans website: http://www.twdb.texas.gov/conservation/municipal/plans/index.asp

Table 5.2.1-3 Projected Per-Capita Water Use with Passive Conservation (GPCD) [1]

No.	Water User Group	Primary County	Base-line (GPCD)	2030	2040	2050	2060	2070	2080
1	Randolph Air Force Base	Bexar	60	60	60	60	60	60	60
2	Port Oconnor Improvement District	Calhoun	70	65	64	64	64	64	64
3	County Line SUD	Hays	80	77	77	77	77	77	77
4	East Medina County SUD	Medina	81	77	76	76	76	76	76
5	Kendall County WCID 1	Kendall	86	81	80	80	80	80	80
6	Picosa WSC	Wilson	86	82	82	82	82	82	82
7	Medina River West WSC	Medina	91	87	87	87	87	87	87
8	Kyle	Hays	91	87	86	86	86	86	86
9	Kirby	Bexar	92	87	87	87	87	87	87
10	Maxwell SUD	Hays	92	88	87	87	87	87	87
11	Cibolo	Guadalupe	93	89	88	88	88	88	88
12	Point Comfort	Calhoun	94	89	88	88	88	88	88
13	La Coste	Medina	94	89	89	89	89	89	89
14	Martindale WSC	Caldwell	96	92	91	91	91	91	91
15	Lackland Air Force Base	Bexar	96	92	92	92	92	92	92
16	Benton City WSC	Medina	97	93	92	92	92	92	92
17	Converse	Bexar	98	93	93	93	93	93	93
18	Victoria County WCID 1	Victoria	98	94	93	93	93	93	93
19	Creedmoor-Maha WSC [2]	Caldwell	100	95	94	94	94	94	94
20	Yancey WSC	Medina	101	97	96	96	96	96	96
21	Springs Hill WSC	Guadalupe	101	97	96	96	96	96	96
22	Goforth SUD [2]	Hays	101	97	97	97	97	97	97
23	Green Valley SUD	Guadalupe	103	99	99	99	99	99	99
24	Wimberley WSC	Hays	104	99	99	99	99	99	99
25	County-Other, La Salle	La Salle	104	99	98	98	98	98	98
26	County-Other, Guadalupe	Guadalupe	105	98	98	98	98	98	98
27	County-Other, Calhoun	Calhoun	105	99	97	97	97	97	97
28	County-Other, Victoria	Victoria	105	100	100	100	100	100	100
29	Quail Creek MUD	Victoria	105	100	99	99	99	99	99
30	San Antonio Water System [3]	Bexar	106	102	97	95	92	89	87
31	County-Other, Wilson	Wilson	107	102	102	102	102	102	102

No.	Water User Group	Primary County	Base-line (GPCD)	2030	2040	2050	2060	2070	2080
32	County-Other, Refugio	Refugio	107	102	102	102	102	102	102
33	County-Other, Caldwell	Caldwell	107	103	103	103	103	103	103
34	County-Other, Gonzales	Gonzales	108	103	102	102	102	102	102
35	S S WSC	Wilson	109	105	104	104	104	104	104
36	County-Other, Goliad	Goliad	110	105	105	105	105	105	105
37	Leon Valley	Bexar	110	105	105	105	105	105	105
38	County-Other, Kendall	Kendall	110	106	105	105	105	105	105
39	McCoy WSC [2]	Atascosa	111	106	106	106	106	106	106
40	Poteet	Atascosa	111	107	106	106	106	106	106
41	County-Other, Hays [2]	Hays	111	107	106	106	106	106	106
42	Kendall West Utility	Kendall	111	107	106	106	106	106	106
43	Polonia WSC [2]	Caldwell	112	108	108	108	108	108	108
44	Marion	Guadalupe	113	108	108	108	108	108	108
45	Canyon Lake Water Service (Texas Water Company) [2]	Comal	113	109	109	109	109	109	109
46	Tri Community WSC	Caldwell	113	109	108	108	108	108	108
47	Atascosa Rural WSC	Bexar	114	110	109	109	109	109	109
48	County-Other, Medina	Medina	116	112	111	111	111	111	111
49	County-Other, Atascosa	Atascosa	116	112	111	111	111	111	111
50	County-Other, Frio	Frio	117	113	112	112	112	112	112
51	San Marcos	Hays	119	110	107	105	103	102	102
52	County-Other, Bexar	Bexar	119	112	111	111	111	111	111
53	County-Other, DeWitt	DeWitt	123	118	117	117	117	117	117
54	County-Other, Dimmit	Dimmit	124	119	118	118	118	118	118
55	Port Lavaca	Calhoun	126	121	121	121	121	121	121
56	Fayette WSC [2]	Gonzales	126	122	121	121	121	121	121
57	County-Other, Karnes	Karnes	127	122	121	121	121	121	121
58	East Central SUD	Bexar	127	122	122	122	122	122	122
59	County-Other, Uvalde	Uvalde	128	123	122	122	122	122	122
60	Luling	Caldwell	128	123	123	123	123	123	123
61	Crystal Clear SUD	Guadalupe	129	124	124	124	124	124	124
62	Lockhart	Caldwell	129	125	124	124	124	124	124
63	Elmendorf	Bexar	130	126	125	125	125	125	125

No.	Water User Group	Primary County	Base-line (GPCD)	2030	2040	2050	2060	2070	2080
64	Devine	Medina	132	127	127	127	127	127	127
65	Universal City	Bexar	135	130	129	129	129	129	129
66	Seguin	Guadalupe	139	134	134	134	134	134	134
67	Nixon	Gonzales	140	136	135	135	135	135	135
68	South Buda WCID 1	Hays	142	138	137	137	137	137	137
69	Big Wells	Dimmit	143	138	138	138	138	138	138
70	Poth	Wilson	144	139	138	138	138	138	138
71	Water Services	Bexar	145	140	139	139	139	139	139
72	Schertz	Bexar	145	141	140	140	140	140	140
73	Guadalupe-Blanco River Authority	Comal	146	142	141	141	141	141	141
74	Sunko WSC	Karnes	146	142	141	141	141	141	141
75	Woodsboro	Refugio	147	142	142	142	142	142	142
76	Aqua WSC [2]	Caldwell	148	144	143	143	143	143	143
77	Selma	Bexar	148	144	143	143	143	143	143
78	County-Other, Zavala	Zavala	149	144	143	143	143	143	143
79	Seadrift	Calhoun	150	145	145	145	145	145	145
80	Oak Hills WSC	Wilson	150	146	145	145	145	145	145
81	County-Other, Comal	Comal	152	147	147	147	147	147	147
82	Batesville WSC	Zavala	153	149	148	148	148	148	148
83	Waelder	Gonzales	154	149	149	149	149	149	149
84	Natalia	Medina	154	150	149	149	149	149	149
85	Charlotte	Atascosa	155	150	150	150	150	150	150
86	Carrizo Hill WSC	Dimmit	156	152	151	151	151	151	151
87	The Oaks WSC	Bexar	157	152	151	151	151	151	151
88	Yorktown	DeWitt	158	153	153	153	153	153	153
89	Live Oak	Bexar	159	154	154	154	154	154	154
90	Yoakum [2]	DeWitt	160	155	155	155	155	155	155
91	C Willow Water	Wilson	165	160	160	160	160	160	160
92	Castroville	Medina	165	160	160	160	160	160	160
93	Karnes City	Karnes	168	163	163	163	163	163	163
94	Refugio	Refugio	171	166	166	166	166	166	166
95	Texas State University	Hays	171	167	167	167	167	167	167

No.	Water User Group	Primary County	Base-line (GPCD)	2030	2040	2050	2060	2070	2080
96	Lytle	Atascosa	174	169	169	169	169	169	169
97	Moore WSC	Frio	174	170	169	169	169	169	169
98	Medina County WCID 2	Medina	177	173	172	172	172	172	172
99	Pearsall	Frio	178	173	173	173	173	173	173
100	Goliad	Goliad	180	175	174	174	174	174	174
101	Wingert Water Systems	Comal	180	175	175	175	175	175	175
102	Smiley	Gonzales	181	176	176	176	176	176	176
103	Asherton	Dimmit	182	177	177	177	177	177	177
104	Runge	Karnes	183	178	178	178	178	178	178
105	El Oso WSC [2]	Karnes	183	179	178	178	178	178	178
106	New Braunfels	Comal	183	179	178	178	178	178	178
107	West Medina WSC	Medina	185	180	179	179	179	179	179
108	Knippa WSC	Uvalde	187	182	182	182	182	182	182
109	Encinal WSC	La Salle	187	183	182	182	182	182	182
110	Stockdale	Wilson	189	184	184	184	184	184	184
111	Crystal City	Zavala	189	184	184	184	184	184	184
112	La Vernia	Wilson	190	185	184	184	184	184	184
113	Jourdanton	Atascosa	190	185	185	185	185	185	185
114	Bexar County WCID 10	Bexar	193	188	187	187	187	187	187
115	Boerne	Kendall	193	189	188	188	188	188	188
116	Pleasanton	Atascosa	196	191	191	191	191	191	191
117	Windmill WSC	Uvalde	197	193	192	192	192	192	192
118	Falls City	Karnes	201	196	196	196	196	196	196
119	Uvalde	Uvalde	211	206	206	206	206	206	206
120	Dilley	Frio	212	208	207	207	207	207	207
121	Floresville	Wilson	213	208	208	208	208	208	208
122	Sabinal	Uvalde	215	210	210	210	210	210	210
123	Gonzales	Gonzales	222	217	217	217	217	217	217
124	Three Oaks WSC	Wilson	223	218	218	218	218	218	218
125	Victoria	Victoria	226	221	221	221	221	221	221
126	Air Force Village II Inc	Bexar	227	221	221	221	221	221	221
127	Fair Oaks Ranch	Bexar	237	233	232	232	232	232	232
128	Cuero	DeWitt	238	233	233	233	233	233	233

No.	Water User Group	Primary County	Base-line (GPCD)	2030	2040	2050	2060	2070	2080
129	Carrizo Springs	Dimmit	243	238	238	238	238	238	238
130	Hondo	Medina	243	238	238	238	238	238	238
131	Gonzales County WSC	Gonzales	244	239	239	239	239	239	239
132	Concan WSC	Uvalde	244	240	239	239	239	239	239
133	Alamo Heights	Bexar	245	240	240	240	240	240	240
134	Ville Dalsace Water Supply	Medina	246	241	241	241	241	241	241
135	3009 Water	Comal	248	244	243	243	243	243	243
136	Zavala County WCID 1	Zavala	256	252	251	251	251	251	251
137	Cotulla	La Salle	280	275	275	275	275	275	275
138	Shavano Park	Bexar	283	278	278	278	278	278	278
139	Loma Alta Chula Vista Water System	Zavala	287	283	282	282	282	282	282
140	KT Water Development	Comal	304	300	300	300	300	300	300
141	Garden Ridge	Comal	315	311	310	310	310	310	310
142	Kenedy	Karnes	352	347	347	347	347	347	347
143	Clear Water Estates Water System	Comal	1,083	1,078	1,077	1,077	1,077	1,077	1,077
144	Fort Sam Houston	Bexar	1,895	1,891	1,890	1,890	1,890	1,890	1,890

[1] Passive water conservation effects are a result of low flow plumbing fixtures. Projected per capita water uses are estimated by the TWDB and used in calculating municipal water demands for WUGs in Chapter 2.

[2] WUGs are split between Region L and other regions (Regions K, P, and/or N).

[3] SAWS has identified utility-specific water conservation goals that are described and quantified in Section 5.2.1.2.3: San Antonio Water System Municipal Water Conservation." Refer to Section 5.2.1.2.3 for the GPCD as a result of passive water conservation.

5.2.1.1.2 Outdoor Water Conservation

In 2018, Texas Living Waters published the *Water Conservation by the Yard: A Statewide Analysis of Outdoor Water Savings Potential*, which detailed regional and statewide projected conservation savings using effective outdoor watering education, technology, and restrictions. According to Texas Living Waters, effectively implementing outdoor watering restrictions can achieve much of the projected conservation savings identified in the 2017 State Water Plan (SWP) efficiently utilizing the following limits:

- Number of days per week residents can water;
- Hours during which residents can irrigate; and
- Specific water delivering technologies.

The Texas Living Waters Project reported an estimated savings potential of twice per week outdoor watering restrictions ranges from 3.5 (low effort) to 8.5 (high effort) percent of total municipal demand.

The Texas Living Waters Project research indicates that education and enforcement have a direct impact on the effectiveness of outdoor watering restrictions.

5.2.1.2 Available Yield

The purpose of the Municipal Water Conservation WMS is to evaluate the potential of additional municipal water conservation for inclusion in the RWP, which could meet part of the projected water needs (shortages) of each WUG for which a need (shortage) is projected. The Municipal Water Conservation WMS for municipal WUGs of Region L is based on the above-listed BMPs, WCAC guidelines for water-use targets and goals, as well as the quantities and costs of water conservation measures, as reported in TWDB's publication entitled, *Quantifying the Effectiveness of Various Water Conservation Techniques in Texas* (TWDB Water Conservation Publication) [8].

5.2.1.2.1 Municipal Water Conservation Goals

The SCTRWPG established the following Municipal Water Conservation goals for the 2026 RWP:

- For municipal WUGs having year 2030 water use of 140 GPCD and greater, the goal is to reduce per capita water use by 10% per decade until 140 GPCD is reached; after which, the goal is to reduce per capita water use by 2.5% per decade for the remainder of the planning period;
- For municipal WUGs having year 2030 water use between 80 GPCD and 139 GPCD, the goal is to reduce per capita water use by 2.5% per year for the remainder of the planning period or until 80 GPCD is reached; and
- For municipal WUGs having year 2030 water use less than 80 GPCD, the goal is to maintain per capita water use at or below 80 GPCD throughout the planning horizon.

A summary of municipal WUGs' water use and population is provided in Table 5.2.1-4. In year 2030, 71 municipal WUGs have a projected per capita water use less than 140 GPCD. These WUGs represent approximately 86% of the South Central Texas Region's population in 2030 and are projected to use approximately 75% of the Region's municipal water. In contrast, 73 WUGs in the SCTRWPA have a projected municipal per capita water use of 140 GPCD or more, representing 14% of the region's population and 25% of the region's municipal water demands.

Table 5.2.1-4 Population and Municipal Per Capita Water Use

2030 per Capita Water Use (GPCD)	Number of Municipal WUGs	Percent of Municipal WUGs	2030 Population (No.)	Percent of Total Population	2030 Water Demands (acft/yr)	Percent of Total Water Demands
Less than 140	71	49.3%	3,452,367	86.0%	399,216	74.7%
140 and Greater	73	50.7%	564,269	14.0%	135,115	25.3%
Totals	**144**	**100%**	**4,016,636**	**100%**	**534,331**	**100%**

The above Municipal Water Conservation Goals for the SCTRWPA were applied to WUGs and the resulting per capita water use goals are summarized in Table 5.2.1-5.

[8] Texas Water Development Board (TWDB). 2003. *Quantifying the Effectiveness of Various Water Conservation Techniques in Texas*; Appendix VI, Region L. Prepared by GDS Associates.

SAWS has chosen to develop utility-specific conservation goals, beyond those included in the Region L Municipal Water Conservation goals described above. A description of the Municipal Water Conservation WMS for SAWS and accompanying tables are included in Section 5.2.1.2.3 entitled, "San Antonio Water System Municipal Water Conservation."

Table 5.2.1-5 Per Capita Water Use Goals for Region L Municipal WUGs (GPCD) [1]

No.	Water User Group	Primary County	Base-line (GPCD)	2030	2040	2050	2060	2070	2080
1	Randolph Air Force Base	Bexar	r	60	60	60	60	60	60
2	Port Oconnor Improvement District	Calhoun	70	65	64	64	64	64	64
3	County Line SUD	Hays	80	77	77	77	77	77	77
4	East Medina County SUD	Medina	81	77	76	76	76	76	76
5	Kendall County WCID 1	Kendall	86	80	80	80	80	80	80
6	Picosa WSC	Wilson	86	80	80	80	80	80	80
7	Medina River West WSC	Medina	91	85	83	81	80	80	80
8	Kyle	Hays	91	85	82	80	80	80	80
9	Kirby	Bexar	92	85	83	81	80	80	80
10	Maxwell SUD	Hays	92	86	83	81	80	80	80
11	Cibolo	Guadalupe	93	87	84	82	80	80	80
12	Point Comfort	Calhoun	94	87	85	82	80	80	80
13	La Coste	Medina	94	87	85	83	81	80	80
14	Martindale WSC	Caldwell	96	89	87	85	83	81	80
15	Lackland Air Force Base	Bexar	96	90	88	86	84	81	80
16	Benton City WSC	Medina	97	91	88	86	84	82	80
17	Converse	Bexar	98	91	89	87	84	82	80
18	Victoria County WCID 1	Victoria	98	91	89	87	85	83	80
19	Creedmoor-Maha WSC [2]	Caldwell	100	93	90	88	86	84	82
20	Yancey WSC	Medina	101	94	92	89	87	85	83
21	Springs Hill WSC	Guadalupe	101	94	92	90	87	85	83
22	Goforth SUD [2]	Hays	101	95	92	90	88	86	84
23	Green Valley SUD	Guadalupe	103	97	94	92	89	87	85
24	Wimberley WSC	Hays	104	97	94	92	90	87	85
25	County-Other, La Salle	La Salle	104	97	94	92	90	87	85
26	County-Other, Guadalupe	Guadalupe	105	96	94	91	89	87	85
27	County-Other, Calhoun	Calhoun	105	97	94	92	89	87	85

No.	Water User Group	Primary County	Base-line (GPCD)	2030	2040	2050	2060	2070	2080
28	County-Other, Victoria	Victoria	105	98	96	93	91	89	86
29	Quail Creek MUD	Victoria	105	98	95	93	91	88	86
30	San Antonio Water System [3]	Bexar	106	94	89	86	84	81	79
31	County-Other, Wilson	Wilson	107	100	97	95	93	90	88
32	County-Other, Refugio	Refugio	107	100	97	95	92	90	88
33	County-Other, Caldwell	Caldwell	107	101	98	96	93	91	89
34	County-Other, Gonzales	Gonzales	108	100	98	95	93	90	88
35	S S WSC	Wilson	109	102	100	97	95	92	90
36	County-Other, Goliad	Goliad	110	103	100	98	95	93	91
37	Leon Valley	Bexar	110	103	100	98	95	93	91
38	County-Other, Kendall	Kendall	110	103	100	98	95	93	91
39	McCoy WSC [2]	Atascosa	111	104	101	99	96	94	91
40	Poteet	Atascosa	111	104	101	99	96	94	92
41	County-Other, Hays [2]	Hays	111	104	101	99	96	94	92
42	Kendall West Utility	Kendall	111	104	101	99	96	94	92
43	Polonia WSC [2]	Caldwell	112	105	103	100	98	95	93
44	Marion	Guadalupe	113	106	103	101	98	96	93
45	Canyon Lake Water Service (Texas Water Company) [2]	Comal	113	106	104	101	98	96	94
46	Tri Community WSC	Caldwell	113	106	103	101	98	96	93
47	Atascosa Rural WSC	Bexar	114	107	104	102	99	97	94
48	County-Other, Medina	Medina	116	109	106	104	101	98	96
49	County-Other, Atascosa	Atascosa	116	109	106	103	101	98	96
50	County-Other, Frio	Frio	117	110	107	104	102	99	97
51	San Marcos	Hays	119	107	104	102	99	97	94
52	County-Other, Bexar	Bexar	119	110	107	104	102	99	97
53	County-Other, DeWitt	DeWitt	123	115	112	109	107	104	101
54	County-Other, Dimmit	Dimmit	124	116	113	111	108	105	102
55	Port Lavaca	Calhoun	126	118	115	112	110	107	104
56	Fayette WSC [2]	Gonzales	126	119	116	113	110	108	105
57	County-Other, Karnes	Karnes	127	119	116	113	111	108	105
58	East Central SUD	Bexar	127	119	116	113	111	108	105

No.	Water User Group	Primary County	Base-line (GPCD)	2030	2040	2050	2060	2070	2080
59	County-Other, Uvalde	Uvalde	128	120	117	114	111	108	105
60	Luling	Caldwell	128	120	117	114	112	109	106
61	Crystal Clear SUD	Guadalupe	129	121	118	115	113	110	107
62	Lockhart	Caldwell	129	121	118	115	113	110	107
63	Elmendorf	Bexar	130	123	119	116	114	111	108
64	Devine	Medina	132	124	121	118	115	112	109
65	Universal City	Bexar	135	127	124	121	118	115	112
66	Seguin	Guadalupe	139	131	128	125	121	118	115
67	Nixon	Gonzales	140	132	129	126	123	120	117
68	South Buda WCID 1	Hays	142	134	131	127	124	121	118
69	Big Wells	Dimmit	143	135	132	128	125	122	119
70	Poth	Wilson	144	136	132	129	126	123	120
71	Water Services	Bexar	145	136	133	130	126	123	120
72	Schertz	Bexar	145	127	123	120	117	114	111
73	Guadalupe-Blanco River Authority	Comal	146	128	124	121	118	115	112
74	Sunko WSC	Karnes	146	127	124	121	118	115	112
75	Woodsboro	Refugio	147	128	125	122	119	116	113
76	Aqua WSC [2]	Caldwell	148	129	126	123	120	117	114
77	Selma	Bexar	148	129	126	123	120	117	114
78	County-Other, Zavala	Zavala	149	130	127	123	120	117	114
79	Seadrift	Calhoun	150	131	127	124	121	118	115
80	Oak Hills WSC	Wilson	150	131	128	125	122	119	116
81	County-Other, Comal	Comal	152	132	129	126	123	120	117
82	Batesville WSC	Zavala	153	134	131	127	124	121	118
83	Waelder	Gonzales	154	134	131	128	125	121	118
84	Natalia	Medina	154	135	131	128	125	122	119
85	Charlotte	Atascosa	155	135	132	129	125	122	119
86	Carrizo Hill WSC	Dimmit	156	137	133	130	127	124	121
87	The Oaks WSC	Bexar	157	137	133	130	127	124	120
88	Yorktown	DeWitt	158	138	135	131	128	125	122
89	Live Oak	Bexar	159	139	135	132	129	126	122
90	Yoakum [2]	DeWitt	160	140	136	133	130	126	123

No.	Water User Group	Primary County	Base-line (GPCD)	2030	2040	2050	2060	2070	2080
91	C Willow Water	Wilson	165	144	130	127	123	120	117
92	Castroville	Medina	165	144	130	127	123	120	117
93	Karnes City	Karnes	168	147	132	129	126	123	120
94	Refugio	Refugio	171	150	135	131	128	125	122
95	Texas State University	Hays	171	151	136	132	129	126	123
96	Lytle	Atascosa	174	152	137	134	131	127	124
97	Moore WSC	Frio	174	153	137	134	131	127	124
98	Medina County WCID 2	Medina	177	155	140	136	133	130	126
99	Pearsall	Frio	178	156	140	126	123	120	117
100	Goliad	Goliad	180	158	142	128	124	121	118
101	Wingert Water Systems	Comal	180	158	142	128	125	122	119
102	Smiley	Gonzales	181	159	143	128	125	122	119
103	Asherton	Dimmit	182	160	144	129	126	123	120
104	Runge	Karnes	183	160	144	130	127	124	121
105	El Oso WSC [2]	Karnes	183	161	145	130	127	124	121
106	New Braunfels	Comal	183	161	145	130	125	117	110
107	West Medina WSC	Medina	185	162	146	131	128	125	122
108	Knippa WSC	Uvalde	187	164	148	133	130	126	123
109	Encinal WSC	La Salle	187	165	148	133	130	127	124
110	Stockdale	Wilson	189	166	149	135	131	128	125
111	Crystal City	Zavala	189	166	149	134	131	128	125
112	La Vernia	Wilson	190	167	150	135	132	128	125
113	Jourdanton	Atascosa	190	167	150	135	132	129	125
114	Bexar County WCID 10	Bexar	193	169	152	137	134	130	127
115	Boerne	Kendall	193	170	153	138	134	131	127
116	Pleasanton	Atascosa	196	172	155	139	136	133	129
117	Windmill WSC	Uvalde	197	174	156	141	127	123	120
118	Falls City	Karnes	201	177	159	143	129	126	122
119	Uvalde	Uvalde	211	186	167	151	136	132	129
120	Dilley	Frio	212	187	168	151	136	133	130
121	Floresville	Wilson	213	188	169	152	137	133	130
122	Sabinal	Uvalde	215	189	170	153	138	135	131

No.	Water User Group	Primary County	Base-line (GPCD)	2030	2040	2050	2060	2070	2080
123	Gonzales	Gonzales	222	196	176	159	143	128	125
124	Three Oaks WSC	Wilson	223	196	177	159	143	129	126
125	Victoria	Victoria	226	199	179	161	145	131	127
126	Air Force Village II Inc	Bexar	227	199	179	161	145	131	128
127	Fair Oaks Ranch	Bexar	237	209	189	170	153	137	134
128	Cuero	DeWitt	238	210	189	170	153	138	135
129	Carrizo Springs	Dimmit	243	215	193	174	156	141	127
130	Hondo	Medina	243	215	193	174	156	141	127
131	Gonzales County WSC	Gonzales	244	216	194	175	157	141	127
132	Concan WSC	Uvalde	244	216	194	175	157	142	128
133	Alamo Heights	Bexar	245	216	195	175	158	142	128
134	Ville Dalsace Water Supply	Medina	246	217	196	176	158	143	128
135	3009 Water	Comal	248	219	197	178	160	144	130
136	Zavala County WCID 1	Zavala	256	226	204	183	165	149	134
137	Cotulla	La Salle	280	248	223	201	181	163	146
138	Shavano Park	Bexar	283	250	225	203	183	164	148
139	Loma Alta Chula Vista Water System	Zavala	287	255	229	206	186	167	150
140	KT Water Development	Comal	304	270	243	219	197	177	160
141	Garden Ridge	Comal	315	280	252	226	204	183	165
142	Kenedy	Karnes	352	313	281	253	228	205	185
143	Clear Water Estates Water System	Comal	1,083	970	873	786	707	637	573
144	Fort Sam Houston	Bexar	1,895	1,702	1,531	1,378	1,241	1,117	1,005

[1] See Section 5.2.1.2.1 for the Municipal Water Conservation Goals.

[2] WUGs are split between Region L and other regions (Regions K, P, and/or N). Values in the table represent Region L portion of WUG.

[3] SAWS has identified utility-specific water conservation goals that are described and quantified in Section 5.2.1.2.3: San Antonio Water System Municipal Water Conservation.

5.2.1.2.2 Region L Municipal Water Conservation Demand Reduction (Yield)

To quantify the volumetric yield of the Municipal Water Conservation WMS, the WUG-specific GPCD goals for each decade were multiplied by the WUG's population projection for that decade, converted to acft/yr, then subtracted from the original water demands (with passive water savings included). For the 2026 SCTRWP, two Municipal Water Conservation strategies were developed and recommended to reach the GPCD goals:

- Municipal Water Conservation – Water Loss Mitigation; and
- Municipal Water Conservation Water Use Reduction.

The volumes of water that could be conserved (demand reduction) due to Water Loss Mitigation and Water Loss Reduction are shown in Table 5.2.1-6 and Table 5.2.1-7, respectively.

Table 5.2.1-6 Demand Reduction (Yield) from Water Loss Mitigation (acft/yr) [1]

No.	Water User Group	Primary County	2030	2040	2050	2060	2070	2080
1	Randolph Air Force Base	Bexar	0	0	0	0	0	0
2	Port Oconnor Improvement District	Calhoun	0	0	0	0	0	0
3	County Line SUD	Hays	0	0	0	0	0	0
4	East Medina County SUD	Medina	0	0	0	0	0	0
5	Kendall County WCID 1	Kendall	0	0	0	0	0	0
6	Picosa WSC	Wilson	3	4	4	5	5	6
7	Medina River West WSC	Medina	1	1	1	1	1	1
8	Kyle	Hays	59	88	120	134	139	143
9	Kirby	Bexar	9	10	10	10	10	10
10	Maxwell SUD	Hays	20	27	36	49	66	72
11	Cibolo	Guadalupe	26	31	37	44	51	59
12	Point Comfort	Calhoun	0	0	0	0	0	0
13	La Coste	Medina	1	1	1	1	1	1
14	Martindale WSC	Caldwell	5	6	7	7	8	9
15	Lackland Air Force Base	Bexar	15	14	14	14	14	14
16	Benton City WSC	Medina	22	25	27	29	30	32
17	Converse	Bexar	30	30	30	30	30	30
18	Victoria County WCID 1	Victoria	2	2	2	2	2	2
19	Creedmoor-Maha WSC [2]	Caldwell	11	20	29	38	47	57
20	Yancey WSC	Medina	7	7	8	8	8	8
21	Springs Hill WSC	Guadalupe	55	64	76	87	101	116
22	Goforth SUD [2]	Hays	50	78	115	165	223	289
23	Green Valley SUD	Guadalupe	52	69	88	109	132	159
24	Wimberley WSC	Hays	6	8	12	17	22	28
25	County-Other, La Salle	La Salle	0	0	0	0	0	0
26	County-Other, Guadalupe	Guadalupe	0	0	0	0	0	0
27	County-Other, Calhoun	Calhoun	0	0	0	0	0	0
28	County-Other, Victoria	Victoria	0	0	0	0	0	0

No.	Water User Group	Primary County	2030	2040	2050	2060	2070	2080
29	Quail Creek MUD	Victoria	1	2	2	2	2	2
30	San Antonio Water System [3]	Bexar	2,686	2,983	3,167	3,310	3,421	3,588
31	County-Other, Wilson	Wilson	0	0	0	0	0	0
32	County-Other, Refugio	Refugio	0	0	0	0	0	0
33	County-Other, Caldwell	Caldwell	0	0	0	0	0	0
34	County-Other, Gonzales	Gonzales	0	0	0	0	0	0
35	S S WSC	Wilson	24	27	31	34	37	42
36	County-Other, Goliad	Goliad	0	0	0	0	0	0
37	Leon Valley	Bexar	18	21	21	21	21	21
38	County-Other, Kendall	Kendall	0	0	0	0	0	0
39	McCoy WSC [2]	Atascosa	10	10	11	11	12	13
40	Poteet	Atascosa	3	3	3	3	3	3
41	County-Other, Hays [2]	Hays	0	0	0	0	0	0
42	Kendall West Utility	Kendall	3	4	5	7	8	10
43	Polonia WSC [2]	Caldwell	11	12	15	17	20	24
44	Marion	Guadalupe	2	2	2	2	2	2
45	Canyon Lake Water Service (Texas Water Company) [2]	Comal	119	161	188	206	271	343
46	Tri Community WSC	Caldwell	2	2	2	2	2	2
47	Atascosa Rural WSC	Bexar	16	19	22	24	26	29
48	County-Other, Medina	Medina	0	0	0	0	0	0
49	County-Other, Atascosa	Atascosa	0	0	0	0	0	0
50	County-Other, Frio	Frio	0	0	0	0	0	0
51	San Marcos	Hays	174	239	288	324	346	362
52	County-Other, Bexar	Bexar	0	0	0	0	0	0
53	County-Other, DeWitt	DeWitt	0	0	0	0	0	0
54	County-Other, Dimmit	Dimmit	0	0	0	0	0	0
55	Port Lavaca	Calhoun	16	15	14	13	13	12
56	Fayette WSC [2]	Gonzales	0	0	0	0	0	0
57	County-Other, Karnes	Karnes	0	0	0	0	0	0
58	East Central SUD	Bexar	66	75	83	90	98	107
59	County-Other, Uvalde	Uvalde	0	0	0	0	0	0
60	Luling	Caldwell	8	8	8	8	9	9
61	Crystal Clear SUD	Guadalupe	83	139	157	177	200	227

No.	Water User Group	Primary County	2030	2040	2050	2060	2070	2080
62	Lockhart	Caldwell	30	32	35	38	40	43
63	Elmendorf	Bexar	6	8	10	14	17	23
64	Devine	Medina	6	6	6	6	7	7
65	Universal City	Bexar	30	31	32	32	32	32
66	Seguin	Guadalupe	76	89	96	100	104	108
67	Nixon	Gonzales	3	3	3	3	3	3
68	South Buda WCID 1	Hays	6	10	15	22	30	40
69	Big Wells	Dimmit	1	1	1	1	1	-
70	Poth	Wilson	2	2	2	2	2	2
71	Water Services	Bexar	9	10	10	11	11	12
72	Schertz	Bexar	80	97	116	134	155	179
73	Guadalupe-Blanco River Authority	Comal	14	20	19	18	18	17
74	Sunko WSC	Karnes	7	7	8	9	9	10
75	Woodsboro	Refugio	2	2	2	2	1	1
76	Aqua WSC [2]	Caldwell	2	2	2	3	3	3
77	Selma	Bexar	26	32	37	42	48	55
78	County-Other, Zavala	Zavala	0	0	0	0	0	0
79	Seadrift	Calhoun	1	1	1	1	1	1
80	Oak Hills WSC	Wilson	10	11	13	15	17	20
81	County-Other, Comal	Comal	0	0	0	0	0	0
82	Batesville WSC	Zavala	1	1	1	1	1	1
83	Waelder	Gonzales	2	2	2	2	2	2
84	Natalia	Medina	2	2	2	2	2	2
85	Charlotte	Atascosa	2	2	2	2	2	2
86	Carrizo Hill WSC	Dimmit	1	1	1	2	2	3
87	The Oaks WSC	Bexar	2	2	3	3	3	3
88	Yorktown	DeWitt	3	3	3	3	3	3
89	Live Oak	Bexar	17	17	17	17	17	17
90	Yoakum [2]	DeWitt	4	3	3	3	3	3
91	C Willow Water	Wilson	4	1	1	2	2	2
92	Castroville	Medina	35	13	14	16	18	20
93	Karnes City	Karnes	13	4	5	5	5	6
94	Refugio	Refugio	14	5	5	5	5	5

No.	Water User Group	Primary County	2030	2040	2050	2060	2070	2080
95	Texas State University	Hays	53	18	18	18	18	18
96	Lytle	Atascosa	20	7	8	8	8	9
97	Moore WSC	Frio	3	1	1	1	1	1
98	Medina County WCID 2	Medina	3	1	1	1	1	1
99	Pearsall	Frio	50	57	21	21	21	22
100	Goliad	Goliad	9	9	3	3	3	3
101	Wingert Water Systems	Comal	10	11	4	4	4	4
102	Smiley	Gonzales	3	3	1	1	1	1
103	Asherton	Dimmit	4	4	1	1	1	1
104	Runge	Karnes	5	6	2	2	2	2
105	El Oso WSC [2]	Karnes	45	47	17	18	19	20
106	New Braunfels	Comal	843	1,198	551	736	947	1,189
107	West Medina WSC	Medina	6	7	2	2	2	2
108	Knippa WSC	Uvalde	3	3	1	1	1	1
109	Encinal WSC	La Salle	6	7	2	2	3	3
110	Stockdale	Wilson	9	9	3	3	3	3
111	Crystal City	Zavala	37	36	11	11	10	10
112	La Vernia	Wilson	20	22	8	8	9	10
113	Jourdanton	Atascosa	31	33	11	12	13	14
114	Bexar County WCID 10	Bexar	39	44	16	18	19	21
115	Boerne	Kendall	162	222	100	130	165	204
116	Pleasanton	Atascosa	80	87	31	34	37	41
117	Windmill WSC	Uvalde	10	9	8	2	2	2
118	Falls City	Karnes	3	3	3	1	1	1
119	Uvalde	Uvalde	116	114	111	36	34	33
120	Dilley	Frio	37	45	52	17	18	18
121	Floresville	Wilson	41	43	45	16	16	17
122	Sabinal	Uvalde	9	9	9	3	3	2
123	Gonzales	Gonzales	55	55	54	53	17	17
124	Three Oaks WSC	Wilson	11	12	13	14	5	5
125	Victoria	Victoria	493	499	501	498	165	164
126	Air Force Village II Inc	Bexar	4	4	4	4	1	1
127	Fair Oaks Ranch	Bexar	78	92	100	103	34	34

No.	Water User Group	Primary County	2030	2040	2050	2060	2070	2080
128	Cuero	DeWitt	66	66	66	65	22	22
129	Carrizo Springs	Dimmit	36	34	32	31	29	9
130	Hondo	Medina	63	61	59	59	60	20
131	Gonzales County WSC	Gonzales	62	62	61	61	60	20
132	Concan WSC	Uvalde	2	2	2	2	2	1
133	Alamo Heights	Bexar	63	63	63	63	63	21
134	Ville Dalsace Water Supply	Medina	3	4	4	4	4	1
135	3009 Water	Comal	12	15	20	25	32	13
136	Zavala County WCID 1	Zavala	10	10	10	9	9	3
137	Cotulla	La Salle	32	31	31	31	32	33
138	Shavano Park	Bexar	17	19	21	23	25	27
139	Loma Alta Chula Vista Water System	Zavala	3	3	3	3	3	2
140	KT Water Development	Comal	27	41	61	86	114	146
141	Garden Ridge	Comal	60	75	89	105	125	148
142	Kenedy	Karnes	40	42	45	47	50	53
143	Clear Water Estates Water System	Comal	33	45	62	84	109	137
144	Fort Sam Houston	Bexar	525	525	525	525	525	525
	Total, Region L		**7,579**	**8,664**	**8,257**	**8,992**	**9,442**	**10,394**

[1] Projected savings is the volume of water (acft/yr) conserved from replacement of leaking pipes.

[2] WUGs are split between Region L and other regions (Regions K, P, and/or N). Values in the table represent Region L portion of projected demand reduction to meet Municipal Water Conservation Goals.

[3] SAWS has identified utility-specific water conservation goals that are described and quantified in Section 5.2.1.2.3, entitled "San Antonio Water System Municipal Water Conservation."

Table 5.2.1-7 Demand Reduction (Yield) from Water Use Reduction (acft/yr) [1]

No.	Water User Group	Primary County	2030	2040	2050	2060	2070	2080
1	Randolph Air Force Base	Bexar	0	0	0	0	0	0
2	Port Oconnor Improvement District	Calhoun	0	0	0	0	0	0
3	County Line SUD	Hays	0	0	0	0	0	0
4	East Medina County SUD	Medina	0	0	0	0	0	0
5	Kendall County WCID 1	Kendall	4	1	2	2	2	3
6	Picosa WSC	Wilson	5	3	4	4	4	5
7	Medina River West WSC	Medina	2	4	7	8	9	9
8	Kyle	Hays	91	298	698	829	859	879

No.	Water User Group	Primary County	2030	2040	2050	2060	2070	2080
9	Kirby	Bexar	13	33	59	69	69	69
10	Maxwell SUD	Hays	30	95	215	362	487	538
11	Cibolo	Guadalupe	37	103	211	352	418	487
12	Point Comfort	Calhoun	1	2	3	5	4	4
13	La Coste	Medina	2	4	7	11	12	12
14	Martindale WSC	Caldwell	6	21	40	62	87	103
15	Lackland Air Force Base	Bexar	21	45	80	113	146	168
16	Benton City WSC	Medina	34	86	159	235	315	396
17	Converse	Bexar	44	99	169	239	306	373
18	Victoria County WCID 1	Victoria	2	6	10	15	19	23
19	Creedmoor-Maha WSC [2]	Caldwell	18	66	167	307	485	704
20	Yancey WSC	Medina	10	24	43	61	81	102
21	Springs Hill WSC	Guadalupe	82	227	446	717	1,057	1,469
22	Goforth SUD [2]	Hays	73	279	688	1,364	2,346	3,665
23	Green Valley SUD	Guadalupe	79	242	525	902	1,393	2,032
24	Wimberley WSC	Hays	9	31	71	137	231	359
25	County-Other, La Salle	La Salle	6	10	16	19	20	17
26	County-Other, Guadalupe	Guadalupe	5	13	32	58	94	143
27	County-Other, Calhoun	Calhoun	5	7	13	18	23	30
28	County-Other, Victoria	Victoria	69	123	194	259	325	384
29	Quail Creek MUD	Victoria	3	4	8	12	15	18
30	San Antonio Water System [3]	Bexar	18,385	22,467	25,319	24,152	26,629	30,895
31	County-Other, Wilson	Wilson	17	29	43	53	58	60
32	County-Other, Refugio	Refugio	8	12	18	24	27	28
33	County-Other, Caldwell	Caldwell	2	5	13	14	24	50
34	County-Other, Gonzales	Gonzales	3	6	8	11	13	15
35	S S WSC	Wilson	35	96	182	279	395	532
36	County-Other, Goliad	Goliad	15	27	40	53	65	75
37	Leon Valley	Bexar	26	73	124	173	223	270
38	County-Other, Kendall	Kendall	60	105	195	317	477	682
39	McCoy WSC [2]	Atascosa	14	34	61	92	122	158
40	Poteet	Atascosa	5	11	15	22	29	36
41	County-Other, Hays [2]	Hays	123	302	755	2,031	4,039	7,231

No.	Water User Group	Primary County	2030	2040	2050	2060	2070	2080
42	Kendall West Utility	Kendall	6	15	31	54	85	124
43	Polonia WSC [2]	Caldwell	16	44	87	143	216	308
44	Marion	Guadalupe	3	6	11	17	24	30
45	Canyon Lake Water Service (Texas Water Company) [2]	Comal	185	591	1,143	1,723	2,893	4,419
46	Tri Community WSC	Caldwell	2	6	10	14	21	26
47	Atascosa Rural WSC	Bexar	26	69	128	195	275	366
48	County-Other, Medina	Medina	17	37	59	71	82	103
49	County-Other, Atascosa	Atascosa	3	6	11	11	9	6
50	County-Other, Frio	Frio	12	10	4	7	10	16
51	San Marcos	Hays	255	411	539	995	1,518	2,440
52	County-Other, Bexar	Bexar	7	17	39	58	82	70
53	County-Other, DeWitt	DeWitt	24	42	64	86	108	130
54	County-Other, Dimmit	Dimmit	6	8	12	15	13	5
55	Port Lavaca	Calhoun	23	53	85	112	132	150
56	Fayette WSC [2]	Gonzales	0	0	1	1	1	2
57	County-Other, Karnes	Karnes	7	13	21	29	38	49
58	East Central SUD	Bexar	102	265	489	737	1,028	1,362
59	County-Other, Uvalde	Uvalde	16	28	41	55	68	79
60	Luling	Caldwell	11	27	48	69	91	114
61	Crystal Clear SUD	Guadalupe	124	484	925	1,458	2,101	2,872
62	Lockhart	Caldwell	44	114	207	311	426	547
63	Elmendorf	Bexar	8	26	60	111	177	296
64	Devine	Medina	10	22	37	53	69	84
65	Universal City	Bexar	44	110	187	263	335	409
66	Seguin	Guadalupe	116	319	571	825	1,090	1,373
67	Nixon	Gonzales	6	13	21	28	34	40
68	South Buda WCID 1	Hays	9	38	95	190	327	512
69	Big Wells	Dimmit	1	1	3	4	5	6
70	Poth	Wilson	4	9	15	19	24	29
71	Water Services	Bexar	13	34	60	87	118	153
72	Schertz	Bexar	722	1,062	1,515	2,043	2,682	3,470
73	Guadalupe-Blanco River Authority	Comal	127	214	250	281	308	332

No.	Water User Group	Primary County	2030	2040	2050	2060	2070	2080
74	Sunko WSC	Karnes	59	80	104	131	163	196
75	Woodsboro	Refugio	18	20	23	25	26	26
76	Aqua WSC [2]	Caldwell	16	24	31	40	51	64
77	Selma	Bexar	238	346	489	645	832	1,056
78	County-Other, Zavala	Zavala	18	21	24	26	28	30
79	Seadrift	Calhoun	14	16	17	19	21	21
80	Oak Hills WSC	Wilson	89	123	171	231	303	392
81	County-Other, Comal	Comal	340	469	782	1,972	2,971	4,328
82	Batesville WSC	Zavala	13	15	18	19	21	22
83	Waelder	Gonzales	15	18	22	24	27	30
84	Natalia	Medina	17	20	26	30	35	38
85	Charlotte	Atascosa	19	20	23	28	32	37
86	Carrizo Hill WSC	Dimmit	10	14	20	25	36	55
87	The Oaks WSC	Bexar	20	27	35	45	56	68
88	Yorktown	DeWitt	28	34	41	47	54	59
89	Live Oak	Bexar	154	183	221	257	292	326
90	Yoakum [2]	DeWitt	31	39	45	51	56	61
91	C Willow Water	Wilson	8	24	29	33	39	48
92	Castroville	Medina	81	224	280	355	433	499
93	Karnes City	Karnes	30	79	92	107	124	142
94	Refugio	Refugio	33	82	92	101	114	131
95	Texas State University	Hays	123	311	347	382	416	448
96	Lytle	Atascosa	47	128	150	174	201	230
97	Moore WSC	Frio	8	23	29	32	36	39
98	Medina County WCID 2	Medina	5	15	16	18	19	21
99	Pearsall	Frio	116	298	532	577	625	672
100	Goliad	Goliad	20	46	75	81	86	91
101	Wingert Water Systems	Comal	22	57	108	118	126	133
102	Smiley	Gonzales	7	14	24	25	26	26
103	Asherton	Dimmit	10	20	32	32	32	31
104	Runge	Karnes	13	28	50	57	65	72
105	El Oso WSC [2]	Karnes	104	247	427	484	554	634
106	New Braunfels	Comal	1,971	6,316	14,300	21,273	31,626	44,366

No.	Water User Group	Primary County	2030	2040	2050	2060	2070	2080
107	West Medina WSC	Medina	14	34	57	62	69	69
108	Knippa WSC	Uvalde	7	16	24	26	25	25
109	Encinal WSC	La Salle	16	35	61	69	79	92
110	Stockdale	Wilson	21	48	80	86	92	99
111	Crystal City	Zavala	86	188	296	303	308	309
112	La Vernia	Wilson	45	112	204	235	271	312
113	Jourdanton	Atascosa	72	171	298	336	378	425
114	Bexar County WCID 10	Bexar	91	231	419	485	561	650
115	Boerne	Kendall	375	1,165	2,590	3,608	4,865	6,393
116	Pleasanton	Atascosa	187	456	817	952	1,103	1,271
117	Windmill WSC	Uvalde	22	47	64	80	72	61
118	Falls City	Karnes	8	17	28	41	45	51
119	Uvalde	Uvalde	271	598	881	1,184	1,201	1,211
120	Dilley	Frio	86	241	412	578	613	649
121	Floresville	Wilson	95	226	361	523	576	632
122	Sabinal	Uvalde	21	46	68	91	91	91
123	Gonzales	Gonzales	128	288	429	551	691	703
124	Three Oaks WSC	Wilson	24	62	103	144	199	225
125	Victoria	Victoria	1,146	2,619	3,981	5,177	6,567	6,773
126	Air Force Village II Inc	Bexar	9	21	32	42	53	55
127	Fair Oaks Ranch	Bexar	180	487	794	1,068	1,372	1,423
128	Cuero	DeWitt	154	347	522	681	863	892
129	Carrizo Springs	Dimmit	84	180	259	317	359	403
130	Hondo	Medina	148	318	471	619	754	917
131	Gonzales County WSC	Gonzales	145	325	487	629	752	899
132	Concan WSC	Uvalde	6	13	18	22	26	29
133	Alamo Heights	Bexar	146	330	500	653	791	957
134	Ville Dalsace Water Supply	Medina	8	19	31	41	51	65
135	3009 Water	Comal	28	81	157	265	403	601
136	Zavala County WCID 1	Zavala	24	52	76	95	109	125
137	Cotulla	La Salle	73	163	246	324	400	480
138	Shavano Park	Bexar	39	101	167	237	312	395
139	Loma Alta Chula Vista Water System	Zavala	7	16	23	28	33	36

No.	Water User Group	Primary County	2030	2040	2050	2060	2070	2080
140	KT Water Development	Comal	62	220	487	893	1,438	2,135
141	Garden Ridge	Comal	142	394	711	1,098	1,576	2,159
142	Kenedy	Karnes	94	225	356	491	631	779
143	Clear Water Estates Water System	Comal	75	241	501	880	1,378	2,008
144	Fort Sam Houston	Bexar	1,227	2,794	4,212	5,489	6,637	7,671
	Total, Region L		**30,356**	**51,395**	**77,307**	**99,313**	**130,568**	**168,408**

[1] Projected demand reduction is the volume of water (acft/yr) conserved by means of smart meter installation and other non-capital efforts.

[2] WUGs are split between Region L and other regions (Regions K, P, and/or N). Values in the table represent Region L portion of projected demand reduction to meet Municipal Water Conservation Goals.

[3] SAWS has identified utility-specific water conservation goals that are described and quantified in Section 5.2.1.2.3 entitled, "San Antonio Water System Municipal Water Conservation."

5.2.1.2.3 San Antonio Water System Municipal Water Conservation

SAWS has chosen to develop utility-specific conservation goals beyond the methodology described in Section 5.2.1.2. The decadal savings for SAWS Municipal Water Conservation are presented in Table 5.2.1-8.

As of June 2024, SAWS replaced 200,000 meters with advanced metering infrastructure (AMI), which represents approximately 30% of customer meters. SAWS anticipates replacement of all customers meters by late 2025. Therefore, the water conservation goal GPCD estimates reflect full implementation of AMI by 2030.

As demonstrated in the table below, the projected per capita water use for SAWS with only passive conservation is 102 GPCD in 2030, decreasing to 87 GPCD by 2080. However, these values represent only the effects of passive conservation water savings, which is the implementation of low flow plumbing fixtures. SAWS implements and plans to continue implementing advanced water conservation measures, which would effectively reduce SAWS' per capita water use to 94 GPCD in 2030, decreasing to 79 GPCD by 2080.

Table 5.2.1-8 SAWS Municipal Water Conservation Goals (GPCD)

Description	2030	2040	2050	2060	2070	2080
GPCD with Passive Conservation (From Table 5.2.1-3)	102	97	95	92	89	87
GPCD Reduction due to SAWS Conservation Strategies	8	8	9	8	8	8
Per Capita Water Use Goals [1]	94	89	86	84	81	79

[1] The GPCD goals identified in this table are consistent with the GPCD goals recommended by the SCTRWPG and those included in the *SAWS 2024 Draft Water Management Plan*.

5.2.1.3 Environmental Considerations

For the most part, the Municipal Water Conservation WMS is not expected to have negative impacts on natural, cultural, or agricultural resources. While increased conservation may increase concentrations of influent to wastewater treatment facilities, the wastewater treatment facilities would be expected to improve treatment technologies to meet discharge permit requirements necessary to maintain receiving water quality standards. Strategies to encourage reduced lawn watering and/or replacement of lawns with water-conserving landscaping could result in environmentally beneficial increases in landscape species diversity and drought tolerance.

For water loss mitigation projects that involve water pipeline replacement, project owners need to be aware of potential for projects in karst invertebrate zones to encounter karst features during construction. Impacts to karst features with suitable habitat may adversely affect federally endangered karst invertebrate species. USFWS-designated karst invertebrate zones occur in Bexar, Medina, Hays, Comal, and Guadalupe Counties. Appendix 5D provides a summary of threatened, endangered, and candidate species and species of concern that may occur in Bexar, Comal, Guadalupe, Hays, and Medina Counties [9, 10, 11, 12, 13, 14, 15, 16, 17, 18].

5.2.1.4 Engineering and Costing

Preliminary engineering and costing analyses were performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model methodology, which includes standard costing procedures and methods for calculating project costs, annual costs, and unit costs.

As deteriorating infrastructure can have high rates of water loss, water loss mitigation is recommended through leak detection and repair and utility water audits. Costs for leak detection and repair were estimated by assuming that 2.5% of a WUG's pipelines are replaced each decade over the planning horizon. It is assumed that none of the distribution line replacements for this water conservation strategy are subject to adopted utility standard minimum size requirements that exceed two standard pipe diameters. Implementing this conservation strategy would reduce a WUG's demand by

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[9] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Bexar County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[10] Texas Parks and Wildlife Department (TPWD). 2019. Annotated County Lists of Rare Species – Comal County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[11] Texas Parks and Wildlife Department (TPWD). 2019. Annotated County Lists of Rare Species – Guadalupe County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[12] Texas Parks and Wildlife Department (TPWD). 2019. Annotated County Lists of Rare Species – Hays County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[13] Texas Parks and Wildlife Department (TPWD). 2019. Annotated County Lists of Rare Species – Medina County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[14] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Bexar County. https://ipac.ecosphere.fws.gov/location/index

[15] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Comal County. https://ipac.ecosphere.fws.gov/location/index

[16] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Guadalupe County. https://ipac.ecosphere.fws.gov/location/index

[17] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Hays County. https://ipac.ecosphere.fws.gov/location/index

[18] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Medina County. https://ipac.ecosphere.fws.gov/location/index

approximately 1 to 3%. Water loss is discussed further in Chapter 1, including summaries of water loss audits for WUGs in the SCTRWPA.

The following table provides the estimated costs for municipal conservation (water loss mitigation). The facility and project costs reflect the cost of water main replacement throughout the entire planning horizon.

Table 5.2.1-9 Estimated Costs of Water Loss Mitigation [1]

No.	Water User Group	Primary County	Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/YR)
1	Randolph Air Force Base	Bexar	$0	$0	$0	$0
2	Port Oconnor Improvement District	Calhoun	$0	$0	$0	$0
3	County Line SUD	Hays	$0	$0	$0	$0
4	East Medina County SUD	Medina	$0	$0	$0	$0
5	Kendall County WCID 1	Kendall	$0	$0	$0	$0
6	Picosa WSC	Wilson	$9,983,000	$13,616,000	$268,500	$89,500
7	Medina River West WSC	Medina	$2,954,000	$4,073,000	$79,500	$79,500
8	Kyle	Hays	$39,932,000	$54,463,000	$1,074,167	$18,206
9	Kirby	Bexar	$17,470,000	$23,827,000	$470,000	$52,222
10	Maxwell SUD	Hays	$29,949,000	$40,847,000	$805,667	$40,283
11	Cibolo	Guadalupe	$19,134,000	$26,096,000	$514,667	$19,795
12	Point Comfort	Calhoun	$0	$0	$0	$0
13	La Coste	Medina	$2,954,000	$4,073,000	$79,500	$79,500
14	Martindale WSC	Caldwell	$8,319,000	$11,346,000	$223,833	$44,767
15	Lackland Air Force Base	Bexar	$23,294,000	$31,770,000	$626,500	$41,767
16	Benton City WSC	Medina	$107,317,000	$146,368,000	$2,886,667	$131,212
17	Converse	Bexar	$19,134,000	$26,096,000	$514,667	$17,156
18	Victoria County WCID 1	Victoria	$1,969,000	$2,715,000	$53,000	$26,500
19	Creedmoor-Maha WSC [2]	Caldwell	$19,966,000	$27,232,000	$537,000	$48,818
20	Yancey WSC	Medina	$161,392,000	$220,121,000	$4,341,333	$620,190
21	Springs Hill WSC	Guadalupe	$94,007,000	$128,215,000	$2,528,667	$45,976
22	Goforth SUD [2]	Hays	$44,092,000	$60,136,000	$1,186,000	$23,720
23	Green Valley SUD	Guadalupe	$99,830,000	$136,157,000	$2,685,333	$51,641
24	Wimberley WSC	Hays	$14,975,000	$20,424,000	$402,833	$67,139
25	County-Other, La Salle	La Salle	$0	$0	$0	$0
26	County-Other, Guadalupe	Guadalupe	$0	$0	$0	$0
27	County-Other, Calhoun	Calhoun	$0	$0	$0	$0

No.	Water User Group	Primary County	Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/YR)
28	County-Other, Victoria	Victoria	$0	$0	$0	$0
29	Quail Creek MUD	Victoria	$2,954,000	$4,073,000	$79,500	$79,500
30	San Antonio Water System [3]	Bexar	$1,591,457,000	$2,170,567,000	$42,808,667	$15,938
31	County-Other, Wilson	Wilson	$0	$0	$0	$0
32	County-Other, Refugio	Refugio	$0	$0	$0	$0
33	County-Other, Caldwell	Caldwell	$0	$0	$0	$0
34	County-Other, Gonzales	Gonzales	$0	$0	$0	$0
35	S S WSC	Wilson	$29,949,000	$40,847,000	$805,667	$33,569
36	County-Other, Goliad	Goliad	$0	$0	$0	$0
37	Leon Valley	Bexar	$24,958,000	$34,039,000	$671,333	$37,296
38	County-Other, Kendall	Kendall	$0	$0	$0	$0
39	McCoy WSC [2]	Atascosa	$99,830,000	$136,157,000	$2,685,333	$268,533
40	Poteet	Atascosa	$4,992,000	$6,808,000	$134,333	$44,778
41	County-Other, Hays [2]	Hays	$0	$0	$0	$0
42	Kendall West Utility	Kendall	$7,487,000	$10,211,000	$201,333	$67,111
43	Polonia WSC [2]	Caldwell	$2,496,000	$3,404,000	$67,167	$6,106
44	Marion	Guadalupe	$3,446,000	$4,752,000	$92,667	$46,333
45	Canyon Lake Water Service (Texas Water Company) [2]	Comal	$73,209,000	$99,849,000	$1,969,167	$16,548
46	Tri Community WSC	Caldwell	$3,446,000	$4,752,000	$92,667	$46,333
47	Atascosa Rural WSC	Bexar	$29,949,000	$40,847,000	$805,667	$50,354
48	County-Other, Medina	Medina	$0	$0	$0	$0
49	County-Other, Atascosa	Atascosa	$0	$0	$0	$0
50	County-Other, Frio	Frio	$0	$0	$0	$0
51	San Marcos	Hays	$69,881,000	$95,309,000	$1,879,667	$10,803
52	County-Other, Bexar	Bexar	$0	$0	$0	$0
53	County-Other, DeWitt	DeWitt	$0	$0	$0	$0
54	County-Other, Dimmit	Dimmit	$0	$0	$0	$0
55	Port Lavaca	Calhoun	$19,134,000	$26,096,000	$514,667	$32,167
56	Fayette WSC [2]	Gonzales	$0	$0	$0	$0
57	County-Other, Karnes	Karnes	$0	$0	$0	$0
58	East Central SUD	Bexar	$53,243,000	$72,618,000	$1,432,167	$21,699
59	County-Other, Uvalde	Uvalde	$0	$0	$0	$0

No.	Water User Group	Primary County	Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/YR)
60	Luling	Caldwell	$52,411,000	$71,482,000	$1,409,833	$176,229
61	Crystal Clear SUD	Guadalupe	$71,545,000	$97,579,000	$1,924,500	$23,187
62	Lockhart	Caldwell	$20,798,000	$28,366,000	$559,500	$18,650
63	Elmendorf	Bexar	$1,664,000	$2,269,000	$44,667	$7,444
64	Devine	Medina	$7,487,000	$10,211,000	$201,333	$33,556
65	Universal City	Bexar	$16,638,000	$22,693,000	$447,500	$14,917
66	Seguin	Guadalupe	$49,083,000	$66,944,000	$1,320,333	$17,373
67	Nixon	Gonzales	$4,160,000	$5,674,000	$111,833	$37,278
68	South Buda WCID 1	Hays	$4,160,000	$5,674,000	$111,833	$18,639
69	Big Wells	Dimmit	$1,477,000	$2,036,000	$39,667	$39,667
70	Poth	Wilson	$3,446,000	$4,752,000	$92,667	$46,333
71	Water Services	Bexar	$13,311,000	$18,154,000	$358,000	$39,778
72	Schertz	Bexar	$49,083,000	$66,944,000	$1,320,333	$16,504
73	Guadalupe-Blanco River Authority	Comal	$17,470,000	$23,827,000	$470,000	$33,571
74	Sunko WSC	Karnes	$54,075,000	$73,752,000	$1,454,500	$207,786
75	Woodsboro	Refugio	$2,462,000	$3,394,000	$66,167	$33,083
76	Aqua WSC [2]	Caldwell	$2,954,000	$4,073,000	$79,500	$39,750
77	Selma	Bexar	$12,479,000	$17,020,000	$335,667	$12,910
78	County-Other, Zavala	Zavala	$0	$0	$0	$0
79	Seadrift	Calhoun	$2,462,000	$3,394,000	$66,167	$66,167
80	Oak Hills WSC	Wilson	$20,798,000	$28,366,000	$559,500	$55,950
81	County-Other, Comal	Comal	$0	$0	$0	$0
82	Batesville WSC	Zavala	$2,462,000	$3,394,000	$66,167	$66,167
83	Waelder	Gonzales	$2,462,000	$3,394,000	$66,167	$33,083
84	Natalia	Medina	$2,954,000	$4,073,000	$79,500	$39,750
85	Charlotte	Atascosa	$2,954,000	$4,073,000	$79,500	$39,750
86	Carrizo Hill WSC	Dimmit	$1,969,000	$2,715,000	$53,000	$53,000
87	The Oaks WSC	Bexar	$985,000	$1,358,000	$26,500	$13,250
88	Yorktown	DeWitt	$4,431,000	$6,109,000	$119,167	$39,722
89	Live Oak	Bexar	$19,134,000	$26,096,000	$514,667	$30,275
90	Yoakum [2]	DeWitt	$14,143,000	$19,290,000	$380,500	$95,125
91	C Willow Water	Wilson	$985,000	$1,358,000	$26,500	$6,625
92	Castroville	Medina	$7,487,000	$10,211,000	$201,333	$5,752

No.	Water User Group	Primary County	Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/YR)
93	Karnes City	Karnes	$7,487,000	$10,211,000	$201,333	$15,487
94	Refugio	Refugio	$5,823,000	$7,942,000	$156,667	$11,190
95	Texas State University	Hays	$18,302,000	$24,962,000	$492,333	$9,289
96	Lytle	Atascosa	$9,983,000	$13,616,000	$268,500	$13,425
97	Moore WSC	Frio	$1,969,000	$2,715,000	$53,000	$17,667
98	Medina County WCID 2	Medina	$1,477,000	$2,036,000	$39,667	$13,222
99	Pearsall	Frio	$17,470,000	$23,827,000	$470,000	$9,400
100	Goliad	Goliad	$3,446,000	$4,752,000	$92,667	$10,296
101	Wingert Water Systems	Comal	$3,446,000	$4,752,000	$92,667	$9,267
102	Smiley	Gonzales	$1,477,000	$2,036,000	$39,667	$13,222
103	Asherton	Dimmit	$1,969,000	$2,715,000	$53,000	$13,250
104	Runge	Karnes	$2,462,000	$3,394,000	$66,167	$13,233
105	El Oso WSC [2]	Karnes	$124,788,000	$170,196,000	$3,356,667	$74,593
106	New Braunfels	Comal	$133,939,000	$182,678,000	$3,602,833	$4,274
107	West Medina WSC	Medina	$11,815,000	$16,291,000	$317,833	$52,972
108	Knippa WSC	Uvalde	$1,477,000	$2,036,000	$39,667	$13,222
109	Encinal WSC	La Salle	$2,462,000	$3,394,000	$66,167	$11,028
110	Stockdale	Wilson	$2,462,000	$3,394,000	$66,167	$7,352
111	Crystal City	Zavala	$13,311,000	$18,154,000	$358,000	$9,676
112	La Vernia	Wilson	$6,655,000	$9,077,000	$179,000	$8,950
113	Jourdanton	Atascosa	$8,319,000	$11,346,000	$223,833	$7,220
114	Bexar County WCID 10	Bexar	$14,143,000	$19,290,000	$380,500	$9,756
115	Boerne	Kendall	$27,453,000	$37,443,000	$738,500	$4,559
116	Pleasanton	Atascosa	$19,966,000	$27,232,000	$537,000	$6,713
117	Windmill WSC	Uvalde	$985,000	$1,358,000	$26,500	$2,650
118	Falls City	Karnes	$1,477,000	$2,036,000	$39,667	$13,222
119	Uvalde	Uvalde	$26,621,000	$36,308,000	$716,167	$6,174
120	Dilley	Frio	$9,151,000	$12,481,000	$246,167	$6,653
121	Floresville	Wilson	$13,311,000	$18,154,000	$358,000	$8,732
122	Sabinal	Uvalde	$492,000	$679,000	$13,167	$1,463
123	Gonzales	Gonzales	$18,302,000	$24,962,000	$492,333	$8,952
124	Three Oaks WSC	Wilson	$18,708,000	$25,794,000	$503,167	$45,742
125	Victoria	Victoria	$84,024,000	$114,599,000	$2,260,167	$4,585

No.	Water User Group	Primary County	Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/YR)
126	Air Force Village II Inc	Bexar	$1,477,000	$2,036,000	$39,667	$9,917
127	Fair Oaks Ranch	Bexar	$16,638,000	$22,693,000	$447,500	$5,737
128	Cuero	DeWitt	$16,638,000	$22,693,000	$447,500	$6,780
129	Carrizo Springs	Dimmit	$11,647,000	$15,885,000	$313,333	$8,704
130	Hondo	Medina	$15,806,000	$21,558,000	$425,167	$6,749
131	Gonzales County WSC	Gonzales	$145,585,000	$198,562,000	$3,916,167	$63,164
132	Concan WSC	Uvalde	$1,477,000	$2,036,000	$39,667	$19,833
133	Alamo Heights	Bexar	$15,806,000	$21,558,000	$425,167	$6,749
134	Ville Dalsace Water Supply	Medina	$1,477,000	$2,036,000	$39,667	$13,222
135	3009 Water	Comal	$3,446,000	$4,752,000	$92,667	$7,722
136	Zavala County WCID 1	Zavala	$3,938,000	$5,430,000	$106,000	$10,600
137	Cotulla	La Salle	$5,823,000	$7,942,000	$156,667	$4,896
138	Shavano Park	Bexar	$3,938,000	$5,430,000	$106,000	$6,235
139	Loma Alta Chula Vista Water System	Zavala	$1,477,000	$2,036,000	$39,667	$13,222
140	KT Water Development	Comal	$8,319,000	$11,346,000	$223,833	$8,290
141	Garden Ridge	Comal	$9,151,000	$12,481,000	$246,167	$4,103
142	Kenedy	Karnes	$10,815,000	$14,750,000	$290,833	$7,271
143	Clear Water Estates Water System	Comal	$2,462,000	$3,394,000	$66,167	$2,005
144	Fort Sam Houston	Bexar	$16,638,000	$22,693,000	$447,500	$852

[1] Costs are associated with conservation measures associated with replacement of leaking pipes.

[2] WUGs are split between Region L and other regions (Regions K, P, and/or N). Values in the table represent the Region L portion of the municipal water conservation strategy.

[3] SAWS has identified utility-specific water conservation goals that are described and quantified in Section 5.2.1.2.3 entitled, "San Antonio Water System Municipal Water Conservation."

Water use reduction includes installation of AMI and non-capital efforts to reduce the consumption of water.

An AMI fixed network system automates the meter reading process with two way communications from utility to meter. The network collects, delivers, and analyzes data regarding how and when usage takes place. This strategy is designed to provide the utility with more information to proactively manage customers and resources. In addition, more information will be available to customers, encouraging participation in conservation efforts. Advanced meter infrastructure can promote conservation through improved reporting, thereby reducing demand and increasing the available supply. Smart meters were assumed a cost of $330 per home, with the assumption that 100% of homes would implement this strategy over the planning horizon. Implementing this conservation strategy would reduce approximately 1 to 5% of the demand.

Remaining conservation measures were assumed to be non-capital approaches, which could include both labor and materials associated with implementing standards, incentives, and outreach. Many of the non-capital cost measures include, but are not limited to, drought tolerant landscape, public education and outreach – including school programs, rebate and incentive programs – local ordinances that increase water efficiency by customers, support of legislation that increases water efficiency in plumbing products and appliances at both the State and Federal level, increased water efficiency in utility operations, and conservation-oriented rate structures. Conservation measures for non-capital approaches were included in the annual costs at an average of $305/ac-ft of water savings.

The following table provides the estimated costs for municipal conservation (water use reduction). The unit cost is presented as an average, with some conservation measures being more expensive and some being less.

Table 5.2.1-10 Estimated Costs of Water Use Reduction WMS [1]

No.	Water User Group	Primary County	Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/YR)
1	Randolph Air Force Base	Bexar	$0	$0	$0	$0
2	Port Oconnor Improvement District	Calhoun	$0	$0	$0	$0
3	County Line SUD	Hays	$0	$0	$0	$0
4	East Medina County SUD	Medina	$0	$0	$0	$0
5	Kendall County WCID 1	Kendall	$797,000	$1,036,000	$129,915	$43,305
6	Picosa WSC	Wilson	$697,000	$906,000	$112,915	$22,583
7	Medina River West WSC	Medina	$151,000	$196,000	$26,440	$2,938
8	Kyle	Hays	$16,251,000	$21,126,000	$2,847,480	$3,239
9	Kirby	Bexar	$1,140,000	$1,482,000	$201,995	$2,927
10	Maxwell SUD	Hays	$8,144,000	$10,587,000	$1,456,130	$2,707
11	Cibolo	Guadalupe	$6,620,000	$8,606,000	$1,198,540	$2,461
12	Point Comfort	Calhoun	$45,000	$58,000	$8,525	$2,131
13	La Coste	Medina	$149,000	$194,000	$27,355	$2,280
14	Martindale WSC	Caldwell	$980,000	$1,274,000	$186,670	$1,812
15	Lackland Air Force Base	Bexar	$1,545,000	$2,009,000	$295,970	$1,762
16	Benton City WSC	Medina	$3,382,000	$4,397,000	$657,020	$1,659
17	Converse	Bexar	$3,124,000	$4,061,000	$608,615	$1,632
18	Victoria County WCID 1	Victoria	$194,000	$252,000	$37,405	$1,626
19	Creedmoor-Maha WSC [2]	Caldwell	$5,892,000	$7,660,000	$1,148,335	$1,631
20	Yancey WSC	Medina	$840,000	$1,092,000	$163,670	$1,605
21	Springs Hill WSC	Guadalupe	$11,832,000	$15,382,000	$2,322,665	$1,581
22	Goforth SUD [2]	Hays	$29,310,000	$38,103,000	$5,759,680	$1,572
23	Green Valley SUD	Guadalupe	$15,846,000	$20,600,000	$3,129,265	$1,540

No.	Water User Group	Primary County	Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/YR)
24	Wimberley WSC	Hays	$2,792,000	$3,630,000	$551,955	$1,537
25	County-Other, La Salle	La Salle	$129,000	$168,000	$25,880	$1,618
26	County-Other, Guadalupe	Guadalupe	$1,057,000	$1,374,000	$207,905	$1,575
27	County-Other, Calhoun	Calhoun	$241,000	$313,000	$46,930	$1,676
28	County-Other, Victoria	Victoria	$2,802,000	$3,643,000	$552,040	$1,551
29	Quail Creek MUD	Victoria	$149,000	$194,000	$28,880	$1,604
30	San Antonio Water System[3]	Bexar	$0	$0	$9,422,975	$305
31	County-Other, Wilson	Wilson	$426,000	$554,000	$84,860	$1,515
32	County-Other, Refugio	Refugio	$199,000	$259,000	$39,320	$1,512
33	County-Other, Caldwell	Caldwell	$347,000	$451,000	$68,810	$1,496
34	County-Other, Gonzales	Gonzales	$106,000	$138,000	$20,965	$1,498
35	S S WSC	Wilson	$3,921,000	$5,097,000	$782,450	$1,471
36	County-Other, Goliad	Goliad	$517,000	$672,000	$102,215	$1,481
37	Leon Valley	Bexar	$2,012,000	$2,616,000	$400,945	$1,485
38	County-Other, Kendall	Kendall	$4,683,000	$6,088,000	$933,510	$1,477
39	McCoy WSC [2]	Atascosa	$1,170,000	$1,521,000	$233,225	$1,476
40	Poteet	Atascosa	$264,000	$343,000	$53,065	$1,474
41	County-Other, Hays [2]	Hays	$48,638,000	$63,229,000	$9,734,595	$1,452
42	Kendall West Utility	Kendall	$918,000	$1,193,000	$182,770	$1,474
43	Polonia WSC [2]	Caldwell	$2,210,000	$2,873,000	$443,620	$1,440
44	Marion	Guadalupe	$214,000	$278,000	$43,540	$1,451
45	Canyon Lake Water Service (Texas Water Company) [2]	Comal	$31,032,000	$40,342,000	$6,251,180	$1,415
46	Tri Community WSC	Caldwell	$187,000	$243,000	$37,320	$1,435
47	Atascosa Rural WSC	Bexar	$2,587,000	$3,363,000	$519,785	$1,420
48	County-Other, Medina	Medina	$657,000	$854,000	$133,145	$1,387
49	County-Other, Atascosa	Atascosa	$34,000	$44,000	$7,745	$1,291
50	County-Other, Frio	Frio	$102,000	$133,000	$20,270	$1,351
51	San Marcos	Hays	$34,827,000	$45,275,000	$6,254,790	$2,563
52	County-Other, Bexar	Bexar	$478,000	$621,000	$97,130	$1,494
53	County-Other, DeWitt	DeWitt	$797,000	$1,036,000	$162,550	$1,355
54	County-Other, Dimmit	Dimmit	$36,000	$47,000	$9,355	$1,871
55	Port Lavaca	Calhoun	$960,000	$1,248,000	$197,090	$1,314
56	Fayette WSC [2]	Gonzales	$17,000	$22,000	$3,610	$1,805

No.	Water User Group	Primary County	Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/YR)
57	County-Other, Karnes	Karnes	$297,000	$386,000	$60,505	$1,345
58	East Central SUD	Bexar	$8,620,000	$11,206,000	$1,773,775	$1,302
59	County-Other, Uvalde	Uvalde	$470,000	$611,000	$96,435	$1,321
60	Luling	Caldwell	$723,000	$940,000	$149,025	$1,307
61	Crystal Clear SUD	Guadalupe	$17,947,000	$23,331,000	$3,702,725	$1,289
62	Lockhart	Caldwell	$3,407,000	$4,429,000	$703,720	$1,287
63	Elmendorf	Bexar	$1,832,000	$2,382,000	$379,265	$1,281
64	Devine	Medina	$516,000	$671,000	$106,485	$1,268
65	Universal City	Bexar	$2,446,000	$3,180,000	$509,985	$1,247
66	Seguin	Guadalupe	$7,897,000	$10,266,000	$1,660,825	$1,210
67	Nixon	Gonzales	$229,000	$298,000	$48,285	$1,207
68	South Buda WCID 1	Hays	$2,841,000	$3,693,000	$602,960	$1,178
69	Big Wells	Dimmit	$33,000	$43,000	$6,830	$1,138
70	Poth	Wilson	$160,000	$208,000	$34,235	$1,181
71	Water Services	Bexar	$840,000	$1,092,000	$179,005	$1,170
72	Schertz	Bexar	$12,555,000	$16,321,000	$3,029,755	$873
73	Guadalupe-Blanco River Authority	Comal	$1,182,000	$1,537,000	$287,075	$865
74	Sunko WSC	Karnes	$703,000	$914,000	$170,730	$871
75	Woodsboro	Refugio	$91,000	$118,000	$22,625	$870
76	Aqua WSC [2]	Caldwell	$224,000	$291,000	$54,605	$853
77	Selma	Bexar	$3,739,000	$4,861,000	$909,305	$861
78	County-Other, Zavala	Zavala	$101,000	$131,000	$24,540	$846
79	Seadrift	Calhoun	$72,000	$94,000	$18,100	$862
80	Oak Hills WSC	Wilson	$1,368,000	$1,778,000	$334,460	$853
81	County-Other, Comal	Comal	$14,250,000	$18,525,000	$3,490,110	$848
82	Batesville WSC	Zavala	$76,000	$99,000	$18,405	$837
83	Waelder	Gonzales	$104,000	$135,000	$25,540	$851
84	Natalia	Medina	$128,000	$166,000	$31,980	$842
85	Charlotte	Atascosa	$126,000	$164,000	$30,675	$829
86	Carrizo Hill WSC	Dimmit	$185,000	$240,000	$45,860	$834
87	The Oaks WSC	Bexar	$226,000	$294,000	$56,825	$836
88	Yorktown	DeWitt	$196,000	$255,000	$49,080	$832
89	Live Oak	Bexar	$1,081,000	$1,405,000	$269,245	$826

No.	Water User Group	Primary County	Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/YR)
90	Yoakum[2]	DeWitt	$198,000	$257,000	$49,690	$815
91	C Willow Water	Wilson	$113,000	$147,000	$32,030	$667
92	Castroville	Medina	$1,202,000	$1,563,000	$340,095	$682
93	Karnes City	Karnes	$336,000	$437,000	$95,480	$672
94	Refugio	Refugio	$302,000	$393,000	$87,430	$667
95	Texas State University	Hays	$1,034,000	$1,344,000	$298,150	$666
96	Lytle	Atascosa	$524,000	$681,000	$152,405	$663
97	Moore WSC	Frio	$87,000	$113,000	$25,590	$656
98	Medina County WCID 2	Medina	$47,000	$61,000	$14,100	$671
99	Pearsall	Frio	$1,225,000	$1,593,000	$396,250	$590
100	Goliad	Goliad	$164,000	$213,000	$53,840	$592
101	Wingert Water Systems	Comal	$240,000	$312,000	$78,345	$589
102	Smiley	Gonzales	$48,000	$62,000	$15,625	$601
103	Asherton	Dimmit	$55,000	$71,000	$18,455	$595
104	Runge	Karnes	$128,000	$167,000	$42,350	$588
105	El Oso WSC [2]	Karnes	$1,120,000	$1,456,000	$368,270	$581
106	New Braunfels	Comal	$65,441,000	$85,073,000	$23,730,985	$535
107	West Medina WSC	Medina	$120,000	$156,000	$39,435	$572
108	Knippa WSC	Uvalde	$45,000	$58,000	$14,625	$585
109	Encinal WSC	La Salle	$159,000	$207,000	$53,145	$578
110	Stockdale	Wilson	$169,000	$220,000	$56,280	$568
111	Crystal City	Zavala	$527,000	$685,000	$176,195	$570
112	La Vernia	Wilson	$534,000	$694,000	$178,110	$571
113	Jourdanton	Atascosa	$723,000	$940,000	$242,355	$570
114	Bexar County WCID 10	Bexar	$1,091,000	$1,418,000	$367,845	$566
115	Boerne	Kendall	$10,673,000	$13,875,000	$3,610,645	$565
116	Pleasanton	Atascosa	$2,093,000	$2,721,000	$713,150	$561
117	Windmill WSC	Uvalde	$86,000	$112,000	$37,790	$620
118	Falls City	Karnes	$70,000	$91,000	$26,250	$515
119	Uvalde	Uvalde	$1,585,000	$2,061,000	$615,290	$508
120	Dilley	Frio	$845,000	$1,098,000	$328,455	$506
121	Floresville	Wilson	$819,000	$1,065,000	$319,575	$506
122	Sabinal	Uvalde	$116,000	$151,000	$46,145	$507

No.	Water User Group	Primary County	Facility Cost ($)	Project Cost ($)	Annual Cost ($)	Unit Cost ($/YR)
123	Gonzales	Gonzales	$772,000	$1,003,000	$334,230	$475
124	Three Oaks WSC	Wilson	$246,000	$320,000	$107,100	$476
125	Victoria	Victoria	$7,314,000	$9,508,000	$3,195,745	$472
126	Air Force Village II Inc	Bexar	$59,000	$77,000	$25,470	$463
127	Fair Oaks Ranch	Bexar	$1,456,000	$1,893,000	$658,645	$463
128	Cuero	DeWitt	$912,000	$1,186,000	$412,350	$462
129	Carrizo Springs	Dimmit	$364,000	$473,000	$179,170	$445
130	Hondo	Medina	$829,000	$1,078,000	$407,585	$444
131	Gonzales County WSC	Gonzales	$809,000	$1,052,000	$399,095	$444
132	Concan WSC	Uvalde	$26,000	$34,000	$12,540	$432
133	Alamo Heights	Bexar	$859,000	$1,117,000	$424,480	$444
134	Ville Dalsace Water Supply	Medina	$58,000	$75,000	$28,520	$439
135	3009 Water	Comal	$531,000	$690,000	$265,340	$441
136	Zavala County WCID 1	Zavala	$107,000	$139,000	$54,210	$434
137	Cotulla	La Salle	$391,000	$508,000	$192,625	$401
138	Shavano Park	Bexar	$319,000	$415,000	$157,750	$399
139	Loma Alta Chula Vista Water System	Zavala	$28,000	$37,000	$14,760	$410
140	KT Water Development	Comal	$1,597,000	$2,076,000	$834,755	$391
141	Garden Ridge	Comal	$1,561,000	$2,029,000	$835,160	$387
142	Kenedy	Karnes	$503,000	$654,000	$291,450	$374
143	Clear Water Estates Water System	Comal	$417,000	$542,000	$609,595	$304
144	Fort Sam Houston	Bexar	$910,000	$1,183,000	$2,219,780	$289

[1] Costs are associated with conservation measures associated with smart meter installation and other non-capital efforts.

[2] WUGs are split between Region L and other regions (Regions K, P, and/or N). Values in the table represent the Region L portion of the municipal water conservation strategy.

[3] SAWS has identified utility-specific water conservation goals that are described and quantified in Section 5.2.1.2.3 entitled, "San Antonio Water System Municipal Water Conservation." As SAWS will have full implementation of AMI completed by 2030, there are no additional capital costs anticipated.

5.2.2 Non-Municipal Water Conservation

The SCTRWPG identified the Non-Municipal Water Conservation WMS as a potentially feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.2.1 Description of Water Management Strategy

Non-Municipal Water Conservation is included as a Recommended strategy for all Irrigation WUGs with an identified water need. Water conservation measures are defined as practices, techniques, programs, and technologies that will protect water resources, reduce consumption of water, reduce the loss or waste of water, or improve the efficiency in the use of water so that a water supply is made available for future or alternative uses. The goal of this WMS is to increase water conservation and thereby reduce freshwater use within the SCTRWPA. The SCTRWPG recommends non-municipal water conservation to improve irrigation efficiencies to reduce the quantity of water used for agricultural activities per acre irrigated.

Several methods of conservation for agriculture were considered for inclusion in the 2026 SCTRWP to help meet irrigation needs. The recommended conservation measures for irrigation include soil moisture monitoring, irrigation scheduling, real-time use metering and monitoring, and soil conservation tillage. Irrigation water conservation is Recommended as a WMS in counties where irrigation needs are identified or created through groundwater conversions and transfers. However, the SCTRWPG supports conservation for irrigation and any other use types for all entities in the SCTRWPA. The full range of BMPs described in TWDB literature is recommended, where appropriate [1].

The Non-Municipal Water Conservation WMS includes estimates of potential water conservation demand reductions and associated costs of water conservation for irrigation WUGs. The following conservation measures are included in the Non-Municipal Water Conservation WMS:

- A tandem strategy of soil moisture monitoring and irrigation scheduling can ensure adequate soil moisture conditions while limiting excess watering. Soil moisture monitoring manages soil moisture levels by use of soil matric potential sensors to measure water suction in soil. Generally, planting in wet soil and adequate water before critical growth periods indicates the success of a crop. Irrigation scheduling is the process of allocating irrigation water according to crop requirements based on meteorological demands and field conditions. According to the Water Advisory Council's Report and Recommendations to the 88th Texas Legislature, it is estimated that fewer than 10% of producers in Texas were using soil water sensors for irrigation scheduling as of 2018. This measure assumes sensors and scheduling will be applied to 10% of cropland by 2030 and will incrementally increase by 3% each decade throughout the planning horizon.
- Real-time monitoring involves the installation of meters that assess water use by automatically recording and transferring flow data at 15-minute intervals. Water providers and users are able to accurately quantify the usage, generating awareness of consumption and cost, thereby improving irrigation efficiency and providing a water savings. This measure assumes metering will be added to 3% of cropland each decade throughout the planning horizon.
- Conservation tillage is defined as tillage practices that minimize soil and water loss by maintaining a surface residue cover of more than 30% on the soil surface. Conservation tillage can reduce evaporation, increase rainfall infiltration, enhance soil profile water storage, soil

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[1] Texas Water Development Board (TWDB). BMPs for Agricultural Water users. http://www.twdb.texas.gov/conservation/BMPs/Ag/index.asp.

moisture conservation, and water use efficiency. A December 2015 USDA report [2] on Conservation-Practice Adoption Rates show that conservation tillage in some form (minimum till, strip till, or no-till) is practiced on 63% of cropland in the region. This strategy assumes a decadal increase of 6% slowing in later years of the planning horizon until 95% of all irrigated acreage practices some sort of conservation tillage.

5.2.2.2 Available Yield

This Non-Municipal Water Conservation WMS is considered for implementation beginning in the 2030 decade. Total yield from all measures is 17,720 acft/yr in the SCTRWPA by 2080. Table 5.2.2-1 summarizes the water demand savings (yield) for each decade and WUG for this Non-Municipal Water Conservation WMS.

The water savings from adopting irrigation scheduling is assumed to be 10% and effective soil conservation tillage is assumed to be 1.75 acre-inches per acre [3]. Adoption of real-time monitoring is assumed to reduced water use by 10% [4].

Table 5.2.2-1 Water Demand Savings (Yield) from Non-Municipal (Irrigation) Water Conservation (acft/yr)

No.	Water User Group	County	2030	2040	2050	2060	2070	2080
1	Irrigation	Atascosa	538	900	1,261	1,621	1,914	2,205
2	Irrigation	Bexar	222	362	501	640	757	874
3	Irrigation	Caldwell	13	21	29	37	44	51
4	Irrigation	Calhoun	156	239	322	406	481	558
5	Irrigation	Comal	11	19	24	31	38	44
6	Irrigation	Dimmit	85	136	188	240	284	327
7	Irrigation	Goliad	69	117	164	212	250	287
8	Irrigation	Guadalupe	17	28	37	48	57	67
9	Irrigation	Karnes	19	31	43	55	66	75
10	Irrigation	La Salle	82	134	184	237	279	322
11	Irrigation	Medina	1,042	1,701	2,359	3,017	3,566	4,115
12	Irrigation	Uvalde	1,050	1,731	2,413	3,094	3,654	4,215
13	Irrigation	Victoria	177	276	375	474	562	651
14	Irrigation	Wilson	246	399	552	704	833	962

[2] Wade, Tara; Claassen, Roger; Wallander, Steven. 2015. *Conservation-Practice Adoption Rates Vary Widely by Crop and Region*. United States Department of Agriculture (USDA) Economic Information Bulletin, Number 147.
[3] Crouch, MariKate; Guerrero, Bridget; Amosson, Steve; Marek, Thomas; Almas, Lal. 2020. *Analyzing Potential Water Conservation Strategies in the Texas Panhandle.* Irrigation Science, Volume 38 (5-6): 9.
[4] Fipps, Guy. 2001. *Potential Water Savings in Irrigated Agriculture in the Lower Rio Grande Basin of Texas*. Texas A&M University.

No.	Water User Group	County	2030	2040	2050	2060	2070	2080
15	Irrigation	Zavala	767	1,235	1,704	2,173	2,571	2,967
All	**Total**	**All**	**4,494**	**7,329**	**10,156**	**12,989**	**15,356**	**17,720**

The possibility exists that implementation of these irrigation conservation measures in a drought year increases the potential yield of a crop per acre-foot (acft) of water but may not reduce the irrigator's overall demand for water. When water is available in a drought year, farmers are likely to use it. Making better use of the water that is available is critical to helping farmers through drought, and the SCTRWPG recommends continued research, education, demonstration, and large-scale implementation of these and any other irrigation conservation measures that farmers find to be appropriate.

5.2.2.3 Environmental Factors

Increased conservation in agricultural irrigation would have a potentially negative impact on streamflows in the area. During dry months, return flows from agricultural operations represent a considerable portion of the streamflow seen in the region. Therefore, additional conservation during these times could have adverse effects on aquatic wildlife habitat and water quality parameters such as dissolved oxygen concentrations. This could also negatively affect protected aquatic species, such as freshwater mussels. The more efficient usage of available supply may reduce habitat if canals with current plant growth and wildlife harborage are converted to pipelines or are lined to reduce seepage and plant growth. Increased conservation would have positive impacts on agricultural resources by enabling more efficient use of the irrigation water supply. This strategy would have no impacts to cultural resources.

5.2.2.4 Engineering and Costing

Preliminary engineering and costing analyses were performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs.

Table 5.2.2-2 and Table 5.2.2-3 provide the estimated costs for the Non-Municipal Water Conservation WMS. It is assumed that sensors associated with soil moisture monitoring cost about $1,000 each, requiring approximately one node per 10 acres, and have a life of about 10 years. It is assumed that meters associated with real-time metering cost about $6,000 each and have a lifespan of about 20 years. According to the EAA, where wells can be on voluntary automated metering, there are approximately 1.5 meters per farm.

Table 5.2.2-2 Non-Municipal Water Conservation WMS Costs for Project Sponsors

No.	Water User Group	Total Cost of Facilities	Total Cost of Project	Annual Cost	Annual Cost of Water ($ per acft)
1	Irrigation, Atascosa	$4,309,000	$6,007,000	$765,000	$347
2	Irrigation, Bexar	$1,708,000	$2,381,000	$303,000	$347
3	Irrigation, Caldwell	$100,000	$139,000	$17,000	$333
4	Irrigation, Calhoun	$1,091,000	$1,520,000	$194,000	$348

No.	Water User Group	Total Cost of Facilities	Total Cost of Project	Annual Cost	Annual Cost of Water ($ per acft)
5	Irrigation, Comal	$86,000	$120,000	$15,000	$341
6	Irrigation, Dimmit	$639,000	$890,000	$113,000	$346
7	Irrigation, Goliad	$561,000	$782,000	$100,000	$348
8	Irrigation, Guadalupe	$131,000	$182,000	$24,000	$358
9	Irrigation, Karnes	$147,000	$204,000	$26,000	$347
10	Irrigation, La Salle	$629,000	$877,000	$112,000	$348
11	Irrigation, Medina	$8,042,000	$11,211,000	$1,429,000	$347
12	Irrigation, Uvalde	$8,237,000	$11,483,000	$1,463,000	$347
13	Irrigation, Victoria	$1,272,000	$1,773,000	$226,000	$347
14	Irrigation, Wilson	$1,880,000	$2,620,000	$333,000	$346
15	Irrigation, Zavala	$5,798,000	$8,082,000	$1,030,000	$347
All	**Total**	**$34,630,000**	**$48,271,000**	**$6,150,000**	**$347**

The capital costs of $34,630,000 are associated with the full demand reduction volume listed in 2080.

Table 5.2.2-3 Summary of Cost Estimate for the Non-Municipal Water Conservation WMS

Item	Estimated Costs
Integration, Relocations, Backup Generator, and Other	$34,630,000
TOTAL COST OF FACILITIES	**$34,630,000**
Planning (3%)	$1,039,000
Design (7%)	$2,424,000
Construction Engineering (1%)	$346,000
Legal Assistance (2%)	$693,000
Fiscal Services (2%)	$693,000
All Other Facilities Contingency (20%)	$6,926,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,520,000
TOTAL COST OF PROJECT	**$48,271,000**
ANNUAL COST	
Debt Service (3.5 percent, 10 years)	$5,804,000
Reservoir Debt Service (3.5 percent, 40 years)	$0
Operation and Maintenance	

Item	Estimated Costs
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$346,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$0
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$6,150,000**
Available Project Yield (acft/yr)	17,720
Annual Cost of Water ($ per acft)*	$347
Annual Cost of Water After Debt Service*	$20
Annual Cost of Water ($ per 1,000 gallons)*	$1.06
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.06
*Based on a peaking factor of 0	
Note: One or more cost element has been calculated externally.	

5.2.2.5 Implementation Considerations

On the agricultural side, conservation savings would not result in a reduction of capital expenditures but a forced expenditure of funding to garner any savings. A finite upper limit to the amount of money that can be spent to conserve agricultural water and still be supported by agricultural income, as individual producers are responsible for implementation. The high cost of conservation and the lack of funds to pay for it make large-scale conservation projects challenging.

In many cases, SWIFT funding is not eligible for individual agricultural users; therefore, implementation of this strategy depends on large-scale implementation by an organization, such as a river authority, or individual funding to agricultural users from grant and loan programs. The following summarizes resources that may support implementation of the Non-Municipal Water Conservation WMS:

- TWDB's Agricultural Water Conservation Grants Program offers grants for projects that support agricultural irrigation conservation strategies in alignment with the state water plan and demonstrate agricultural water conservation best management practices, such as irrigation systems improvements, demonstrations and technology transfer, and equipment cost share grant programs. Applications must be submitted by a political subdivision such as GCDs or River Authorities. These entities can serve as sponsors or facilitators to pass funding through to local producers. More information can be found at https://www.twdb.texas.gov/financial/programs/awcg/index.asp.
- The Texas Department of Agriculture (TDA) hosts a series of grant, loan, and cost share assistance programs for agricultural producers which can be found at https://texasagriculture.gov/Grants-Services/Grants-and-Services.

- Through the USDA NRCS, the Environmental Quality Incentive Program (EQIP) provides incentives to farmers toward the costs of improvements. More information can be found at https://www.nrcs.usda.gov/programs-initiatives/eqip-environmental-quality-incentives.
- Through partnerships for Climate-Smart Commodities, the USDA provides technical and financial assistance to producers to implement climate-smart production practices on a voluntary basis on working lands. More information can be found at https://www.usda.gov/climate-solutions/climate-smart-commodities.
- The Water Quality Management Plan (WQMP) program, administered by the Texas State Soil and Water Conservation Board (TSSWCB), develops site-specific, voluntary plans specially crafted for agricultural or silvicultural lands approved by local Soil and Water Conservation Districts (SWCDs). TSSWCB offers financial assistance for implementation in the form of cost-share funding. To identify the appropriate TSSWCB Regional Office administering the WQMPs, visit www.tsswcb.texas.gov/contact-us/regional-office-service-areas.
- Through the EAA Groundwater Conservation Plan Program, EAA promotes implementation of individual groundwater conservation plans through its water conservation grant and cost-share programs. Documentation can be found at https://www.edwardsaquifer.org/business-center/bc-files/#cost-share-grant-programs.

Other programs, such as the Texas A&M AgriLife Extension Service's Financial and Risk Management (FARM) Assistance Program, offer additional, non-financial support for farmers. FARM Assistance provides individual producers with a statistically-based strategic financial analysis that is unique to the participant's operation. The data garnered from these analyses provide Texas A&M AgriLife Extension Service with insight on the agricultural industry and enable research to help industry groups, policymakers, and individuals identify trends and gauge impacts at the industry level.

5.2.3 Drought Management

The SCTRWPG identified the Drought Management WMS as a potentially feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.3.1 Description of Water Management Strategy

For the 2026 SCTRWP, the Drought Management WMS was developed for Municipal, Irrigation, and Livestock uses. The following sections provide descriptions of the WMS for each use type.

Municipal

Drought management is the periodic activation of approved drought contingency plans (DCPs) resulting in short-term demand reduction and/or restriction. This reduction in demand is then considered a "supply" source. Using this approach, an entity may make the conscious decision not to develop firm water supplies greater than or equal to projected water demands with the understanding that demands will have to be reduced or go unmet during times of drought. Using this rationale, an economic impact of not meeting projected water demands can be estimated and compared with the costs of other potentially feasible WMSs in terms of annual unit costs.

Figure 5.2.3-1 is a water supply planning example of the visual methodology. For each WUG with an identified shortage or need during the planning period, a future water supply plan was developed consisting of one or more WMSs. In each case, the planned future water supply was greater than the projected dry weather demand to allow for droughts more severe than the drought of record, uncertainty in water demand projections, and/or available supply from Recommended WMSs. This difference between planned water supply and projected dry weather demand is called management supply in Region L.

Figure 5.2.3-2 illustrates how a drought management WMS could alter the planning paradigm for WUGs with projected needs. Instead of identifying WMSs to meet the projected need, planned water supply remains below the projected dry weather water demand. The difference between these two lines represents the drought management WMS. Under this concept, water demand of a WUG would be reduced by activating a drought contingency plan to reduce demands, resulting in unmet needs. This strategy of demand reduction or water restriction could negate the need for WMSs to meet the full projected need of the WUG. Basically, using this approach, the WUG is planning to manage water shortages through DCP activation or water restriction, if needed. This concept is more fully illustrated on Figure 5.2.3-3, which shows that, in any given year, the actual demand may be above or below the planned supply. During times in which the demand exceeds supply, the WUG would experience shortages and incur associated economic impacts.

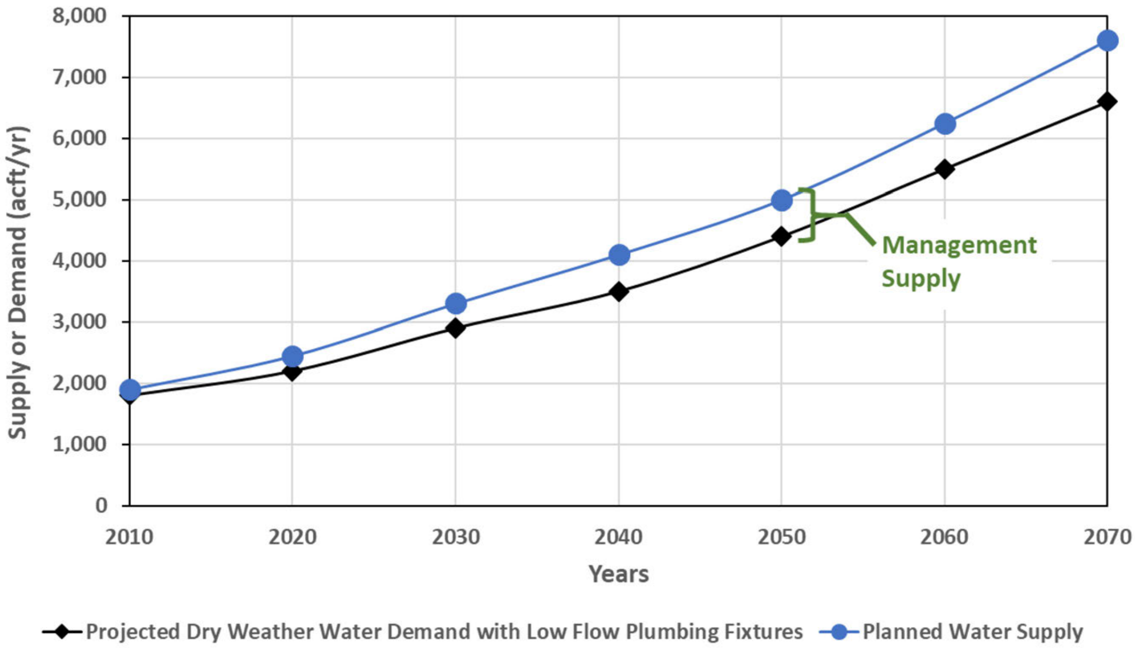

Figure 5.2.3-1 Example - Typical Water Supply Planning

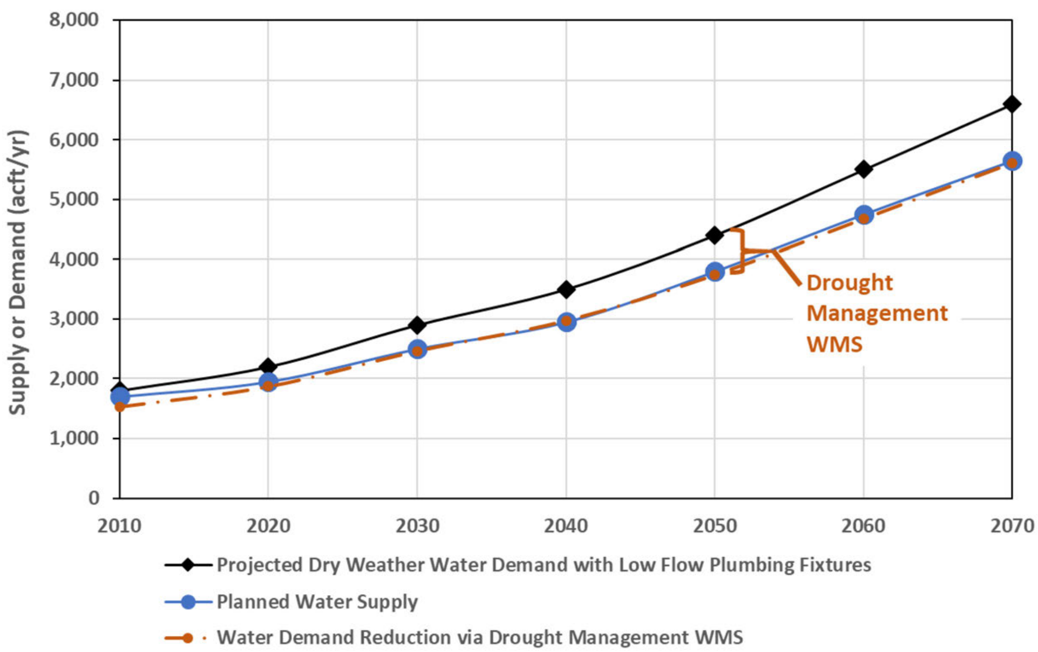

Figure 5.2.3-2 Example - Drought Management WMS Planning Application

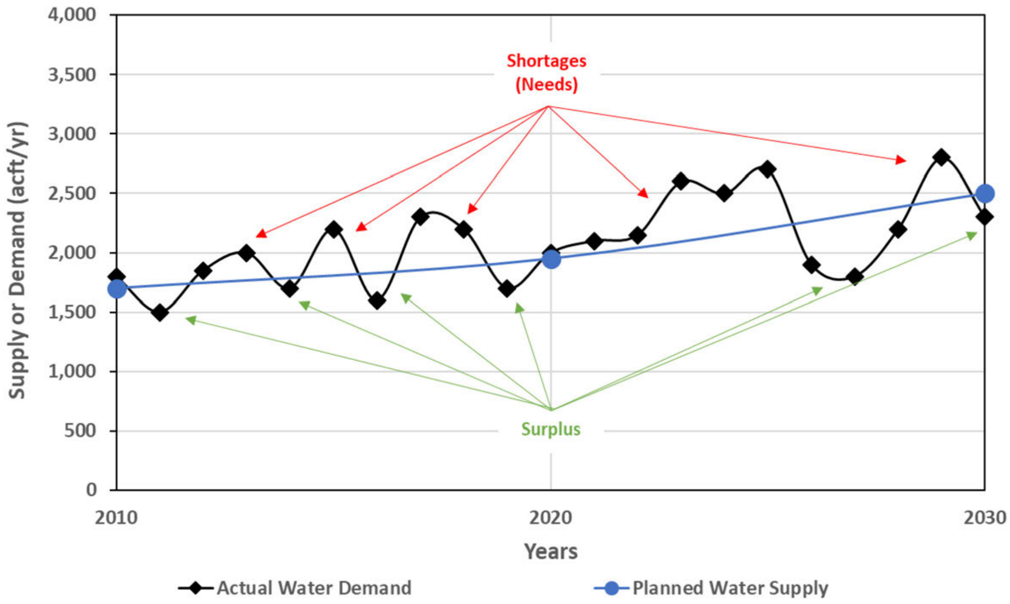

Figure 5.2.3-3 Example - Annual Water Demand and Planned Water Supply

Drought Management Strategy Methodology

On October 3, 2019, the TWDB released the Drought Management Costing Tool to estimate socioeconomic impacts and evaluate economic impact of the water volumes reduced by implementation of drought management strategies. The tool was subsequently updated in March 2024 for use in 2026 SCTRWPs. As described in the TWDB-provided Drought Management Costing Tool User Manual, "the primary purpose of the tool is to provide WUG level costs and the expected household level residential water savings associated with policy-imposed restrictions or reduction on residential water use." The tool utilizes various inputs – user supplied percent use reductions; Census household size; population projections; and Texas Municipal League (TML) price and quantity data to estimate reductions in water use and consumer costs (Figure 5.2.3-4). The following subsections summarize the components and features that comprise the Drought Management Costing Tool. More details can be found in the TWDB Drought Management Costing Tool User Manual.

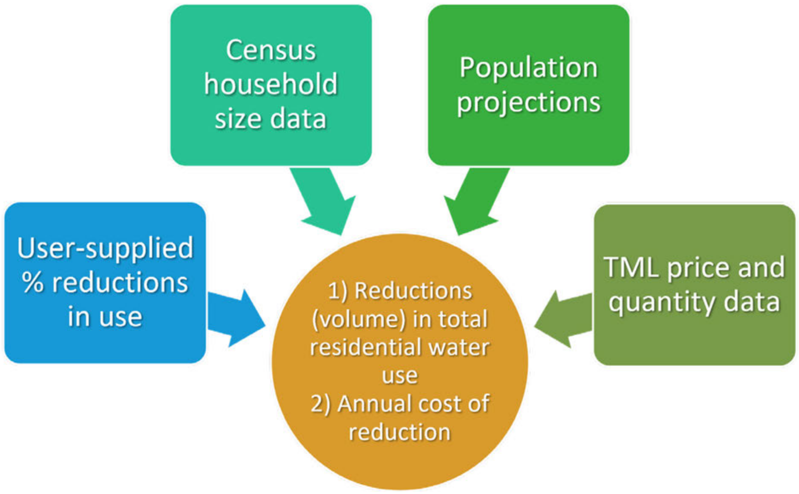

Figure 5.2.3-4 Costing Data and Output (TWDB, 2024)

Texas Municipal League Data

The TML generated water demand curves for WUGs from the 2023 annual cost and usage surveys. Parameters that were used included population, fees for 5,000 and 10,000 gallons of use, and average monthly use for each household in the associated WUG. These data were compiled to estimate the expected price for the average monthly water use for WUGs.

Analysis Assumptions

The following are the key assumptions in the development of the Drought Management Costing Tool (TWDB, 2024):

1. The relevant demand functions are only for residential outdoor water use. Historical studies have revealed that approximately 30% of residential use within the state is for outdoor water use. Therefore, this tool only allows potential reductions less than or equal to 30% of normal water use due to drought management strategies.
2. A representative value of -0.5 was assumed for outdoor water demand.
3. Only residential water use reductions are examined. Available data did not support similar estimates for commercial water use.
4. County-other WUGs are not included in this costing tool.
5. Year 2020 household size data (WUG-specific where possible) are employed to determine the number of households in each decade, using the TWDB adopted projected populations. These baseline household sizes are not assumed to adjust over time.
6. Baseline data from TML for average monthly prices and quantities (per household) from the most recent years 2020-2023 were used in developing the demand functions for the various WUGs. Where possible, WUG-specific data was used. Proxy values that were based on planning region and three city size classifications were assigned to WUGs with no TML survey results.
7. Final cost estimates are expressed in Year 2023 dollars to be consistent with the WMS costing requirements in the 2027 SWP.

Use of the Costing Tool

The Microsoft Excel-based tool is composed of three major components (tabs within the workbook; TWDB, 2024):

1. **Data Entry:** User data entry form for decade-specific desired reductions in water use by region and WUG;
2. **Final Summary:** A summary of the key parameters and final cost (economic impact) and water savings estimates; and
3. **Population and Households:** Reference tab with background information on the number of households according to the 2020 census data and the Board-adopted 2030 through 2080 WUG and region level population projections.

For the purposes of the SCTRWPG and the Drought Management WMS, only total annual water reduction (in acft; described as yield) and total annual cost (in 2023 dollars) data for the Region L WUGs were obtained from the Drought Management Costing Tool. Total annual water reduction or yield by WUG is described in Section 5.2.1.2 and detailed in Table 5.2.3-1. Total annual costs are described in Section 5.2.1.4 and detailed in Table 5.2.3-5. Due to the decentralized nature of County-Other WUGs and the reduced ability to create and enforce restrictions, drought management was considered as a WMS but not recommended for meeting needs.

Irrigation

Irrigation Drought Management is demand reduction associated with irrigation-related, voluntary reductions of groundwater during severe drought conditions.

This strategy is recommended for irrigation WUGs demonstrating needs that do not fall under the EAA's jurisdiction, as the EAA implements water restrictions by curtailment of water; the EAA Critical Period Management (CPM) Plan helps sustain aquifer and springflow levels during times of drought by temporarily reducing the authorized withdrawal amounts of Edwards groundwater permit holders.

Livestock

The Drought Management WMS is recommended for only one Livestock WUG in Region L, which is Livestock, Hays County. The TPWD owns and operates the A.E. Wood State Fish Hatchery, which accounts for the majority of Livestock demands in Hays County, estimated at 2,432 acft/yr. During typical years, the hatchery relies on surface water from the Guadalupe River and recycled water from their facility. However, water availability modeling for the 2026 SCTRWP indicates that the hatchery's Guadalupe Run-of-River water rights do not have a firm yield during a repeat of the drought of record. During periods of drought, the TPWD would rely on their recycled water or reuse supplies, which would provide 2,420 acft/yr, resulting in a Need of 12 acft/yr. This reuse supply would allow the hatchery to maintain broodstock that are critical to production; however, it will not enable the hatchery to sustain full operating capacity during severe drought.

5.2.3.2 Available Yield

For the 2026 SCTRWP, the Drought Management WMS was developed for Municipal, Irrigation, and Livestock uses. The following sections provide yields for each water use type.

Municipal

The TWDB defines "total annual water reduction" in the Drought Management Costing Tool User Manual as "… all household water use due to drought management plan implementation based on percentage of reduction," which is estimated via the equation represented on Figure 5.2.3-5.

$$\frac{\left[\left(\frac{population}{household\ size}\right) * 12 * (monthly\ reduction\ in\ gallons)\right]}{325{,}851\,\frac{gal}{acft}}\ [\mathbf{in\ acft}].$$

Figure 5.2.3-5 Formula Used to Calculate Total Annual Water Reduction for the Municipal Drought Management WMS

As described above, the TWDB defines "total annual water reduction" as yield that is based on the SCTRWPG's set percent reduction in demand. The yield is considered a "supply" for participating WUGs because the reduction in demand "reduces" the associated needs. For the Drought Management WMS, the SCTWPG considered four demand reduction scenarios of 5%, 10%, 15%, and 20%. At an RWPG meeting on August 1, 2024, the SCTRWPG selected the 10% demand reduction scenario for all applicable

WUGs, unless another demand reduction scenario was appropriate or a WUG requested a utility-specific reduction scenario.

To determine the yield of the Drought Management WMS for municipal users, the 10% reduction scenario was applied to whole municipal WUGs in all decades, regardless of split region, for those that exhibited identified needs in any decade of the planning horizon. The yields for the Municipal Drought Management WMS are summarized for each applicable WUG in Table 5.2.3-1. SAWS requested a utility-specific reduction savings for Drought Management, which is discussed in subsequent paragraphs. In addition, there were utility-specific drought management reductions for New Braunfels (15% demand reduction for 2030 to 2070; and a 30% demand reduction for 2080), Oak Hills WSC (15% demand reduction for all decades), and Springs Hill WSC (10% demand reduction for 2030 to 2070; and a 15% demand reduction for 2080).

Table 5.2.3-1 Yield for the Municipal Drought Management WMS (acft/yr) [1]

No.	Water User Group	County	2030	2040	2050	2060	2070	2080
1	Air Force Village II Inc	Bexar	8	8	8	8	8	8
2	Alamo Heights	Bexar	88	88	88	88	88	88
3	Aqua WSC [2]	Bexar	10	11	13	14	16	18
4	Atascosa Rural WSC	Bexar	100	117	132	145	159	176
5	Benton City WSC	Atascosa	158	176	192	202	213	225
6	Bexar County WCID 10	Bexar	71	80	88	95	103	113
7	Boerne	Kendall	213	293	396	516	653	810
8	C Willow Water	Wilson	7	8	8	9	10	11
9	Canyon Lake Water Service (Texas Water Company) [2]	Comal	827	1,131	1,323	1,448	1,916	2,432
10	Carrizo Hill WSC	Dimmit	3	4	4	5	6	9
11	Castroville	Medina	59	64	71	82	92	99
12	Cibolo	Guadalupe	207	252	301	353	413	482
13	Clear Water Estates Water System	Comal	8	11	15	21	27	34
14	Converse	Bexar	284	285	285	285	285	285
15	County Line SUD	Hays	314	628	1,004	1,297	1,464	1,556
16	Creedmoor-Maha WSC [2]	Hays	112	202	292	381	472	563
17	Crystal Clear SUD	Hays	531	893	1,008	1,136	1,285	1,456
18	Cuero	DeWitt	76	76	76	75	75	75
19	East Central SUD	Guadalupe	472	535	592	644	702	767
20	East Medina County SUD	Medina	84	90	94	97	100	103
21	El Oso WSC [2]	Karnes	61	64	66	68	71	75

No.	Water User Group	County	2030	2040	2050	2060	2070	2080
22	Elmendorf	Bexar	28	38	51	68	85	117
23	Fair Oaks Ranch	Bexar	74	88	95	98	99	99
24	Fayette WSC [2]	Bexar	0	0	1	1	1	1
25	Fort Sam Houston	Comal	47	47	47	47	47	47
26	Garden Ridge	Caldwell	211	261	311	368	436	517
27	Goforth SUD [2]	Gonzales	359	569	845	1,218	1,646	2,135
28	Gonzales	Comal	48	48	47	47	46	45
29	Green Valley SUD	Calhoun	380	508	652	805	980	1,179
30	Guadalupe-Blanco River Authority	Medina	91	127	123	119	115	110
31	Hondo	Karnes	59	57	55	56	56	56
32	Karnes City	Kendall	17	18	19	20	21	22
33	Kendall West Utility	Bexar	18	23	29	36	45	54
34	Kirby	Comal	63	71	72	72	72	72
35	KT Water Development	Hays	19	29	43	60	80	102
36	Kyle	Medina	542	809	1,102	1,235	1,279	1,312
37	La Coste	Bexar	11	11	11	11	11	12
38	Leon Valley	Bexar	142	172	172	172	172	172
39	Live Oak	Caldwell	85	85	85	85	85	85
40	Lockhart	Caldwell	141	153	166	179	192	205
41	Luling	Caldwell	38	38	39	41	42	44
42	Lytle	Atascosa	25	26	28	29	31	33
43	Martindale WSC	Caldwell	33	44	49	54	60	66
44	Maxwell SUD	Caldwell	197	265	356	479	644	711
45	McCoy WSC [2]	Atascosa	73	77	81	85	90	96
46	Natalia	Medina	11	11	11	12	12	11
47	New Braunfels	Comal	1,529	2,177	3,004	4,010	5,161	12,958
48	Oak Hills WSC	Wilson	78	91	105	121	140	162
49	Pearsall	Frio	74	85	92	93	95	96
50	Picosa WSC	Wilson	23	27	30	34	37	41
51	Pleasanton	Atascosa	111	121	132	144	157	171
52	Port Lavaca	Calhoun	79	76	72	68	64	60
53	Runge	Karnes	11	11	12	13	14	14

No.	Water User Group	County	2030	2040	2050	2060	2070	2080
54	S S WSC	Wilson	165	191	216	238	264	294
55	San Antonio Water System [3]	Bexar	26,865	29,834	31,670	33,099	34,211	35,879
56	San Marcos	Hays	1,168	1,646	2,028	2,309	2,491	2,608
57	Schertz	Guadalupe	574	699	830	960	1,111	1,283
58	Seguin	Guadalupe	537	633	679	706	734	763
59	Selma	Bexar	108	131	153	173	197	224
60	Shavano Park	Bexar	73	83	91	99	108	118
61	South Buda WCID 1	Hays	47	77	116	168	229	298
62	Springs Hill WSC	Guadalupe	443	525	617	713	822	1,418
63	Texas State University	Hays	42	42	42	42	42	42
64	The Oaks WSC	Bexar	15	17	19	20	22	24
65	Universal City	Bexar	184	194	197	198	199	199
66	Uvalde	Uvalde	135	133	129	125	121	116
67	Victoria	Victoria	670	680	683	680	676	672
68	Victoria County WCID 1	Victoria	11	11	12	12	12	12
69	Ville Dalsace Water Supply	Medina	3	4	4	4	4	4
70	Water Services	Bexar	80	86	91	96	101	108
71	Wimberley WSC	Hays	44	64	91	126	167	214
72	Wingert Water Systems	Comal	14	16	18	19	19	19
73	Yancey WSC	Medina	54	57	59	61	63	65
All	**Total**	**All**	**39,542**	**46,302**	**51,738**	**56,697**	**61,766**	**74,550**

[1] Based on 10% demand reduction (acft/yr) unless otherwise stated.

[2] WUGs are split between Region L and other regions (Regions K, P, and/or N). Values in the table represent Region L portion of WUG's yield.

[3] SAWS has identified utility-specific drought management reductions that are described and quantified in subsequent paragraphs.

SAWS has chosen to develop utility-specific drought management reduction savings, which are summarized in Table 5.2.3-2.

Table 5.2.3-2 SAWS Drought Management Reduction

Description	2030	2040	2050	2060	2070	2080
% Reduction (Drought Management)	10%	10%	10%	10%	10%	10%

Description	2030	2040	2050	2060	2070	2080
Drought Management Savings (acft/yr)	26,865	29,834	31,670	33,099	34,211	35,879
Total Annual Cost (2023 $)	$6,515,377	$7,235,427	$7,680,699	$8,027,264	$8,296,950	$8,701,478

Irrigation

It is assumed that the growth of agriculture would be reduced based on water available, and during severe drought conditions, farmers that use groundwater would restrict their usage by 10%. The Palmer Drought Severity Index (PDSI) is a resource that could be used for determining triggers for drought management strategies. The volumes of water saved (yield) for the Irrigation Drought Management WMS are shown in Table 5.2.2-3.

Table 5.2.2-3 Yield for the Irrigation Drought Management WMS (acft/yr)

No.	Water User Group	WMS Name	2030	2040	2050	2060	2070	2080
1	Irrigation, Caldwell	Drought Management Reduction: Irrigation	34	34	34	34	34	34
2	Irrigation, Calhoun	Drought Management Reduction: Irrigation	1,046	1,046	1,046	1,046	1,046	1,046
3	Irrigation, Dimmit	Drought Management Reduction: Irrigation	189	189	189	189	189	189
4	Irrigation, Goliad	Drought Management Reduction: Irrigation	313	313	313	313	313	313
5	Irrigation, Guadalupe	Drought Management Reduction: Irrigation	28	28	28	28	28	28
6	Irrigation, Karnes	Drought Management Reduction: Irrigation	82	82	82	82	82	82
7	Irrigation, La Salle	Drought Management Reduction: Irrigation	394	394	394	394	394	394
8	Irrigation, Victoria	Drought Management Reduction: Irrigation	1,109	1,109	1,109	1,109	1,109	1,109
9	Irrigation, Wilson	Drought Management Reduction: Irrigation	1,223	1,223	1,223	1,223	1,223	1,223
10	Irrigation, Zavala	Drought Management Reduction: Irrigation	4,257	4,257	4,257	4,257	4,257	4,257
All	**Total**	**All**	**8,675**	**8,675**	**8,675**	**8,675**	**8,675**	**8,675**

Livestock

Based on conversations with TPWD A.E. Wood State Fish Hatchery staff, the facility would implement a drought management strategy, thereby temporarily suspending operations until conditions improve. Table 5.2.3-4 provides a summary of the yield associated with Demand Management for Livestock.

Table 5.2.3-4 Yield for the Livestock Drought Management WMS (acft/yr)

No.	Water User Group	WMS Name	2030	2040	2050	2060	2070	2080
1	Livestock, Hays	Drought Management Reduction: Livestock	12	12	12	12	12	12

5.2.3.3 Environmental Considerations

Drought Management is not expected to have significant negative impacts on natural resources. Successful drought management could reduce flows to streams and other surface water sources. However, this WMS would be implemented during severe drought, and it is unlikely that its implementation would reduce flows to surface water further than flow reductions that would already occur during severe drought. If flow contributions to streams are reduced from this strategy, implementation may negatively impact stream water quality, which can negatively affect aquatic resources and protected aquatic wildlife species.

Strategies to encourage reduced lawn watering and/or replacement of lawns with water-conserving landscaping could result in environmentally beneficial increases in landscape species diversity and general drought tolerance of landscapes. Increased use of drought-tolerant native plant species would also benefit native pollinator species, including the protected monarch butterfly. No adverse impacts on cultural or agricultural resources are expected.

5.2.3.4 Engineering and Costing

For the 2026 SCTRWP, the Drought Management WMS was developed for Municipal, Irrigation, and Livestock uses. The following sections provide engineering and costing information for each water use type.

Municipal

Preliminary engineering and costing analyses were performed using TWDB Drought Management Costing Tool. Black & Veatch utilized the Drought Management Costing Tool to estimate costs in 2023 dollars. The TWDB defines "total annual cost" in the Drought Management Costing Tool User Manual as "[…] adverse monetary impacts of possible restrictions on water use for the residential water user," which is estimated using the formula shown on Figure 5.2.3-6.

$$(average\ unit\ cost\ per\ acft) * (yield)\ [\mathbf{in\ 2023}\ \$].$$

Figure 5.2.3-6 Formula Used to Calculate Total Annual Costs for the Municipal Drought Management WMS

Using this approach, an entity may make the conscious decision not to develop firm water supplies greater than or equal to projected water demands with the understanding that demands will have to be reduced or go unmet during times of drought. Using this rationale, an economic impact of not meeting projected water demands can be estimated and compared with the costs of other potentially feasible WMSs in terms of annual unit costs.

Based on the municipal yields data presented in Table 5.2.3-1, annual cost data were estimated for WUGs that exhibited municipal water needs in any decade. These values were determined to compare with other potentially feasible WMSs and are summarized in Table 5.2.3-5. The decadal percent reductions, yields, and costs for SAWS are presented in Table 5.2.3-2. For the 2026 planning cycle, the SCTRWP selected 10% demand reduction for all applicable WUGs.

Table 5.2.3-5 Total Annual Cost for Municipal Drought Management WMS [1]

No.	Water User Group	County	2030	2040	2050	2060	2070	2080
1	Air Force Village II Inc	Bexar	$2,493	$2,493	$2,493	$2,493	$2,493	$2,493
2	Alamo Heights	Bexar	$22,858	$22,858	$22,858	$22,858	$22,858	$22,858
3	Aqua WSC [2]	Bexar	$2,575	$2,971	$3,345	$3,701	$4,111	$4,578
4	Atascosa Rural WSC	Bexar	$26,147	$30,455	$34,317	$37,678	$41,536	$45,963
5	Benton City WSC	Atascosa	$41,240	$45,976	$50,118	$52,577	$55,415	$58,677
6	Bexar County WCID 10	Bexar	$18,396	$20,770	$22,894	$24,786	$26,955	$29,435
7	Boerne	Kendall	$59,450	$81,852	$110,691	$144,172	$182,502	$226,377
8	C Willow Water	Wilson	$2,243	$2,489	$2,732	$2,949	$3,199	$3,479
9	Canyon Lake Water Service (Texas Water Company) [2]	Comal	$215,574	$294,766	$344,999	$377,593	$499,539	$634,096
10	Carrizo Hill WSC	Dimmit	$1,141	$1,294	$1,470	$1,688	$2,069	$2,888
11	Castroville	Medina	$19,388	$21,134	$23,668	$27,220	$30,485	$32,619
12	Cibolo	Guadalupe	$71,714	$87,037	$104,166	$122,257	$142,971	$166,692
13	Clear Water Estates Water System	Comal	$2,641	$3,685	$5,073	$6,838	$8,852	$11,161
14	Converse	Bexar	$74,168	$74,262	$74,262	$74,262	$74,262	$74,262
15	County Line SUD	Hays	$81,808	$163,615	$261,785	$338,053	$381,673	$405,664
16	Creedmoor-Maha WSC [2]	Hays	$29,092	$52,613	$76,049	$99,409	$122,944	$146,682
17	Crystal Clear SUD	Hays	$138,493	$232,736	$262,694	$296,310	$335,028	$379,552
18	Cuero	DeWitt	$19,881	$19,858	$19,740	$19,669	$19,594	$19,519
19	East Central SUD	Guadalupe	$123,160	$139,553	$154,436	$167,803	$182,973	$200,057
20	East Medina County SUD	Medina	$21,970	$23,448	$24,521	$25,193	$25,966	$26,855

No.	Water User Group	County	2030	2040	2050	2060	2070	2080
21	El Oso WSC [2]	Karnes	$15,950	$16,569	$17,185	$17,843	$18,598	$19,469
22	Elmendorf	Bexar	$16,847	$22,594	$30,269	$40,651	$50,625	$69,928
23	Fair Oaks Ranch	Bexar	$33,691	$40,139	$43,362	$44,650	$44,973	$44,973
24	Fayette WSC [2]	Bexar	$97	$126	$159	$208	$273	$362
25	Fort Sam Houston	Comal	$12,362	$12,362	$12,362	$12,362	$12,362	$12,362
26	Garden Ridge	Caldwell	$33,779	$41,754	$49,753	$58,965	$69,894	$82,849
27	Goforth SUD [2]	Gonzales	$93,552	$148,301	$220,265	$317,639	$429,088	$556,673
28	Gonzales	Comal	$10,451	$10,447	$10,294	$10,127	$9,950	$9,759
29	Green Valley SUD	Calhoun	$99,150	$132,563	$170,077	$209,869	$255,399	$307,514
30	Guadalupe-Blanco River Authority	Medina	$23,793	$32,997	$32,006	$31,067	$29,988	$28,759
31	Hondo	Karnes	$17,114	$16,419	$16,032	$16,121	$16,214	$16,307
32	Karnes City	Kendall	$5,634	$5,943	$6,247	$6,595	$6,990	$7,443
33	Kendall West Utility	Bexar	$6,048	$7,640	$9,687	$12,064	$14,783	$17,898
34	Kirby	Comal	$8,744	$9,893	$10,112	$10,112	$10,112	$10,112
35	KT Water Development	Hays	$6,193	$9,586	$14,116	$19,844	$26,401	$33,909
36	Kyle	Medina	$141,322	$210,971	$287,312	$322,100	$333,551	$341,984
37	La Coste	Bexar	$2,127	$2,098	$2,086	$2,112	$2,143	$2,175
38	Leon Valley	Bexar	$37,039	$44,911	$44,911	$44,911	$44,911	$44,911
39	Live Oak	Caldwell	$14,029	$14,029	$14,029	$14,029	$14,029	$14,029
40	Lockhart	Caldwell	$45,288	$49,419	$53,551	$57,682	$61,814	$65,937
41	Luling	Caldwell	$9,058	$9,291	$9,515	$9,830	$10,165	$10,530
42	Lytle	Atascosa	$4,755	$5,070	$5,378	$5,657	$5,975	$6,341
43	Martindale WSC	Caldwell	$10,897	$14,645	$16,176	$17,869	$19,738	$21,803
44	Maxwell SUD	Caldwell	$51,450	$69,144	$92,929	$124,887	$167,843	$185,399
45	McCoy WSC [2]	Atascosa	$19,109	$20,014	$21,030	$22,165	$23,455	$24,919
46	Natalia	Medina	$2,935	$2,850	$2,989	$3,072	$3,085	$3,008
47	New Braunfels	Comal	$510,737	$727,367	$1,003,841	$1,339,860	$1,724,479	$10,514,664
48	Oak Hills WSC	Wilson	$32,492	$37,532	$43,365	$50,120	$57,948	$67,026
49	Pearsall	Frio	$19,308	$22,088	$24,027	$24,359	$24,732	$25,154
50	Picosa WSC	Wilson	$7,719	$8,903	$10,066	$11,093	$12,274	$13,623

No.	Water User Group	County	2030	2040	2050	2060	2070	2080
51	Pleasanton	Atascosa	$62,989	$68,606	$74,720	$81,377	$88,628	$96,533
52	Port Lavaca	Calhoun	$25,117	$24,121	$22,894	$21,654	$20,357	$18,980
53	Runge	Karnes	$1,986	$2,097	$2,208	$2,335	$2,480	$2,645
54	San Antonio Water System [3]	Bexar	$6,515,377	$7,235,427	$7,680,699	$8,027,264	$8,296,950	$8,701,478
55	S SSC	Wilson	$43,143	$49,769	$56,277	$62,029	$68,722	$76,647
56	San Marcos	Hays	$418,654	$589,729	$726,609	$827,570	$8	$934,561
57	Schertz	Guadalupe	$185,356	$225,755	$268,076	$310,393	$358,952	$414,653
58	Seguin	Guadalupe	$161,403	$190,327	$204,190	$212,360	$220,747	$229,370
59	Selma	Bexar	$16,456	$20,005	$23,392	$26,505	$30,081	$34,192
60	Shavano Park	Bexar	$14,990	$16,960	$18,713	$20,283	$22,070	$24,122
61	South Buda WCID 1	Hays	$15,541	$25,352	$38,274	$55,772	$75,800	$98,721
62	Springs Hill WSC	Guadalupe	$115,434	$136,962	$160,792	$185,829	$214,261	$587,378
63	Texas State University	Hays	$10,901	$10,901	$10,901	$10,901	$10,901	$10,901
64	The Oaks WSC	Bexar	$4,932	$5,581	$6,160	$6,677	$7,264	$7,944
65	Universal City	Bexar	$52,253	$55,013	$56,044	$56,207	$56,392	$56,604
66	Uvalde	Uvalde	$17,854	$17,530	$17,042	$16,491	$15,923	$15,350
67	Victoria	Victoria	$114,691	$116,454	$116,840	$116,316	$115,717	$115,030
68	Victoria County WCID 1	Victoria	$3,709	$3,804	$3,834	$3,834	$3,832	$3,832
69	Ville Dalsace Water Supply	Medina	$1,150	$1,253	$1,329	$1,371	$1,419	$1,475
70	Water Services	Bexar	$20,904	$22,454	$23,817	$25,028	$26,456	$28,113
71	Wimberley WSC	Hays	$14,699	$21,301	$29,994	$41,791	$55,299	$70,759
72	Wingert Water Systems	Comal	$4,665	$5,260	$6,055	$6,203	$6,203	$6,203
73	Yancey WSC	Medina	$13,993	$14,857	$15,491	$15,900	$16,370	$16,911
All	**Total ($)**	**All**						

[1] Based on 10% demand reduction (acft/yr) unless otherwise stated

Irrigation

No capital costs are associated with this strategy; however, costs will be determined using the TWDB Socioeconomic Impact Analysis of Unmet Needs for the 2026 SCTRWP, which will show an impact cost to the local economy based on the missed opportunity to grow agriculture. Unit costs will vary by county. This report is anticipated to be published by the TWDB in August 2025, prior to adoption of the Final 2026 SCTRWP in October 2025.

Livestock

Based on conversations with staff from the TPWD A.E. Wood State Fish Hatchery staff, the facility would implement a drought management strategy, thereby temporarily suspending operations until conditions improve. Costs are not associated with this strategy, as the facility will continue operations and no capital investment is required.

5.2.4 Edwards Transfers

The SCTRWPG identified the Edwards Transfers WMS as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.4.1 Description of Water Management Strategy

The EAA was created in 1993 by SB 1477 of the 73rd Texas Legislature. This bill, which is typically called "The Act" has been amended in subsequent legislative sessions. Requirements of the EAA pursuant to The Act include the following:

- Issuing permits for all non-exempt wells;
- Limiting permitted withdrawals to 572,000 acft/yr; and
- Enforcing water management practices, procedures, and methods to ensure that the continuous minimum springflows of the Comal Springs and the San Marcos Springs are maintained to protect endangered and threatened species to the extent required by federal law (e.g., the EAHCP, EAA critical period rules, etc.).

Since the EAA began to issue Initial Regular Permits (IRPs) for wells, numerous transfers of the water rights have been associated with these permits among interested parties. Subject to requirements in The Act and EAA rules related to the base and unrestricted portions of water rights associated with irrigated agriculture, many historical transfers have been from irrigation to municipal use. This Edwards Transfers WMS is an estimate of such irrigation to municipal transfers for entities in Atascosa, Bexar, Comal, Guadalupe, Hays, Medina, and Uvalde Counties.

5.2.4.2 Available Yield

The Edwards Transfers WMS is planned for implementation in the 2030 decade and has an available yield that varies by decade. Table 5.2.4-1 provides a summary of the available yield for the Edwards Transfers WMS.

Table 5.2.4-1 Available Yield for the Edwards Transfers WMS (acft/yr)

Water User Group	2030	2040	2050	2060	2070	2080
Alamo Heights	200	200	200	200	200	200
Bexar County WCID 10	400	400	400	400	400	400
Castroville	1,000	1,000	1,000	1,000	1,000	1,000
Converse	200	200	200	200	200	200
Fort Sam Houston	12,550	12,550	9,450	8,250	7,250	6,250
Hondo	350	350	350	350	350	350
Kirby	150	150	150	150	150	150
Leon Valley	1,000	1,000	1,000	1,000	1,000	1,000
Lytle	200	200	200	200	200	200
Selma	2,500	2,500	2,500	2,500	2,500	2,500

Water User Group	2030	2040	2050	2060	2070	2080
Uvalde	350	350	350	350	350	350
Ville Dalsace Water Supply	100	100	100	100	100	100
TOTAL	**19,000**	**19,000**	**15,900**	**14,700**	**13,700**	**12,700**

Section 1.15 of The Act provides that the EAA shall manage withdrawals and points of withdrawal from the aquifer by granting permits, and Section 1.34 of The Act specifies the manner in which water rights may be transferred, as follows:

- Water withdrawn from the aquifer must be used within the boundaries of the authority.
- The authority by rule may establish a procedure by which a person who installs water conservation equipment may sell the water conserved.
- A permit holder may lease permitted water rights, but a holder of a permit for irrigation use may not lease more than 50 percent of the irrigation water rights initially permitted. The user's remaining irrigation water rights must be used in accordance with the original permit and must pass with transfer of the irrigated land.
- Subject to approval by the authority, the owner of historically irrigated land may sever all or a portion of the remaining water rights for the historically irrigated land which has become developed land in the same proportion as the proportion of developed land and undeveloped land or for which the owner of the historically irrigated land has demonstrated that all or a portion of the land is land no longer practicable to farm. Water rights used for irrigation tied to a portion of land that cannot be developed because of its topography or its location in a floodplain may be included in the proportion of land considered developed land. Water rights for use in irrigation severed under this subsection may change in purpose or place of use. Rules adopted to implement this subsection may not expand the type of land considered developed land or land considered land no longer practicable to farm. The approval of a severance under this section is subject to a contested case hearing in accordance with authority rules.

In accordance with these and many other provisions of The Act, the EAA has issued IRPs for municipal, industrial, and irrigation water use totaling 571,600 acft/yr. During a drought scenario and full implementation of the EAHCP, the reliable supply of the total permitted amounts is approximately 296,553 acft/yr [1] in all decades. However, the Edwards Aquifer transferability is most constrained by the amount of enrollment in the EAA's Voluntary Irrigation Suspension Program Option (VISPO) and ASR programs. As of January 8, 2024, the EAA reported total enrolled program balances for VISPO of 41,795 acft/yr and for ASR of 50,000 acft/yr, totaling approximately 91,795 acft/yr. While legally transferrable, due to the nature of the EAHCP's VISPO and ASR programs, the VISPO and ASR enrolled volumes cannot be relied upon to be available for withdrawal during a repeat of the drought of record.

Table 5.2.4-2 summarizes the volumes of EAA permits and estimated unrestricted transfer potential by use type. The transfer potential takes into consideration drought-stage implementation of the EAHCP

[1] Availability is derived from limitations imposed by the EAA Act and from contractual obligations associated with the Edwards Aquifer Habitat Conservation Plan (EAHCP). It should be noted, for long-term planning purposes, programs contained within the EAHCP and associated with its 15-year incidental take permit may be adjusted as the plan is resubmitted for approval upon the expiration of the permit.

based on the EAA's CPM Plan [2]. Therefore, it is anticipated that all recommended Edwards Aquifer transfers shown as part of this WMS will involve leasing or purchasing Edwards Aquifer rights from irrigation permit holders. As shown in Table 5.2.4-3, the unrestricted transfer potential for irrigation permits is 26,907 acft/yr, which represents the maximum available yield that this WMS could attain. As described above, however, the actual yield for the WMS varies between 12,700 acft/yr and 19,000 acft/yr.

Table 5.2.4-2 EAA Permits and Remaining Unrestricted Transfer Potential by Use Type (acft/yr)

Use Type	EAA Estimated Permits [1]	EAA Enrolled ASR and VISPO Permits [2]	Estimated Unrestricted Transfer Potential [3]
Municipal	333,301	2,110	195,418
Industrial [4]	40,930	11,972	22,487
Irrigation	197,270	77,713	26,907
Exempt	99	0	0
EAA Total	**571,600**	**91,795**	**244,812**

Notes:

[1] EAA estimated permit values before any transfers, as of January 8, 2024.

[2] EAA enrolled ASR and VISPO permits as of October 18, 2024.

[3] Unrestricted transfer potential represents the sum of the reliable supply (volume available during a repeat of the drought of record) of permits that are administratively available for transfer to other entities.

[4] EAA's Industrial Use designation includes permits associated with manufacturing, steam-electric power, mining, and livestock uses, as defined by Regional Water Planning rules.

Table 5.2.4-3 Transfer Potential of Irrigation Permits by County

Transfer Source County	Estimated Unrestricted Transfer Potential of Irrigation Permits (acft/yr)
Atascosa	335
Bexar	4,702
Comal	398
Guadalupe	0
Hays	0
Medina	10,716
Uvalde	10,756
Total	**26,907**

[2] Edwards Aquifer Authority (EAA). "Critical Period/Drought Management." April 2019. https://www.edwardsaquifer.org/business-center/groundwater-permit-holder/critical-period-drought-management/

In the 2026 SCTRWP, the Edwards Transfers WMS is recommended for WUGs that are already using Edwards Aquifer supplies, as permitted by the EAA. Volumes of the Edwards Transfers are summarized by the county in which the transfer would originate (transfer source county) in Table 5.2.4-4.

Table 5.2.4-4 Edwards Transfers WMS Volumes by Transfer Source County (acft/yr)

Transfer Source County	Water User Group	2030	2040	2050	2060	2070	2080
Atascosa	Lytle	200	200	200	200	200	200
Bexar	Alamo Heights	200	200	200	200	200	200
Bexar	Bexar County WCID 10	400	400	400	400	400	400
Bexar	Converse	200	200	200	200	200	200
Bexar	Fort Sam Houston	250	250	250	250	250	250
Bexar	Kirby	150	150	150	150	150	150
Bexar	Leon Valley	1,000	1,000	1,000	1,000	1,000	1,000
Bexar	Selma	2,500	2,500	2,500	2,500	2,500	2,500
Medina	Castroville	1,000	1,000	1,000	1,000	1,000	1,000
Medina	Fort Sam Houston	9,200	9,200	9,200	8,000	7,000	6,000
Medina	Hondo	350	350	350	350	350	350
Medina	Ville Dalsace Water Supply	100	100	100	100	100	100
Uvalde	Fort Sam Houston	3,100	3,100	0	0	0	0
Uvalde	Uvalde	350	350	350	350	350	350
Total	**All**	**19,000**	**19,000**	**15,900**	**14,700**	**13,700**	**12,700**

5.2.4.3 Environmental Factors

Environmental Considerations

No major environmental impacts are associated with the Edwards Transfers WMS. The transferred water that will be withdrawn from the aquifer is already permitted; only the locations of withdrawals will be changed. As the recommended transfers will generally be from central or eastern urban areas to central or western rural (or suburban) areas (i.e. transfer from east to west due to hydrologic constraints), withdrawal centers will be somewhat farther from Comal and San Marcos Springs, which could result in incremental springflow enhancement.

Implementation of this Edwards Transfers WMS may have a positive impact on habitats of threatened and endangered species and SGCN. If irrigators transfer their irrigation permits and convert their land to dryland crops and/or grassland, native grasses could speed the process of reaching a mature plant community, which reduces the opportunity for soil erosion through water and winds. Such a decision could provide habitat for native Texas wildlife, including the Texas horned lizard, tortoises, deer, raptors, and other desert grassland species. Appendix 5D provides a summary of threatened and endangered species and SGCN that may occur in Atascosa, Bexar, Comal, Guadalupe, Hays, Medina, and Uvalde Counties [3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16].

Cultural Considerations

Projects in Texas can come under the purview of the National Historic Preservation Act (NHPA) and the Antiquities Code of Texas (ACT). Both are administered by lead federal agencies and the State Historic Preservation Officer of Texas at the THC in Austin, Texas. Projects that are permitted, licensed, or partially funded by the federal government must comply with Section 106 of the NHPA and take into consideration the undertaking's effects on historic properties, defined as any property listed in, or eligible for listing in, the NRHP. A project on land owned or operated by a political subdivision of the State of Texas is required under the ACT to assess whether it will impact cultural resources that meet the criteria for listing as a SAL. Because this WMS involves the transfer of water rights from irrigation to municipal and other uses, the project is not expected to have adverse impacts on cultural resources. Should construction become necessary, a cultural resources assessment should be performed to determine whether additional cultural resources investigations are required.

5.2.4.4 Engineering and Costing

Preliminary engineering and costing analyses have been performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include costs associated with

[3] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Atascosa County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/
[4] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Bexar County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/
[5] Texas Parks and Wildlife Department (TPWD). 2019. Annotated County Lists of Rare Species – Comal County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/
[6] Texas Parks and Wildlife Department (TPWD). 2019. Annotated County Lists of Rare Species – Guadalupe County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/
[7] Texas Parks and Wildlife Department (TPWD). 2019. Annotated County Lists of Rare Species – Hays County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/
[8] Texas Parks and Wildlife Department (TPWD). 2019. Annotated County Lists of Rare Species – Medina County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/
[9] Texas Parks and Wildlife Department (TPWD). 2019. Annotated County Lists of Rare Species – Uvalde County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/
[10] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Atascosa County. https://ipac.ecosphere.fws.gov/location/index
[11] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Bexar County. https://ipac.ecosphere.fws.gov/location/index
[12] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Comal County. https://ipac.ecosphere.fws.gov/location/index
[13] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Guadalupe County. https://ipac.ecosphere.fws.gov/location/index
[14] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Hays County. https://ipac.ecosphere.fws.gov/location/index
[15] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Medina County. https://ipac.ecosphere.fws.gov/location/index
[16] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Uvalde County. https://ipac.ecosphere.fws.gov/location/index

integration and facility upgrades ($309 per acft) and purchase of water ($1,928 per acft). The purchase of water was estimated using the average unit cost of non-Edwards WMSs recommended for SAWS, NBU, and GBRA strategies. A cost estimate summary for the Edwards Transfers WMS is provided in Table 5.2.4-5. TWDB Costing Tool Cost Estimate Summaries for Edwards Transfers strategies are provided in Appendix 5E.

Table 5.2.4-5 Cost Estimate Summary for the Edwards Transfers WMS

Water User Group	Available Project Yield in 2030 (acft/yr)	Total Cost of Facilities ($)	Total Cost of Project ($)	Annual Unit Cost ($/acft)
Alamo Heights	200	$62,000	$86,000	$1,961
Bexar County WCID 10	400	$124,000	$171,000	$1,961
Castroville	1,000	$309,000	$428,000	$1,961
Converse	200	$62,000	$86,000	$1,961
Fort Sam Houston	12,550	$3,878,000	$5,371,000	$1,961
Hondo	350	$108,000	$150,000	$1,961
Kirby	150	$46,000	$64,000	$1,961
Leon Valley	1,000	$309,000	$428,000	$1,961
Lytle	200	$62,000	$86,000	$1,961
Selma	2,500	$773,000	$1,070,000	$1,961
Uvalde	350	$108,000	$150,000	$1,961
Ville Dalsace Water Supply	100	$31,000	$43,000	$1,961
Total	**19,000**	**$5,872,000**	**$8,133,000**	**$23,532**

5.2.4.5 Implementation Considerations

Lease and purchase of Edwards Aquifer irrigation permits for transfer to municipal and industrial uses are active at the present time. As the existing Edwards Aquifer supply used to quantify needs reported in the 2026 SCTRWP assumes full EAHCP implementation, the key implementation considerations for the Edwards Transfers WMS is the ability to locate and negotiate with willing lessors or sellers of permits in sufficient quantities. Additionally, as costs associated with buying or leasing EAA permits continues to increase, implementation is also impacted by the willingness of rural or suburban communities to buy or lease EAA permits at costs substantially greater than previously experienced.

5.2.5 Fresh Groundwater Development

The SCTRWPG identified the Fresh Groundwater Development WMS as a potentially feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.5.1 Description of Water Management Strategy

Fresh Groundwater Development is a Recommended WMS for 18 municipal WUGs and one non-municipal WUG. Many WUGs in the SCTRWPA commonly use local aquifers as a water supply source. Where local groundwater supplies are available, there is generally a preference for groundwater as a source because it is 1) readily available at different locations within a distribution system; 2) relatively inexpensive; and 3) often requires minimal treatment compared to surface water. The implementation decade for this WMS varies depending on the sponsor.

For the 2026 SCTRWP, two Fresh Groundwater Development strategies were developed and recommended:

- Fresh Groundwater Development – New Wells to Increase Production Capacity; and
- Fresh Groundwater Development – New Permits or Increased Permit Production Limits.

Inclusion and evaluation of this WMS was performed at the request of individual WUGs, regardless of needs or alternative sources. Inclusion and evaluation of this WMS was also provided for WUGs with water needs that rely on groundwater but do not already have WMSs to meet needs. For these WUGs, selection and evaluation of the appropriate strategy was accomplished using the following approach:

- Evaluate applicability of this WMS for WUGs by considering existing sources of water for WUGs with identified needs. Applicable WUGs 1) rely solely on groundwater from a single aquifer or have limited options for future supplies; and 2) have projected needs during the planning horizon that are likely not to be met by other WMSs.
- Determine whether the MAG or groundwater availability for each WUG's existing groundwater supply source is sufficient to meet projected water needs. If there is sufficient water available within the constraints of the MAG or groundwater availability, then determine if the WUG's existing infrastructure capacities are sufficient to meet identified needs.
- Evaluate the production capacity from the selected WUGs' existing wells and their permitted water rights. Determine which entities are limited by the capacity of their existing wells and which are limited by their permitted water rights. If existing capacity does not meet projected water needs, then develop a strategy for Fresh Groundwater Development – New Wells to Increase Production Capacity. Estimate the number of new wells required to meet water needs, plus the capacities and depths of existing wells in the area and costs for new wells using the Uniform Costing Model.
- If existing infrastructure capacity is sufficient, then develop a strategy for Fresh Groundwater Development – New Permits or Increased Permit Production Limits. Estimate costs for system expansion using the Uniform Costing Model.

The evaluation of the Fresh Groundwater Development WMS is at a planning level and was based on data from the following sources:

- Information prepared for the SCTRWPG on projected water demands for each of the WUGs;

- Estimated system capacity for each WUG through 2080, based on TCEQ reported system information; and
- Compilation of publicly available information for each WUG from TCEQ and TWDB.

Figure 5.2.5-1 provides general locations of municipal WUGs that require new wells to increase production capacity. Figure 5.2.5-2 provides general locations of the non-municipal WUGs in Uvalde County (Figure 5.2.5-2).

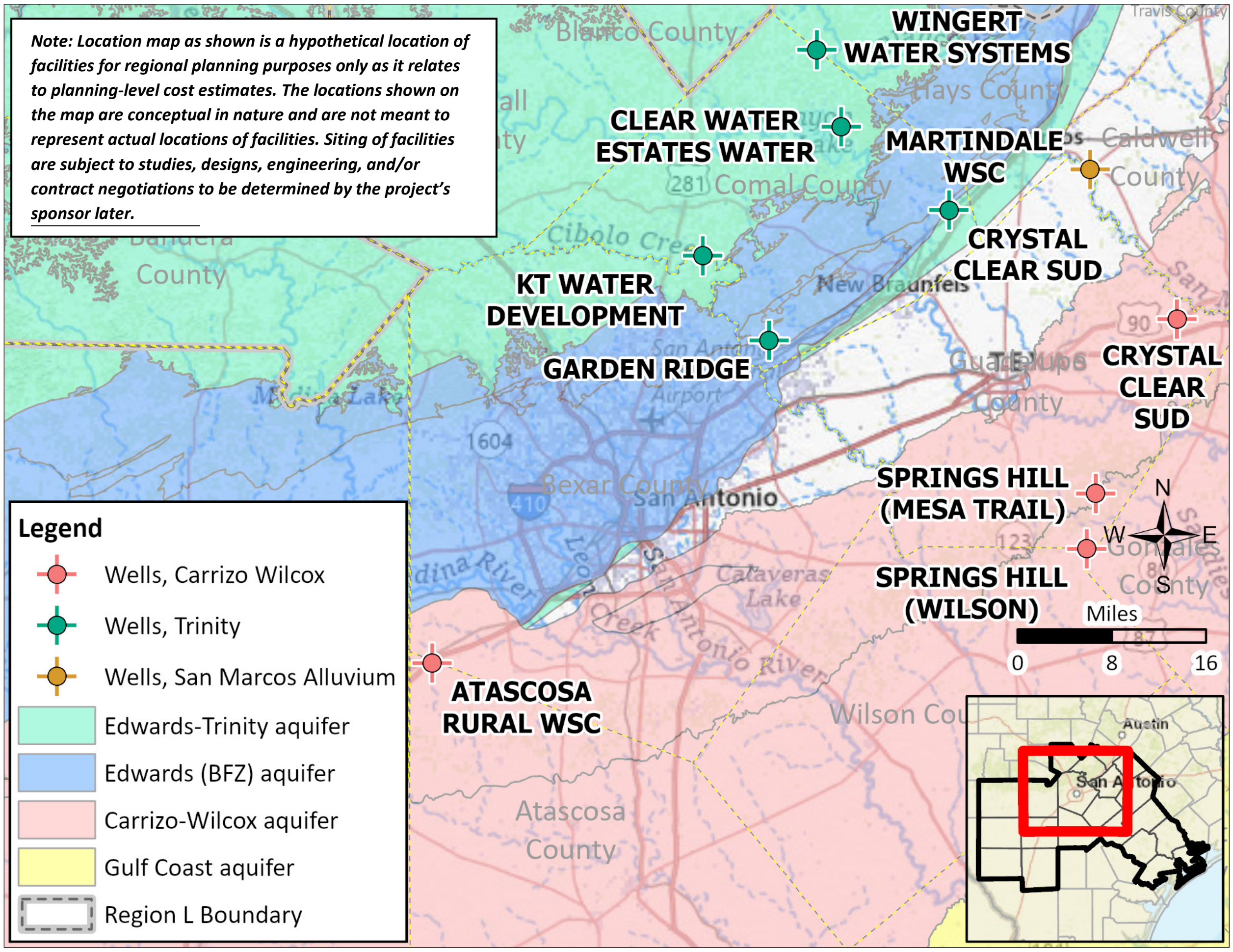

Figure 5.2.5-1 General Location of Municipal WUGs with the Fresh Groundwater Development – New Wells to Increase Production Capacity WMS

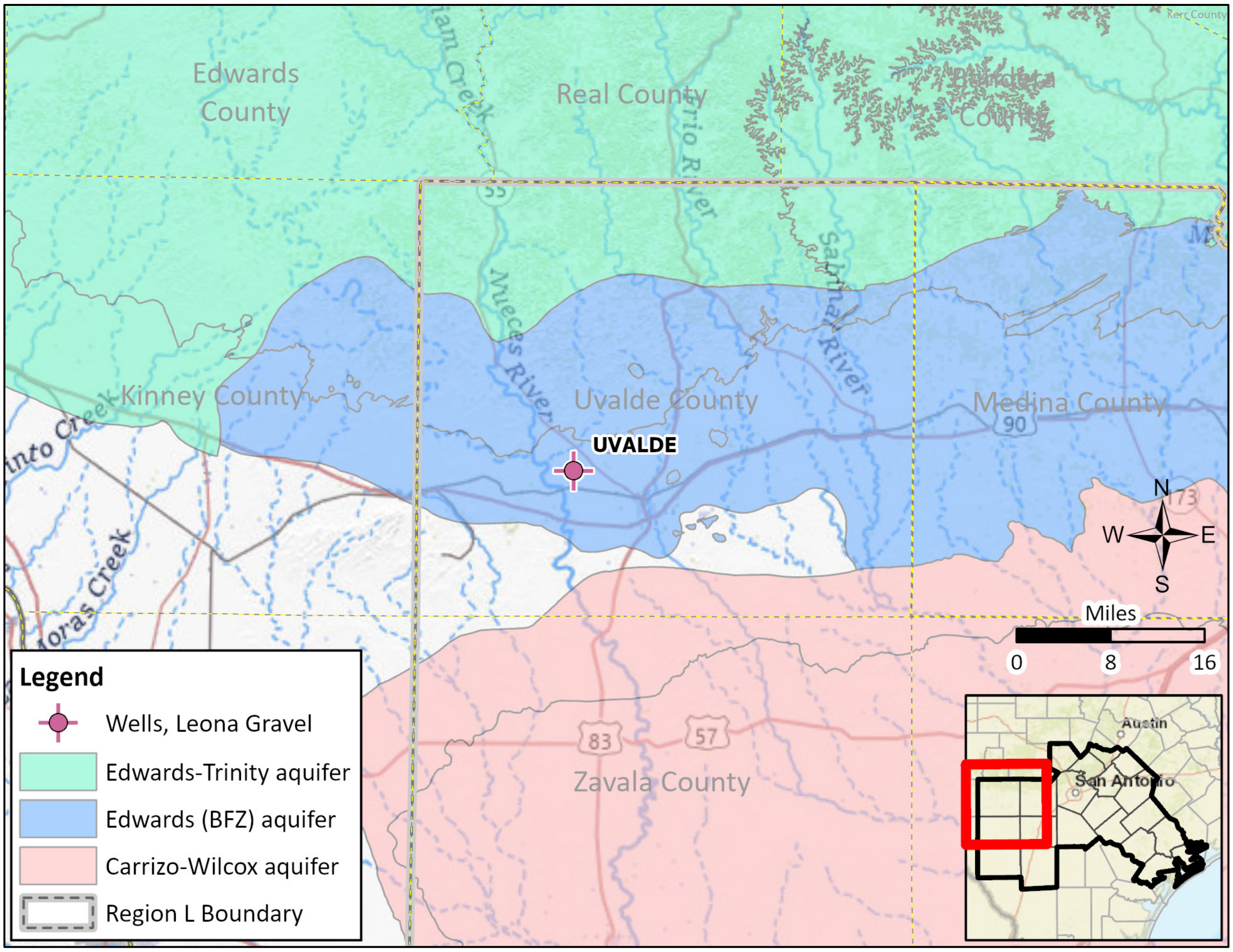

Figure 5.2.5-2 General Location of Non-Municipal WUGs Requiring New Wells

5.2.5.2 Available Yield

The following sections provide summaries of the available yields for the two Fresh Groundwater Development strategies: New Wells to Increase Production Capacity; and New Permits or Increased Permit Production Limits.

New Wells to Increase Production Capacity

Fresh Groundwater Development – New Wells to Increase Production Capacity is the Recommended WMS for 13 municipal WUGs and one non-municipal WUG (Mining, Uvalde County) that do not have sufficient production capacities to meet identified water needs. Many of these strategies are limited by MAG estimates, which become groundwater availabilities. Therefore, the available yield for each WUG varies depending on MAG availability. Table 5.2.5-1 provides a summary of the yields as envisioned by the sponsor (Envisioned Yield). Table 5.2.5-2 provides a summary of the yields available considering MAG constraints (MAG-Constrained Yield) for the Fresh Groundwater Development WMS. The MAG-Constrained Yield is the available yield included in the 2027 Regional and State Water Planning Database (DB27).

Table 5.2.5-1 Envisioned Yields for the Fresh Groundwater Development WMS – New Wells to Increase Production Capacity (acft/yr)

No.	Water User Group	County	Aquifer	2030	2040	2050	2060	2070	2080
1	Atascosa Rural WSC	Atascosa	Carrizo-Wilcox	1,200	1,400	1,600	1,800	2,000	2,200
2	Clear Water Estates Water System	Comal	Trinity	0	1,500	1,500	1,500	1,500	1,500
3	County-Other, Comal	Comal	Trinity	1,000	1,000	1,000	1,000	1,000	1,000
4	County-Other, Victoria	Victoria	Gulf Coast	300	300	300	300	300	300
5	Crystal Clear SUD	Comal	Trinity	1,988	1,988	1,988	1,988	1,988	1,988
6	Crystal Clear SUD [1]	Guadalupe	Carrizo-Wilcox	766	766	766	766	766	766
7	Elmendorf	Bexar	Carrizo-Wilcox	0	0	847	847	847	847
8	Garden Ridge	Comal	Trinity	750	905	1,000	1,088	1,173	1,257
9	KT Water Development	Comal	Trinity	486	973	1,624	2,448	3,391	4,471
10	Martindale WSC	Caldwell	San Marcos River Alluvium	0	240	240	240	240	240
11	Mining, Uvalde	Uvalde	Leona Gravel	1,400	1,400	1,400	1,400	1,400	1,400
12	Springs Hill WSC (Mesa Trail)	Guadalupe	Carrizo-Wilcox	560	560	560	560	560	560
13	Springs Hill WSC (Wilson)	Wilson	Carrizo-Wilcox	1,000	1,000	1,000	1,000	1,000	1,000
14	Wingert Water Systems	Hays	Trinity	35	35	35	35	35	35
All	**Total Envisioned Yield**	**All**	**All**	**9,416**	**11,062**	**13,525**	**15,414**	**17,506**	**19,839**

[1] Indicates this project has yields that are MAG-Constrained in one or more decades.

Table 5.2.5-2 MAG-Constrained Yields for the Fresh Groundwater Development WMS – New Wells to Increase Production Capacity (acft/yr)

No.	Water User Group	County	Aquifer	2030	2040	2050	2060	2070	2080
1	Atascosa Rural WSC	Atascosa	Carrizo-Wilcox	1,200	1,400	1,600	1,800	2,000	2,200
2	Clear Water Estates Water System	Comal	Trinity	0	1,500	1,500	1,500	1,500	1,500
3	County-Other, Comal	Comal	Trinity	1,000	1,000	1,000	1,000	1,000	1,000
4	County-Other, Victoria	Victoria	Gulf Coast	300	300	300	300	300	300
5	Crystal Clear SUD	Comal	Trinity	1,988	1,988	1,988	1,988	1,988	1,988
6	Crystal Clear SUD [1]	Guadalupe	Carrizo-Wilcox	280	248	284	260	262	252
7	Elmendorf	Bexar	Carrizo-Wilcox	0	0	847	847	847	847
8	Garden Ridge	Comal	Trinity	750	905	1,000	1,088	1,173	1,257
9	KT Water Development	Comal	Trinity	486	973	1,624	2,448	3,391	4,471
10	Martindale WSC	Caldwell	San Marcos River Alluvium	0	240	240	240	240	240
11	Mining, Uvalde	Uvalde	Leona Gravel	1,400	1,400	1,400	1,400	1,400	1,400
12	Springs Hill WSC (Mesa Trail) [1]	Guadalupe	Carrizo-Wilcox	205	180	207	191	191	184
13	Springs Hill WSC (Wilson) [1]	Wilson	Carrizo-Wilcox	95	165	200	1,000	1,000	1,000
14	Wingert Water Systems	Hays	Trinity	35	35	35	35	35	35
All	**Total MAG-Constrained Yield**	**All**	**All**	**6,339**	**8,934**	**10,825**	**12,697**	**13,927**	**15,274**

[1] Indicates this project has yields that are MAG-Constrained in one or more decades.

Production and/or drilling permits for these wells may be required in accordance with specific GCD rules. For most aquifers in the region, GCDs have adopted DFCs. In some GCDs, full use of all groundwater supplies (permitted, grandfathered and exempt) may result in non-achievement of the

DFCs for an aquifer. To ensure consistency with the DFCs, TWDB requires that groundwater availability for each aquifer be limited for planning purposes to the MAG for the discrete geographic-aquifer unit (i.e., aquifer/county/basin unit). In some instances, the sum of existing supplies and future supplies (as groundwater-based WMSs) are greater than the MAG or groundwater availability for a discrete geographic-aquifer unit. This has resulted, for regional water planning purposes only, in adjustments to available yields shown in this plan, and a lack of firm water available for future projects in this plan for some areas for certain time periods. This should not be construed as recommending or requiring that GCDs make these adjustments or deny future permit applications. As described in Guiding Principle V (refer to Appendix 5A), this is not intended to influence or interfere with the regulatory decisions made by the governing boards of permitting entities. The SCTRWPG recognizes and supports the ability of permit holders to exercise their rights to groundwater use in accordance with their permits and it recognizes and supports a GCD's discretion to issue permits and grandfather historical users for amounts in excess of the MAG. The SCTRWPG may not modify groundwater permits that GCDs have already issued or limit future permits that GCDs may issue. If MAG estimates are modified during or after this planning cycle, the SCTRWPG may amend this plan to adjust WMS supply volumes that are affected by the modified MAG estimate(s).

The following assumptions were used to develop the Fresh Groundwater Development WMS – New Wells to Increase Production Capacity for non-municipal WUGs:

- Well capacity is 150 gallons per minute (gpm);
- Well construction standards are consistent with non-potable wells;
- Water treatment costs were not included;
- Facilities will be constructed on land owned or leased by the WUG; and
- Power costs are calculated by estimating a typical water lift for medium sized wells in the county.

New Permits or Increased Permit Production Limits

Fresh Groundwater Development – New Permits or Increased Permit Production Limits is the Recommended WMS for five municipal WUGs that rely on groundwater as a sole source and are expected to have a water shortage by 2080. These five WUGs have sufficient infrastructure capacity to develop additional supply from existing well(s) to meet their projected needs; however, they are limited by their permitted capacities. This strategy includes acquisition of new or amended permits to increase the authorized production limits of existing permits. The Fresh Groundwater Development – New Permits or Increased Permit Production Limits is a Recommended strategy for the following five WUGs:

- Benton City WSC;
- Kendall West Utility;
- Oak Hills WSC;
- Pearsall; and
- Picosa WSC.

The recommended strategy for the above entities is to apply for new permits or permit modifications to increase their permitted capacities. Because no new or expanded infrastructure is associated with new permits or expanded production permit limits, no costs are associated for these WUGs. Estimated permit capacity increases are summarized in Table 5.2.5-3.

Table 5.2.5-3 Yields for the Fresh Groundwater Development WMS – New Permits or Increased Permit Production Limits (acft/yr)

No.	Water User Group	County	Aquifer	2030	2040	2050	2060	2070	2080
1	Benton City WSC	Atascosa	Carrizo-Wilcox	0	0	0	0	0	63
2	Kendall West Utility	Kendall	Trinity	0	0	400	400	400	400
3	Oak Hills WSC	Wilson	Carrizo-Wilcox	373	475	588	714	857	1,015
4	Pearsall	Frio	Carrizo-Wilcox	100	100	100	100	100	100
5	Picosa WSC	Wilson	Carrizo-Wilcox	0	38	84	122	169	221
All	**Total**	**All**	**All**	**473**	**613**	**1,172**	**1,336**	**1,526**	**1,799**

5.2.5.3 Environmental Considerations

Individual projects associated with the Fresh Groundwater Development WMS may include well field development, well field expansions, pipeline construction, access road construction, and associated facility construction and upgrades. These projects would likely require site-specific reviews to determine applicable requirements for environmental permitting and field data collection.

Vegetation, Land Use, and Agricultural Resources

Detailed field surveys would typically be required for projects involving new pipeline construction and/or projects requiring extensive vegetation clearing, soil disturbance, or stream/wetland impacts. If a significant negative impact appears likely, it may be possible to adjust well pad, pipeline, and/or access road locations to reduce or avoid impacts. Mitigation may include compensation for net losses of wetlands where impacts are unavoidable. Well pad and/or road construction in agricultural areas would result in loss of agricultural land uses.

Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing and woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species that are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each water management strategy to determine the best course of action regarding revegetation. Pipeline easements may continue to be used for agricultural purposes.

Aquatic Resources

Projects may require an on-site delineation of streams, ponds, and wetlands to comply with U.S. Army Corps of Engineers (USACE) Section 404 regulations. Stream crossings for pipeline construction would result in temporary stream impacts that may require USACE permitting or coordination, depending on the level of project impacts. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities. A preconstruction notification to the USACE is required under certain conditions, including cases where there would be permanent impacts to over 0.1 acre of waters of the United States. The USACE permit requires that there will be no change in preconstruction contours of waters of the United States. Utility crossings under streams/rivers (e.g., through horizontal directional drilling) would not require a USACE permit.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that may occur in the project areas for this WMS [1, 2]. Site-specific field surveys would likely be required to determine the quality of habitat for federal and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be necessary to obtain its recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may occur or nest in project areas. The federal Migratory Bird Treaty Act (MBTA) protects birds, nests, and eggs from impacts unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or to avoid vegetation clearing during the general bird nesting season from March 15 to September 15. Preconstruction surveys for active bird nests are recommended.

Cultural Considerations

Projects in Texas can come under the purview of the NHPA and the ACT. Both are administered by the THC and the SHPO in Austin, Texas. If an undertaking is federally permitted, licensed, or partially funded, the Project must comply with Section 106 of the NHPA. The ACT requires projects on land owned or operated by a political subdivision of the State of Texas [3] to assess whether the project will impact cultural resources that meet the requirements for listing as a SAL.

Projects under control of political subdivisions of the State of Texas, such as water agencies, counties, and city-owned entities, must comply with the ACT. A structured cultural resources survey of the final design plan may be performed to accurately assess the presence and significance of identified and unrecorded cultural resources within its boundaries.

5.2.5.4 Engineering and Costing

Preliminary engineering and costing analyses were performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include the cost of disinfection treatment and do not include 1) expenses attributed to regional water level declines that may necessitate the lowering of pumps or replacement of older wells; 2) expenses for removing high concentrations of metals such as iron and manganese; or 3) expenses for cooling water from deep well extraction.

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[1] Texas Parks and Wildlife Department. 2024. Annotated County Lists of Rare Species. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[2] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation Resource List. https://ipac.ecosphere.fws.gov/location/index

[3] Political subdivision entities include any county, municipality, special district, river authority, or compact, Title 4 Water Code District, soil and water conservation district, county or municipal improvement district, regional planning commission, council of government, or utility that is public-owned. Refer to Texas Water Code (TWC) §2254.021.

A summary of the projected cost estimates associated with the Fresh Groundwater Development WMS is provided in Table 5.2.5-4. Infrastructure was sized to deliver the sponsor's Envisioned Yield, but because the project is MAG-limited, the annual unit costs were calculated using the MAG-Constrained Yield in the first decade of implementation. All cost estimates consider infrastructure and capacities necessary to deliver the sponsor's Envisioned Yield, despite the lack of groundwater availability. TWDB Costing Tool Cost Estimate Summaries for the Fresh Groundwater Development WMS are provided in Appendix 5E.

Table 5.2.5-4 Cost Estimate Summary for the Fresh Groundwater Development WMS – New Wells to Increase Production Capacity

No.	Water User Group	County	Aquifer	Total Cost of Facilities	Total Cost of Project	Annual Cost*	Annual Cost of Water ($ per acft)
1	Atascosa Rural WSC	Atascosa	Carrizo-Wilcox	$6,694,000	$9,484,000	$1,315,000	$1,096
2	Clear Water Estates Water System	Comal	Trinity	$4,369,000	$6,305,000	$1,015,000	$677
3	County-Other, Comal	Comal	Trinity	$4,687,000	$6,764,000	$1,236,000	$1,236
4	County-Other, Victoria	Victoria	Gulf Coast	$703,000	$1,079,000	$84,000	$280
5	Crystal Clear SUD	Comal	Trinity	$12,586,000	$18,231,000	$1,441,000	$725
6	Crystal Clear SUD	Guadalupe	Carrizo-Wilcox	$18,596,000	$27,384,000	$2,482,000	$8,864
7	Elmendorf	Bexar	Carrizo-Wilcox	$3,383,000	$4,861,000	$828,000	$978
8	Garden Ridge	Comal	Trinity	$4,861,000	$6,991,000	$1,068,000	$1,424
9	KT Water Development	Comal	Trinity	$7,884,000	$11,362,000	$1,720,000	$3,539
10	Martindale WSC	Caldwell	San Marcos River Alluvium	$932,000	$1,514,000	$128,000	$533
11	Mining, Uvalde	Uvalde	Leona Gravel	$1,147,000	$1,731,000	$137,000	$98
12	Springs Hill (Mesa Trail)	Guadalupe	Carrizo-Wilcox	$930,000	$1,364,000	$105,000	$512
13	Springs Hill (Wilson)	Wilson	Carrizo-Wilcox	$4,705,000	$6,870,000	$1,116,000	$11,747
14	Wingert Water Systems	Hays	Trinity	$836,000	$1,252,000	$208,000	$5,943
*Includes amortization at 3.5% for 20 years, O&M, and power costs.							

5.2.5.5 Implementation Considerations

Implementation of the Fresh Groundwater Development WMS includes the following considerations:

- Verification of available groundwater quantity and well productivity;
- Verification of water quality for concentrations of constituents, such as total dissolved solids (TDS), chloride, sulfate, iron, manganese, and hydrogen sulfide;
- Verification of impacts to the aquifer source;

- Verification that groundwater is compatible with other water sources being used by the sponsor and/or its customers and that it will meet all water quality requirements in the end user's distribution system;
- Potential for differing water qualities/chemical constituents in the water;
- Regulations by and obtaining permits from the Gonzales County Underground WCD, including the renewal of pumping permits at 5 year intervals.
- Regulations by TCEQ;
- Regulations by and obtaining permits from local GCDs, including potential permit renewals;
- Depending on the level and types of project impacts, the following natural and cultural resources studies and agency coordination may be required:
  - Stream/wetland delineations to support USACE Section 404 permitting;
  - Site-specific evaluations for threatened/endangered species habitat;
  - Presence/absence surveys for threatened/endangered species if suitable habitat occurs;
  - USFWS and TPWD coordination if protected species may be affected; and
  - Structured cultural resources surveys of project impact areas, and THC coordination in compliance with the Antiquities Code of Texas and NHPA, if applicable.
- Because of the generalized nature and planning-level detail of this evaluation, each individual entity or WUG should conduct more thorough and site-specific evaluations for any new well. It is recommended that the owner or WUG evaluate infrastructure capabilities specific to their existing system and their local hydrogeologic conditions to determine feasibility and to refine cost estimates accordingly; and
- During times of drought, WUGs should be aware that the saturated thickness and, therefore, the associated well capacity, may be impacted by drawdown from nearby operating wells.

5.2.6 Brackish Groundwater Development

The SCTRWPG identified the Brackish Groundwater Development WMS as a potentially feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.6.1 Description of Water Management Strategy

There are six projects included in the Brackish Groundwater Development WMS. These six projects would provide water to four distinct municipal WUGs in the SCTRWPA, including Caldwell County-Other, County Line SUD, Maxwell SUD, and S S WSC. Inclusion and evaluation of these projects were performed at the request of individual WUGs.

Projects included in this WMS generally include new brackish groundwater well fields and associated infrastructure to withdraw brackish groundwater, treat raw water using desalination treatment technologies, and convey treated water to distribution systems or customers, and dispose of brine concentrate. The implementation decade for this Brackish Groundwater Development WMS varies depending on the project. More information on the yield and implementation decade can be found in Section 5.2.6.2.

5.2.6.2 Available Yield

Six new Brackish Groundwater Development projects are included in the 2026 SCTRWP. Many of these strategies are limited by MAG estimates, which become groundwater availabilities. Therefore, the available yield for each WUG varies depending on MAG availability. Table 5.2.6-1 provides a summary of the yields as envisioned by the sponsor (Envisioned Yield). Table 5.2.6-2 provides a summary of the yields available considering MAG constraints (MAG-Constrained Yield) for the Brackish Groundwater Development WMS. For each project, the MAG-Constrained Yield is the available yield included in DB27.

Table 5.2.6-1 Envisioned Yields for the Brackish Groundwater Development WMS (acft/yr)

Project	County	Aquifer	2030	2040	2050	2060	2070	2080
Caldwell Brackish Partnership Project [1]	Caldwell	Carrizo-Wilcox	0	10,305	10,305	10,305	10,305	10,305
Gonzales & Guadalupe Brackish Partnership Project [1]	Gonzales & Guadalupe	Carrizo-Wilcox	0	13,332	13,332	13,332	13,332	13,332
County Line SUD - Trinity Project	Hays	Trinity	0	0	500	1,000	1,000	1,000
County Line SUD - Brackish Edwards Project [1]	Hays	Edwards-Balcones Fault Zone (BFZ) (Saline)	0	0	500	1,000	1,500	1,500
Maxwell SUD - Trinity Project	Hays	Trinity	0	230	230	230	230	230
S S WSC - Brackish Carrizo-Wilcox Project [1]	Wilson	Carrizo-Wilcox	0	0	0	1,120	1,120	1,120

Project	County	Aquifer	2030	2040	2050	2060	2070	2080
Total Envisioned Yield	**All**	**All**	**0**	**23,864**	**24,864**	**26,724**	**27,224**	**27,224**
[1] Indicates this project has yields that are MAG-Constrained in one or more decades.								

Table 5.2.6-2 MAG-Constrained Yields for the Brackish Groundwater Development WMS (acft/yr)

Project	County	Aquifer	2030	2040	2050	2060	2070	2080
Caldwell Brackish Partnership Project [1]	Caldwell	Carrizo-Wilcox	0	1,176	4,137	5,103	6,303	6,291
Gonzales & Guadalupe Brackish Partnership Project [1]	Gonzales & Guadalupe	Carrizo-Wilcox	0	6,732	9,144	8,925	8,943	7,836
County Line SUD - Trinity Project	Hays	Trinity	0	0	500	1,000	1,000	1,000
County Line SUD - Brackish Edwards Project [1]	Hays	Edwards-BFZ (Saline)	0	0	500	1,000	1,366	1,366
Maxwell SUD - Trinity Project	Hays	Trinity	0	230	230	230	230	230
S S WSC - Brackish Carrizo-Wilcox Project [1]	Wilson	Carrizo-Wilcox	0	0	0	705	914	913
Total MAG-Constrained Yield	**All**	**All**	**0**	**8,138**	**14,511**	**16,963**	**18,756**	**17,636**
[1] Indicates this project has yields that are MAG-Constrained in one or more decades.								

Production and/or drilling permits for these wells may be required in accordance with specific GCD rules. For most aquifers in the region, GCDs have adopted DFCs. In some GCDs, full use of all groundwater supplies (permitted, grandfathered and exempt) may result in non-achievement of the DFCs for an aquifer. To ensure consistency with the DFCs, TWDB requires that groundwater availability for each aquifer be limited for planning purposes to the MAG for the discrete geographic-aquifer unit (i.e., aquifer/county/basin unit). In some instances, the sum of existing supplies and future supplies (as groundwater-based WMSs) are greater than the MAG or groundwater availability for a discrete geographic-aquifer unit. This has resulted, for regional water planning purposes only, in adjustments to available yields shown in this plan, and a lack of firm water available for future projects in this plan for some areas for certain time periods. This should not be construed as recommending or requiring that GCDs make these adjustments or deny future permit applications. As described in Guiding Principle V (refer to Appendix 5A), this is not intended to influence or interfere with the regulatory decisions made by the governing boards of permitting entities. The SCTRWPG recognizes and supports the ability of permit holders to exercise their rights to groundwater use in accordance with their permits and it recognizes and supports a GCD's discretion to issue permits and grandfather historical users for amounts in excess of the MAG. The SCTRWPG may not modify groundwater permits that GCDs have already issued, or limit future permits that GCDs may issue. If MAG estimates are modified during or after this planning cycle, the SCTRWPG may amend this plan to adjust WMS supply volumes that are affected by the modified MAG estimate(s). Supplemental groundwater may be obtained under existing permits through the Groundwater Conversions WMS.

Brackish groundwater desalination projects are described in detail in the following sections. All strategies include water loss associated with desalination treatment technologies and disposal of brine concentrate. Each brackish groundwater desalination WMS has a calculated percent water loss of 20%.

Caldwell Brackish Partnership Project

The partnership of BVRT Utility Holding Company (BVRT), County Line SUD, and Maxwell SUD signed a Memorandum of Understanding to explore the development of groundwater in Caldwell County to address rapid population growth within their services areas which straddle the Interstate Highway-35 (IH-35) and State Highway-130 (SH-130) corridors; the sponsors for this WMS are Caldwell County-Other, County Line SUD, and Maxwell SUD. The Envisioned Yield for this WMS is 10,305 acft/yr, projected for the mid-2030s. Because of MAG limitations, the project will result in a reduced project firm yield as shown in Table 5.2.6-2. Strategy yields are allocated evenly amongst Caldwell County-Other, County Line SUD, and Maxwell SUD.

This project includes an 11 MGD RO WTP assuming 1.1 peaking factor, well field, two injection wells, and a 30-inch diameter 18-mile transmission pipeline. Wells would be completed in the Carrizo-Wilcox Aquifer, and their approximate locations were determined based on aquifer thickness, well depth, estimated water quality, and consideration of available property. This project is located in Caldwell County (Figure 5.2.6-1).

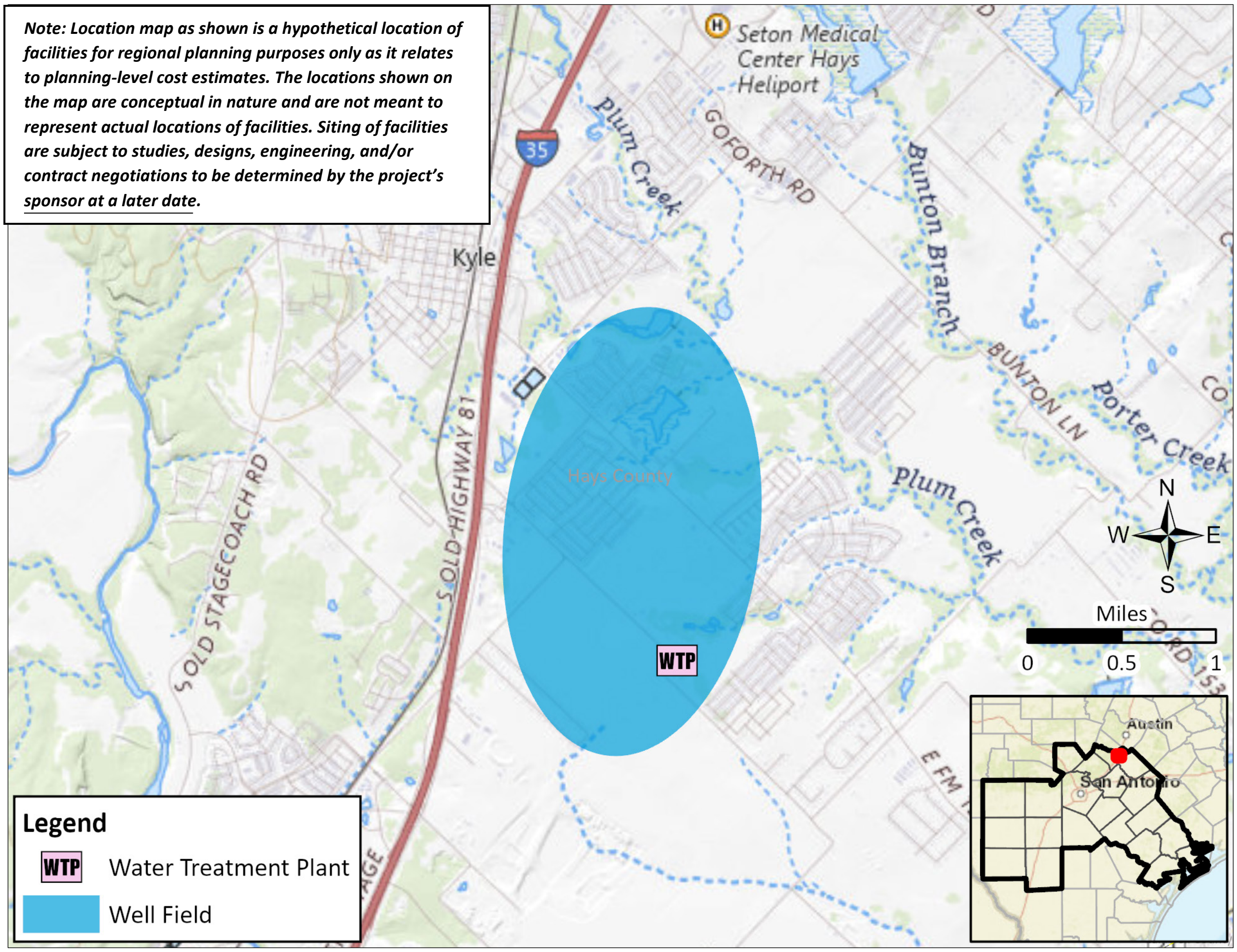

Figure 5.2.6-1 Approximate Location of Caldwell Brackish Partnership Project

While the WTP is sized at 11 MGD, with a peaking factor of 1.1 the annual average demand is roughly 10 MGD. As part of the RO treatment process, an assumed 10% water loss between the influent enters the WTP and the finished water leaving the WTP. However, this percentage is only applied to 8 MGD, as 2 MGD would bypass the WTP and be blended with the finished water, resulting in a total finished water volume of 9.2 MGD, or 10,305 acft/year.

The proposed wellfield would be located within both the Plum Creek Conservation District (CD) and the Gonzales County UWCD, both of which regulate groundwater production and well spacing in the Carrizo-Wilcox Aquifer within their districts. Wellfield configuration assumes a total of 10 wells producing 800 gpm each, at approximately 1,400 feet deep. Water from the Carrizo-Wilcox Aquifer at this location is estimated to have a TDS concentration of approximately 1,500 milligrams per liter (mg/L). This strategy is designed to produce water at a uniform (baseload) rate.

Gonzales & Guadalupe Brackish Partnership Project

The partnership of BVRT, County Line SUD, and Maxwell SUD signed a Memorandum of Understanding to explore the development of groundwater in Guadalupe County to address rapid population growth within their services areas which straddle the Interstate Highway 35 and State Highway 130 corridors; the sponsors for this WMS are Caldwell County-Other, County Line SUD, and Maxwell SUD. The Envisioned Yield for this WMS is 13,329 acft/yr, projected for the mid-2030s. Because of MAG limitations, the project will result in a reduced project firm yield shown in Table 5.2.6-2. Strategy yields are allocated evenly amongst Caldwell County-Other, County Line SUD, and Maxwell SUD.

The project includes a 14.3 MGD RO WTP assuming 1.1 peaking factor, well field, two injection wells, and a 30-inch diameter 32-mile transmission pipeline with a booster pump station. Wells would be completed in the Carrizo-Wilcox Aquifer, and their approximate locations were determined based on aquifer thickness, well depth, estimated water quality, and consideration of available property. The project is located in Guadalupe County and a portion of western Gonzales County (Figure 5.2.6-2).

While the WTP is sized at 14.3 MGD, with a peaking factor of 1.1, the annual average demand is roughly 13 MGD. As part of the RO treatment process, an assumed 10% water loss between the influent enters the WTP and the finished water leaving the WTP. However, this percentage is only applied to 10.4 MGD, as 2.6 MGD would bypass the WTP and be blended with the finished water, resulting in a total finished water volume of 11.9 MGD, or 13,329 acft/year.

The proposed wellfield would be located within both the Guadalupe County GCD and the Gonzales County UWCD, both of which regulate groundwater production and well spacing in the Carrizo-Wilcox Aquifer within their Districts. Wellfield configuration assumes a total of 12 wells producing 1,000 gpm each, at approximately 1,600 feet deep. Water from the Carrizo-Wilcox Aquifer at this location is estimated to have a TDS concentration of approximately 1,500 mg/L. This strategy is designed to produce water at a uniform (baseload) rate.

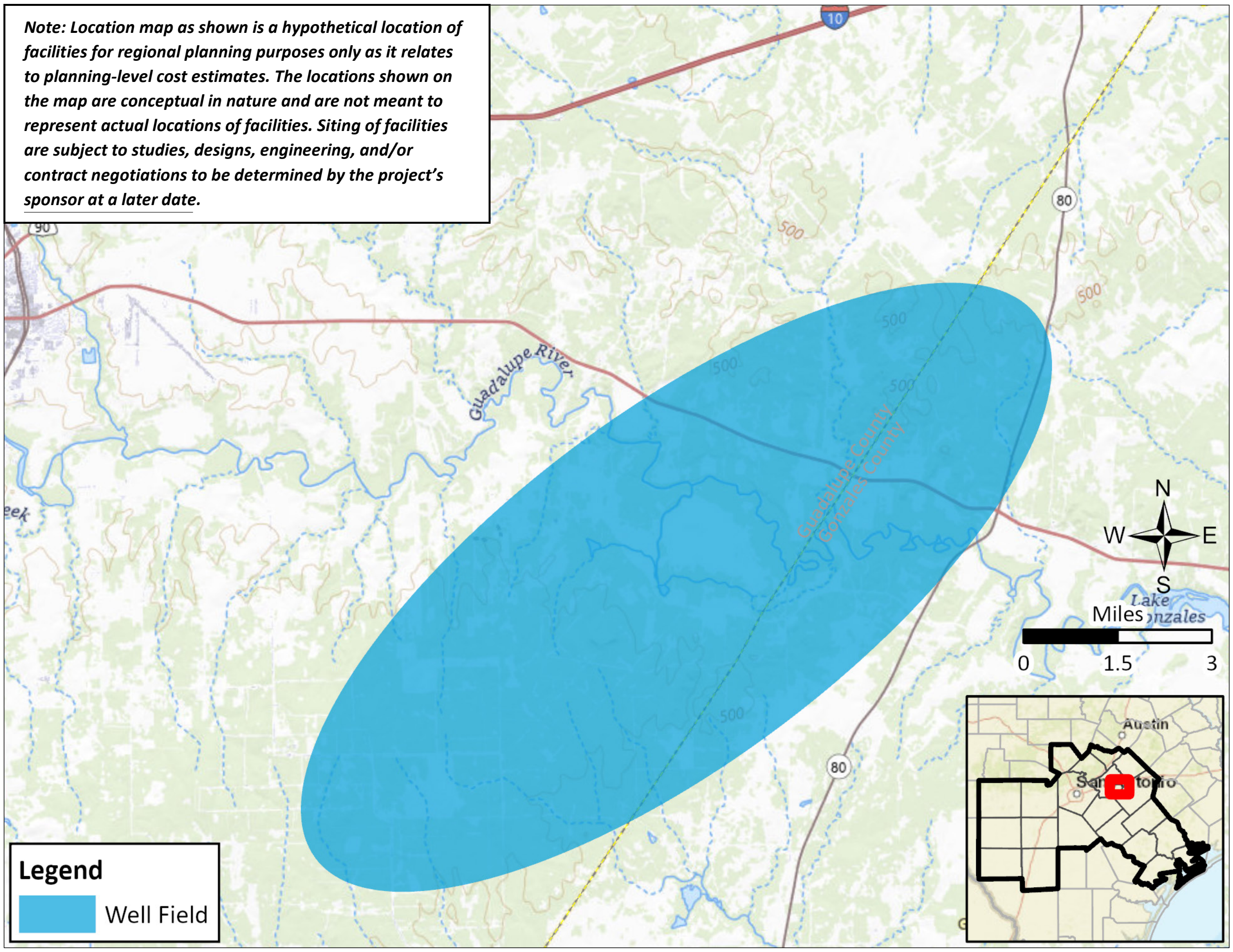

Figure 5.2.6-2 Approximate Location of Gonzales & Guadalupe Brackish Partnership Project

County Line SUD – Trinity Project

County Line SUD plans to add a well field in the Trinity Aquifer as a new source of water. The project will be delivered to their system in a phased approach. Phase 1 is projected for the 2050 decade and will have a yield of 500 acft/yr. Phase 2 is projected for the 2060 decade and will expand upon Phase 1 with an additional yield of 500 acft/yr. The total project is envisioned to result in a yield of 1,000 acft/yr after Phase 2. Both phases are included and evaluated as part of this WMS.

Water is to be pumped from the downdip portion of the Trinity Aquifer and will be treated. The project's general location is anticipated to be near the northwest boundary of County Line SUD and the City of Kyle in Hays County (Figure 5.2.6-3). This WMS utilizes the same facilities and is within the same area as the County Line SUD – Brackish Edwards Project. Locations will be defined when the project is executed.

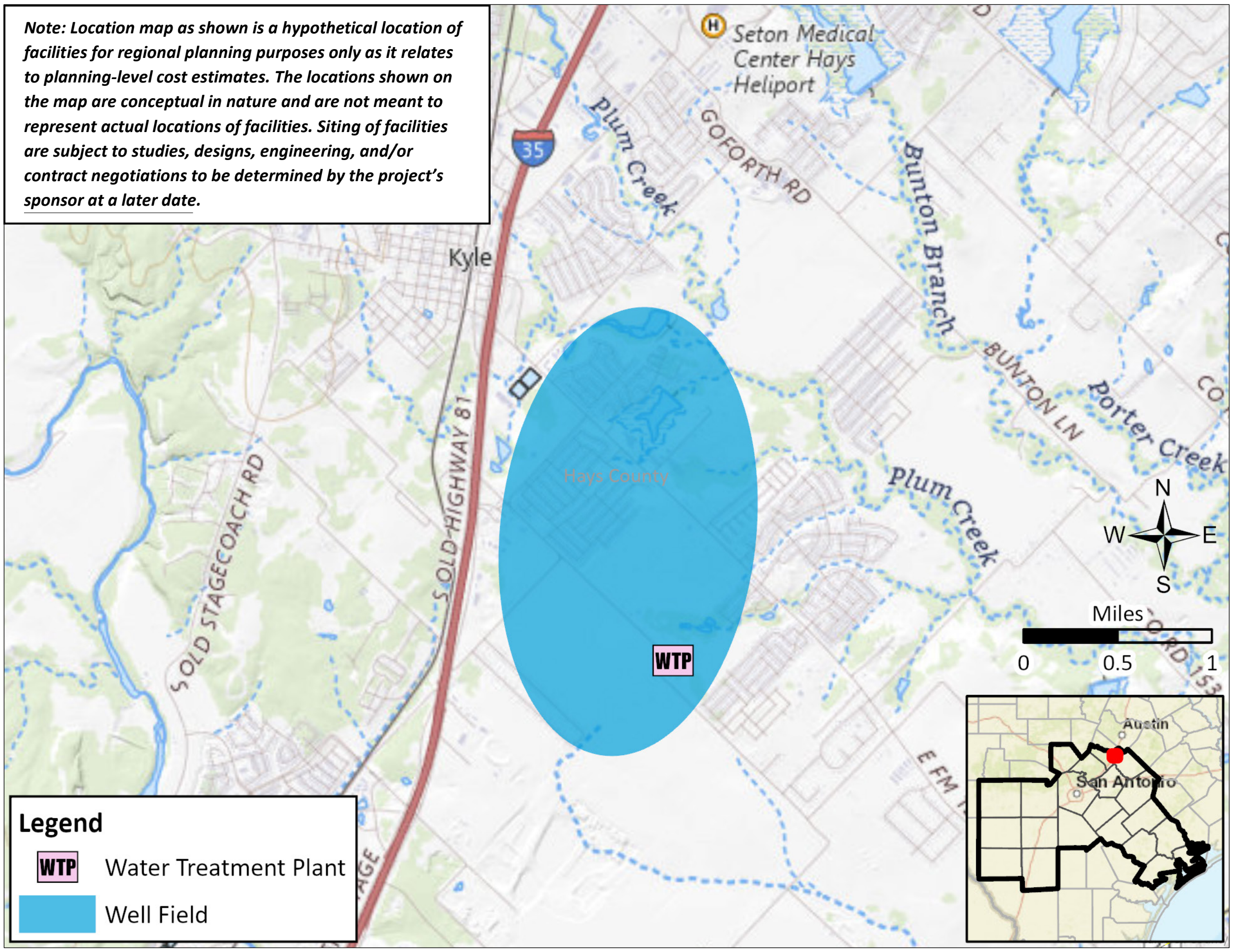

Figure 5.2.6-3 Approximate Location of County Line SUD – Trinity Project

The project will consist of three wells: two wells in Phase 1 and one well in Phase 2, each with an estimated pumping capacity of 350 gpm. In this downdip region of the Trinity Aquifer, the well depth is expected to be approximately 1,200 feet, and have a TDS concentration of 1,000 mg/L. This area is near the edge of the Trinity Aquifer system, and wells are limited in the area. The lack of available data and the fractured and heterogenous nature of the aquifer system in this area are such that it is difficult to predict well characteristics. Test hole drilling and evaluation is recommended prior to well installation to determine site-specific aquifer properties and water quality.

Table 5.2.6-3 County Line SUD – Trinity Project Decadal Water Management Strategy Yields by Phase (acft/yr)

County Line SUD – Trinity Project	2030	2040	2050	2060	2070	2080
Phase 1	0	0	500	500	500	500
Phase 2	0	0	0	500	500	500
Total	**0**	**0**	**500**	**1,000**	**1,000**	**1,000**

County Line SUD – Brackish Edwards Project

County Line SUD plans to add wells in the brackish portion of the Edwards Aquifer. The new source of water for County Line SUD will be delivered to their system in a three-phased approach. Phase 1 is projected for the 2050 decade and will have a firm yield of 500 acft/yr. Phase 2 is projected for the 2060 decade and will expand upon Phase 1, resulting in a combined firm yield of 1,000 acft/yr. Finally, Phase 3 is projected for the 2070 decade and will result in a total project firm yield of 1,500 acft/yr. All three phases are included and evaluated as part of this WMS. Because of MAG limitations, the project will result in a reduced project firm yield shown in Table 5.2.6-2.

A new desalination WTP will be included to treat the brackish Edwards Aquifer water. The project's general location is anticipated to be near the northwest boundary of County Line SUD and the City of Kyle in Hays County (Figure 5.2.6-4). This WMS utilizes the same facilities and is within the same area as the County Line SUD – Trinity Project. Locations will be defined when the project is executed.

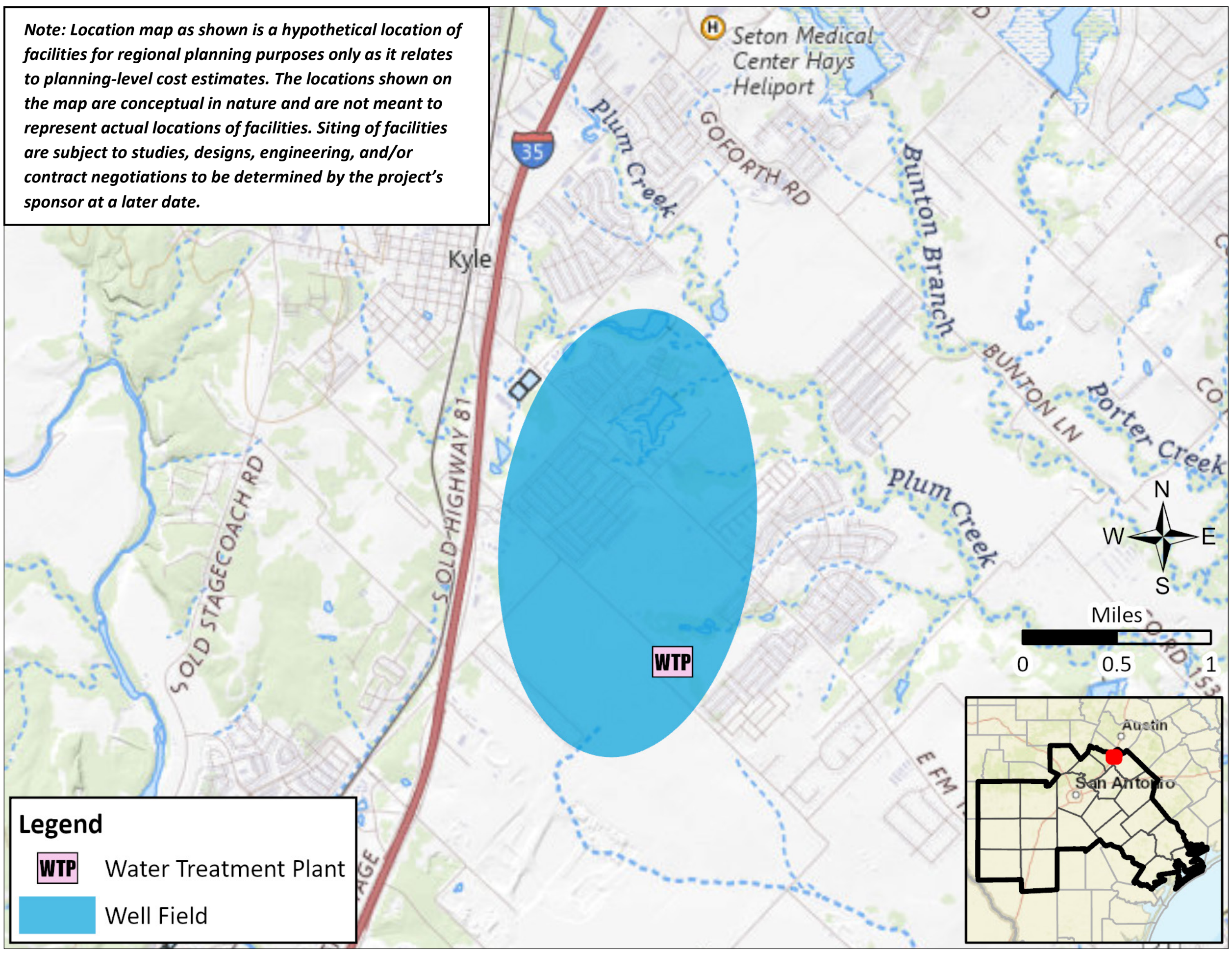

Figure 5.2.6-4 Approximate Location of County Line SUD – Brackish Edwards Project

The project will consist of four wells: two wells in Phase 1, one well in Phase 2, and one well in Phase 3, each with an estimated pumping capacity of 350 gpm. In this downdip region of the Brackish Edwards Aquifer, the exact well depth is unknown because of limited information available for this area. It is recommended that a test well be drilled, and additional studies performed in the area to determine more accurate well field information. For planning purposes, the well depth is assumed to be approximately 1,200 feet, and has a TDS concentration of 1,500 mg/L. This area is close to the transition zone of the Edwards Aquifer where water quality changes from fresh to brackish, and wells in the area are limited. The lack of available data and the fractured and heterogenous nature of the aquifer system in this area are such that it is difficult to predict the well characteristics. Test hole drilling and evaluation is recommended prior to well installation to determine site-specific aquifer properties and water quality.

Table 5.2.6-4 County Line SUD – Brackish Edwards Project Decadal Water Management Strategy Yields by Phase (acft/yr)

County Line SUD – Brackish Edwards Project	2030	2040	2050	2060	2070	2080
Phase 1	0	0	500	500	500	500
Phase 2	0	0	0	500	500	500
Phase 3	0	0	0	0	500	500
Total	**0**	**0**	**500**	**1,000**	**1,500**	**1,500**

Maxwell SUD – Trinity Project

Maxwell SUD plans to add a well in the Trinity Aquifer in the 2040 decade that will develop a supply of 230 acft/yr. The new source of water for Maxwell SUD will be treated via brackish water treatment at the well field and delivered to the existing distribution system via a new 16-inch pipeline that will replace the existing infrastructure. The projected general location is anticipated to be at the existing Maxwell SUD Edwards well field site in Hays County (Figure 5.2.6-5). The total project is envisioned to result in a yield of 230 acft/yr.

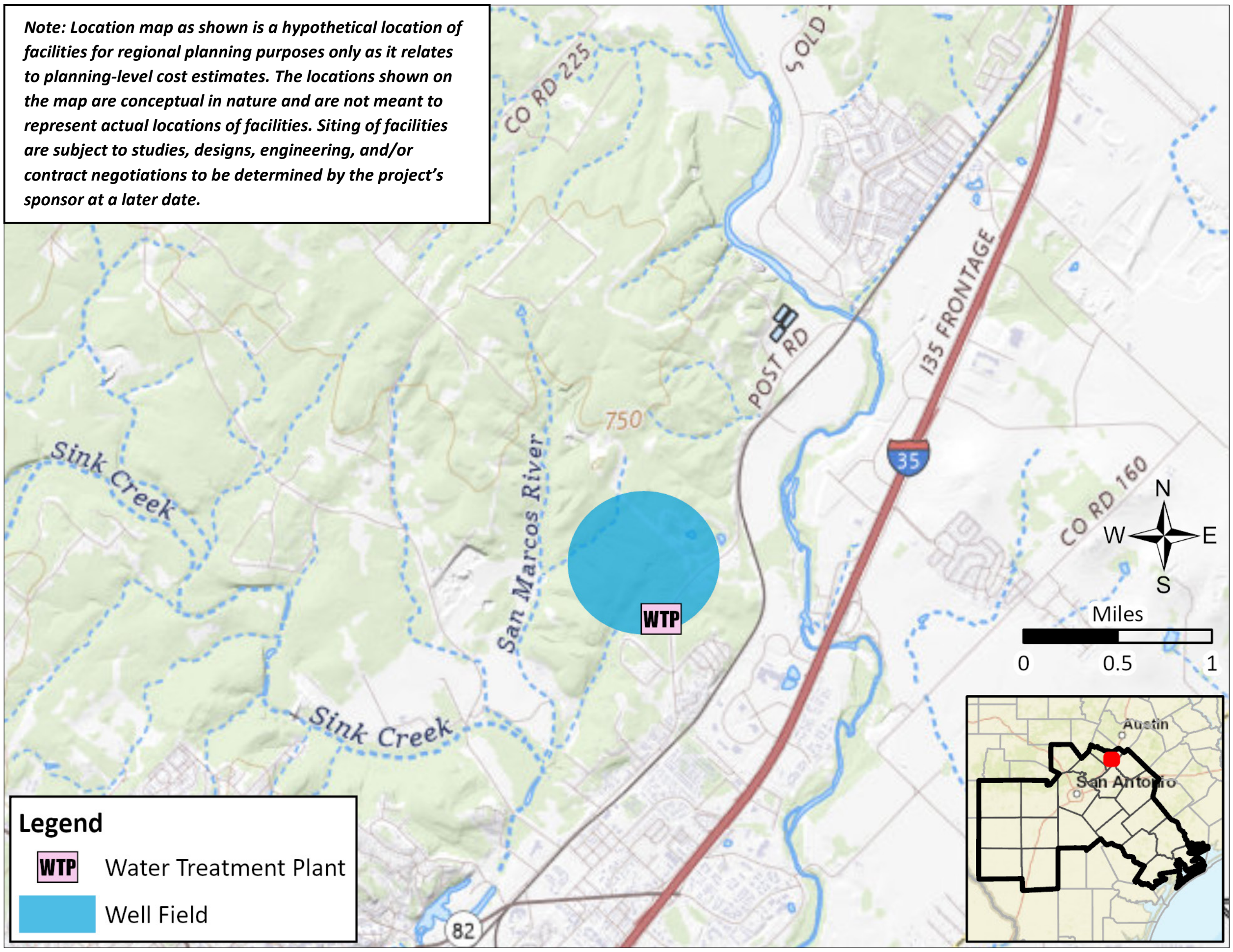

Figure 5.2.6-5 Approximate Location of Maxwell SUD – Trinity Project

The project is anticipated to consist of one new well in the Trinity Aquifer with a pumping capacity of approximately 250 gpm. In this region of the Trinity Aquifer, the depth of the well is expected to be approximately 1,200 feet, and the water is anticipated to have a TDS concentration of approximately 2,000 mg/L. Most of the wells in the proposed well field area are completed in the overlying Edwards Aquifer, and therefore, little data exist on the deeper Trinity Aquifer. Any potential project in the area should include test well drilling and evaluation to determine aquifer characteristics and water quality in the vicinity of the planned Trinity Aquifer wells. The project lies within the purview of the Barton Springs Edwards Aquifer Conservation District (BSEACD).

S S WSC – Brackish Carrizo-Wilcox Project

S S WSC – Brackish Carrizo-Wilcox Project was originally a recommended WMS in the 2016 SCTRWP. It includes development of a 1,120 acft/yr brackish groundwater supply from the Carrizo-Wilcox Aquifer in Wilson County. It is designed to produce an average annual water supply of 1.0 MGD and a peak demand of 2.0 mgd. However, due to MAG limitations, the project will result in a reduced project firm yield shown in Table 5.2.6-2.

The facilities of the project are planned to be located in the vicinity of S S WSC's Sutherland Springs Road Plant, which is located approximately 3 miles west-northwest of the town of Sutherland Springs (Figure

5.2.6-6). This strategy builds on a preliminary assessment of potential brackish groundwater supplies from the Carrizo-Wilcox Aquifer in a target area that is generally a 10 to 20 mile wide band that is south of Interstate 10 and between Loop 410 and Seguin [1].

The project includes a brackish well field consisting of three wells located along CR 319, spaced approximately 1 mile apart. The desalination WTP will be co-located at S S WSC's existing water plant. The disposal well for the brine concentrate is planned to be in the general area of the desalination plant. A raw water collector pipeline will deliver brackish Carrizo-Wilcox Aquifer water from the wells to the WTP. Water treatment will consist of pretreatment and desalination. A treated water pipeline and booster pump station would deliver water to the Sutherland Springs Road Plant. A concentrate water pipeline would deliver reject water to a ground storage tank (GST). A small pump and a pipeline will transport the concentrate to a new, deep injection well.

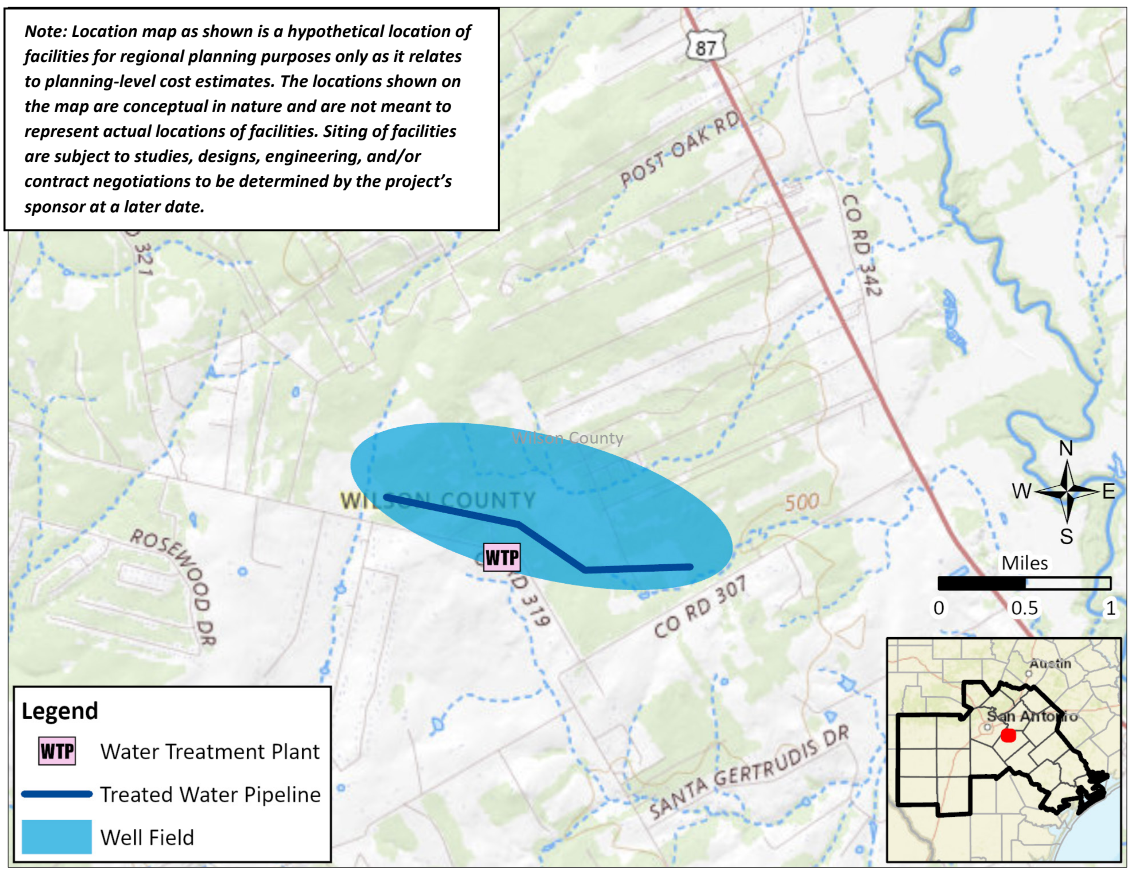

Figure 5.2.6-6 Approximate Location of S S WSC – Brackish Carrizo-Wilcox Groundwater Project

Groundwater production and well spacing in the Carrizo-Wilcox Aquifer are regulated by the Evergreen UWCD. Based on the results from the earlier study and for planning purposes, a typical Carrizo-Wilcox Aquifer well in this location is expected to be about 1,100 feet deep, yield about 750 gpm, and produce water with a TDS concentration of about 1,200 mg/L.

[1] HDR Engineering, Inc. February 2008, Preliminary assessment of potential water supplies from the Wilcox Aquifer in parts of Bexar, Guadalupe, and Wilson Counties: Prepared for San Antonio River Authority.

5.2.6.3 Environmental Factors

Individual projects associated with the Brackish Groundwater Development WMS may include well field development, desalination treatment, pipeline construction, and associated facility construction and upgrades. These projects would require site-specific reviews to determine requirements for environmental permitting and field data collection, if needed.

Caldwell Brackish Partnership Project

Vegetation, Land Use, and Agricultural Resources

The project area occurs mostly in the East Central Texas Plains ecoregion, with a small portion on the west edge mapped as Texas Blackland Prairie. The majority of the project area is mapped as post oak motte/woodlands, post oak savanna grassland, and mesquite shrubland by TPWD [2]; the project area is mostly open fields and woodlands with one industrial cattle facility. Based on the TPWD mapping, the project area contains 11 acres mapped as row crops, and 661 acres mapped as disturbance or tame grassland which may be used for grazing or hay fields.

Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing and woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species that are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each water management strategy to determine the best course of action regarding revegetation. Pipeline easements may continue to be used for agricultural purposes.

Aquatic Resources

The project area contains one underground water pipeline, one unnamed artificial path, and four artificial paths in streams/rivers, seven intermittent segments of streams/rivers (Big Sandy Creek, Copperas Creek, Daniels Creek, Hines Branch, McNeil Creek, Tenney Creek, and Plum Creek), and one perennial segment of Plum Creek. The project area contains 360 acres of freshwater emergent wetlands, 140.6 acres of which are freshwater pond, and 219.4 acres of which are riverine mapped wetlands. The project area includes impaired stream segment 1810 Plum Creek, as defined by TCEQ [3]. The project area does not contain ecologically significant stream segments, as designated by the TPWD.

Projects may require an on-site delineation of streams, ponds, and wetlands. Stream crossings for pipeline construction would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain

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[2] Elliott, L.F., A. Treuer-Kuehn, C.F. Blodgett, C.D. True, D. German, and D.D. Diamond. 2009-2014. Ecological Systems of Texas: 391 Mapped Types. Phase 1 – 6, 10-meter resolution Geodatabase, Interpretive Guides, and Technical Type Descriptions. Texas Parks & Wildlife Department and Texas Water Development Board, Austin, Texas. Documents and Data Available at: https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/.

[3] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Draft Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d)*. https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir.

conditions, including cases where there would be permanent impacts to over 0.1 acre of waters of the United States. The USACE permit requires that there will be no change in preconstruction contours of waters of the United States. Utility crossings under streams/rivers (e.g., through horizontal directional drilling) would not require a USACE permit.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that may occur in Caldwell County [4, 5]. Suitable habitat may occur the federally listed endangered whooping crane (*Grus americana*); federal proposed endangered tricolored bat (*Perimyotis subflavus*); and federal candidate monarch butterfly (*Danaus plexippus*) in the project region. Suitable habitat may occur for the state threatened species interior least tern (*Sternula antillarum anthalassos*), swallow-tailed kite (*Elanoides forficatus*), white-faced ibis (*Plegadis ibis*), wood stork (*Mycteria americana*), Guadalupe darter (*Percina apristis*), headwater catfish (*Ictalurus lupus*), Cagle's map turtle (*Graptemys caglei*), and Texas horned lizard (*Phrynosoma cornutum*). Potentially suitable habitat may occur for numerous state wildlife, plant, and insect species designated by TPWD as SGCN. These species do not have formal protected status but are being monitored by TPWD.

Migratory birds may occur in and nest in the project areas. The federal MBTA protects birds, nests, and eggs from impacts unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or to avoid vegetation clearing during the general bird nesting season from March 15 to September 15. Preconstruction surveys for active bird nests are recommended.

Cultural Considerations

Projects in Texas can come under the purview of the NHPA and the ACT. Both are administered by lead federal agencies and the State Historic Preservation Officer (SHPO) at the THC in Austin, Texas. Projects that are permitted, licensed, or partially funded by the federal government must comply with Section 106 of the NHPA and take into consideration the undertaking's effects on historic properties, defined as any property listed in, or eligible for listing in, the NRHP. A project on land owned or operated by a political subdivision of the State of Texas [6] is required under the ACT to assess whether it will impact cultural resources that meet the criteria for listing as an SAL.

In the State of Texas, all human burials are protected by law [7], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project area and the remains are determined to be Native American, they will be handled in accordance with procedures established through coordination with the THC, and work in the affected area could only resume in accordance with THC authorization.

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[4] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[5] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List. https://ipac.ecosphere.fws.gov/location/index.

[6] Political subdivision entities include any county, municipality, special district, river authority or compact, Title 4 Water Code District, soil and water conservation district, county or municipal improvement district, regional planning commission, council of government, or utility that is public-owned. Refer to Texas Water Code (TWC) Code §2254.021.

[7] As per the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

A background literature review was performed for the proposed project's footprint. The background literature review identified four cultural resources within the approximate 24,149-acre project area (Table 5.2.6-5) [8]. These cultural resources are one archaeological site (41CW40) undetermined for NRHP-listing, two cemeteries (CW-C014, and CW-C015), and one Official Texas Historical Marker (OTHM) (Marker No. 16585). Additionally, the historical map review identified 205 potential historic-age buildings/structures that are within the project area [9].

A probability model was used to assess the overall potential of buried prehistoric archaeological deposits in the project area, which included low, moderate, and high potential zones. The model indicated that 3.3% of the project area had a high likelihood of containing significant unidentified archaeological resources, 51.5% had a moderate likelihood, and 45.2% had a low likelihood. Areas with higher archaeological probability were considered to be located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score for the project area was developed, which considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area. Next, the cultural resources within the project area were evaluated according to its NRHP eligibility and SAL designation. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts and properties or archaeological sites, SALs, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, Recorded Texas Historical Landmarks, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, Freedom Colonies, and historical markers each received 1 point. The points for all cultural resources within the project area were tabulated and added to the mean score for a total cultural assessment score.

According to the background review results, one archaeological site, two cemeteries, one OTHM, and 205 potential historic-age structures are located within the project area; the probability model indicates a moderate likelihood of buried deposits; and the project assessment score is 248.8. Based on these results, a cultural resources assessment for the final design plan will likely be necessary, as well as a buffer zone of at least 100 feet between the cemeteries and the proposed development.

Table 5.2.6-5 Cultural Resources Results for the Caldwell Brackish Partnership Project

Resource Name	Resource Type	Prehistoric/ Historic	NRHP Eligibility
41CW40	Archaeological site	Historic	Undetermined
Hard Shell Cemetery 1 (CW-C034)	Cemetery	Historic	Undetermined
Hall Cemetery (CW-C014)	Cemetery	Historic	Undetermined
Wattsville Gin (16585)	OTHM	Historic	Undetermined

[8] Texas Historical Commission (THC). 2024. Texas Archeological and Historical Sites Atlas. Available at: https://atlas.thc.texas.gov/. Accessed December 2024.

[9] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed December 2024.

Resource Name	Resource Type	Prehistoric/ Historic	NRHP Eligibility
None (N=205)	Buildings/Structures	Historic	–
Assessment Score Total	**All**	**All**	**248.8**

Gonzales & Guadalupe Brackish Partnership Project

Vegetation, Land Use, and Agricultural Resources

The project area occurs in the East Central Texas Plains ecoregion, with the majority of the project area mapped as post oak motte/woodlands, savannah grassland, and mesquite shrubland by TPWD [10]; the project area is mostly open fields and woodlands with some residential development. Based on the TWPD mapping, the project area includes 81 acres mapped as row crops, 676 acres mapped as disturbance or tame grassland, and 77 acres mapped as sandyland grassland which may be used for livestock grazing or hay fields.

Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing and woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species that are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each water management strategy to determine the best course of action regarding revegetation. Pipeline easements may continue to be used for agricultural purposes.

Aquatic Resources

The project area contains one pipeline, one canal/ditch, one unnamed artificial path, and 10 artificial paths/streams/rivers (Darst Creek, East Fork O'Neal Creek, Guadalupe River, Nash Creek, O'Neal Creek, Polecat Creek, Rocky Creek, Salt Creek, Sawlog Creek, and Tidwell Creek). The project area contains 5.7 acres of freshwater emergent wetlands, 181.9 acres of freshwater pond, and 513.3 acres of riverine mapped wetlands. The project has the potential to affect impaired stream segment 1804 of the Guadalupe River Below Comal River, as defined by TCEQ [11]. The project area does not contain ecologically significant stream segments, as designated by the TPWD.

Projects may require an on-site delineation of streams, ponds, and wetlands. Stream crossings for pipeline construction would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including cases where there would be permanent impacts to over 0.1 acre of waters of the

[10] Elliott, L.F., A. Treuer-Kuehn, C.F. Blodgett, C.D. True, D. German, and D.D. Diamond. 2009-2014. Ecological Systems of Texas: 391 Mapped Types. Phase 1 – 6, 10-meter resolution Geodatabase, Interpretive Guides, and Technical Type Descriptions. Texas Parks & Wildlife Department and Texas Water Development Board, Austin, Texas. Documents and Data Available at: https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/.

[11] Texas Commission on Environmental Quality. 2024. *2024 Draft Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir.

United States. The USACE permit requires that there will be no change in preconstruction contours of waters of the United States. Utility crossings under streams/rivers (e.g., through horizontal directional drilling) would not require a USACE permit.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that may occur in the project areas for this WMS [12, 13]. Suitable habitat may occur for the federally listed endangered whooping crane (*Grus americana*), false spike (*Fusconaia mitchelli*), federal proposed endangered tricolored bat (*Perimyotis subflavus*), and federal candidate monarch butterfly (*Danaus plexippus*) in the project region.

Suitable habitat may occur for the state threatened species interior least tern (*Sternula antillarum anthalassos*), swallow-tailed kite (*Elanoides forficatus*), white-faced ibis (*Plegadis ibis*), wood stork (*Mycteria americana*), Guadalupe darter (*Percina apristis*), plateau shiner (*Cyprinella lepida*), Cagle's map turtle (*Graptemys caglei*), Texas horned lizard (*Phrynosoma cornutum*), Texas tortoise (*Gopherus berlandieri*), and white-nosed coati (*Nasua narica*). Potentially suitable habitat may occur for numerous state wildlife, plant, and insect species designated by TPWD as SGCN. These species do not have formal protected status but are being monitored by TPWD.

Migratory birds may occur in and nest in the project areas. The federal MBTA protects birds, nests, and eggs from impacts unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or to avoid vegetation clearing during the general bird nesting season from March 15 to September 15. Preconstruction surveys for active bird nests are recommended.

Cultural Considerations

Projects in Texas can come under the purview of the NHPA and the ACT. Both are administered by lead federal agencies and the SHPO at the THC in Austin, Texas. Projects that are permitted, licensed, or partially funded by the federal government must comply with Section 106 of the NHPA and take into consideration the undertaking's effects on historic properties, defined as any property listed in, or eligible for listing in, the NRHP. A project on land owned or operated by a political subdivision of the State of Texas [14] is required under the ACT to assess whether it will impact cultural resources that meet the criteria for listing as an SAL.

In the State of Texas, all human burials are protected by law [15], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project area and the remains are determined to be Native American, they will be handled in accordance with procedures established

[12] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[13] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List. https://ipac.ecosphere.fws.gov/location/index.

[14] Political subdivision entities include any county, municipality, special district, river authority or compact, Title 4 Water Code District, soil and water conservation district, county or municipal improvement district, regional planning commission, council of government, or utility that is public-owned. Refer to Texas Water Code (TWC) §2254.021.

[15] As per the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

through coordination with the THC, and work in the affected area could only resume in accordance with THC authorization.

A background literature review was performed for the proposed project's footprint. The background literature review identified 25 cultural resources within the approximate 39,851-acre project area (Table 5.2.6-6) [16, 17]. These cultural resources include 10 archaeological sites; one NRHP-listed district; ten cemeteries, of which two are Texas Freedom Colonies; and three OTHMs. All 10 archaeological sites are currently undetermined for listing on the NRHP. One of the cemeteries (Capote Cemetery) is a designated Historic Texas Cemetery. Additionally, the historical map review identified 316 potential historic-age buildings/structures that are within the project area [18].

A probability model was used to assess the overall potential of buried prehistoric archaeological deposits in the project area, which included low, moderate, and high potential zones. The model indicated that 3.8% of the project area had a high likelihood of containing significant unidentified archaeological resources, 18.1% had a moderate likelihood, and 78.1% had a low likelihood. Areas with higher archaeological probability were considered to be located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score for the project area was developed, which considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area. Next, the cultural resources within the project area were evaluated according to its NRHP eligibility and SAL designation. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts and properties or archaeological sites, SALs, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, Recorded Texas Historical Landmarks, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, Freedom Colonies, and historical markers each received 1 point. For cultural resources with multiple resource types, the values of each resource type were calculated and used to determine the overall assessment score. The points for all cultural resources within the project area were tabulated and added to the mean score for a total cultural assessment score.

According to the background review results, 10 archaeological sites, one NRHP-listed district, 10 cemeteries, two Texas Freedom Colonies, three OTHMs, and 316 potential historic-age structures are located within the project area; the probability model indicates a low likelihood of buried deposits; and the project assessment score is 424.2. Based on these results, a cultural resources assessment for the final design plan will likely be necessary, as well as a buffer zone of at least 100 feet between the cemeteries and the proposed development.

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[16] Texas Historical Commission (THC). 2024. Texas Archeological and Historical Sites Atlas. Available at: https://atlas.thc.texas.gov/. Accessed December 2024.

[17] Texas Freedom Colonies Project. 2024. Texas Freedom Colonies Atlas 2.1. Available at: https://www.thetexasfreedomcoloniesproject.com/atlas. Accessed December 2024.

[18] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed December 2024.

Table 5.2.6-6 Cultural Resources Results for the Gonzalez & Guadalupe Brackish Partnership Project

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility
41GU5	Archaeological site	Historic	Undetermined
41GU6	Archaeological site	Historic	Undetermined
41GU170	Archaeological site	Prehistoric	Undetermined
41GU171	Archaeological site	Prehistoric	Undetermined
41GU172	Archaeological site	Prehistoric	Undetermined
41GZ3	Archaeological site	Prehistoric	Undetermined
41GZ180	Archaeological site	Multicomponent	Undetermined
41GZ181	Archaeological site	Prehistoric	Undetermined
41GZ188	Archaeological site	Historic	Undetermined
41GZ189	Archaeological site / Cemetery	Historic	Undetermined
Wilson Utility Pottery Kilns	Archaeological District	Historic	Listed
Belmont (GZ-C089)	Cemetery	Historic	Undetermined
Belmont No. 2 (GZ-C105)	Cemetery	Historic	Undetermined
Capote Cemetery (GU-C152)	Cemetery / Freedom Colony	Historic	Undetermined
Erskine (GU-C194)	Cemetery	Historic	Undetermined
Matthies Cemetery (GU-C011)	Cemetery	Historic	Undetermined
Meyer (GZ-C118)	Cemetery	Historic	Undetermined
Nash Creek Cemetery (GU-C140)	Cemetery / Freedom Colony	Historic	Undetermined
New Birth (GU-C146)	Cemetery	Historic	Undetermined
St. James (GZ-C096)	Cemetery	Historic	Undetermined
El Capote Ranch (Marker No. 1412)	OTHM	Historic	Undetermined
Wilson Potteries (Marker No. 5858)	OTHM	Historic	Undetermined
William B. Fleming (Marker No. 17932)	OTHM	Historic	Undetermined
None (N=316)	Buildings / Structures	Historic	–
Assessment Score Total	**All**	**All**	**424.2**

County Line SUD – Trinity Project

Vegetation, Land Use, and Agricultural Resources

The project area occurs in the Blackland Prairie ecoregion, and the project vicinity contains high-density residential development, agricultural fields, and a small amount of uncleared woodland. As mapped by TPWD [19], the dominant vegetation types in the project area are disturbance or tame grassland, row crops, urban low intensity, deciduous woodland, and mesquite shrubland. Based on the TPWD mapping, the project area contains 439 acres mapped as row crops and 772 acres mapped as disturbance or tame grassland which could be used for grazing or hay production.

Construction of the WTP would result in conversion of native herbaceous and woody vegetation into industrial use. Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing, woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species which are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each water management strategy to determine the best course of action regarding revegetation.

Aquatic Resources

One artificial path, three intermittent streams including Plum Creek and Clear Fork Plum Creek, their associated floodplains, and one pipeline are mapped in the project area. The NWI mapping shows 36.4 acres of ponds and riverine wetlands in the project area.

The Texas Integrated Report of 303(d) listed water bodies identifies the water bodies or segments in Texas that do not meet assigned water quality standards. Segment 1810 of Plum Creek, a tributary of the San Marcos River, is listed as impaired. The project area does not contain ecologically significant stream segments as designated by TPWD.

The project will require an on-site delineation of streams, ponds, and wetlands. Stream crossings for pipeline construction, if applicable, would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58 – Utility Line Activities for Water and other Substances. A preconstruction notification to the USACE is required under certain conditions, including if there would be permanent impacts to over 0.1 acre of waters of the United States. The USACE permit requires that there will be no change in preconstruction contours of waters of the United States. Utility crossings under stream (e.g., through horizontal directional drilling) would not require a USACE permit.

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[19] Elliott, L.F., A. Treuer-Kuehn, C.F. Blodgett, C.D. True, D. German, and D.D. Diamond. 2009-2014. Ecological Systems of Texas: 391 Mapped Types. Phase 1 – 6, 10-meter resolution Geodatabase, Interpretive Guides, and Technical Type Descriptions. Texas Parks & Wildlife Department and Texas Water Development Board, Austin, Texas. Documents and Data Available at: https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that may occur in Hays County [20, 21]. Suitable habitat for the federally endangered whooping crane (*Grus americana*) and the federal candidate monarch butterfly may occur in the project area. The whooping crane would be expected to occur only during migration. The project will likely require an on-site habitat assessment to determine if suitable habitat for federally listed species is present within this area.

Suitable habitat may occur for the state threatened species interior least tern (*Sternula antillarum anthalassos*), white-faced ibis (*Plegadis ibis*), wood stork (*Mycteria americana*), Texas troglobitic water slater (*Lirceolus smithii*), Guadalupe darter (*Percina apristis*), headwater catfish (*Isctalurus lupus*), Cagle's map turtle (*Graptemys caglei*), and Texas horned lizard (*Phrynosoma cornutum*). Potentially suitable habitat may occur for numerous state wildlife, plant, and insect species designated by TPWD as SGCN. These species do not have formal protected status but are being monitored by TPWD.

Site-specific field surveys would be required to determine the quality of habitat and potential for impacts to federal and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD would likely be required to obtain their recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may occur or nest in the project area. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15. Preconstruction surveys for active bird nests are recommended.

Cultural Considerations

Projects in Texas can come under the purview of the NHPA and the ACT. Both are administered by lead federal agencies and the SHPO at the THC in Austin, Texas. Projects that are permitted, licensed, or partially funded by the federal government must comply with Section 106 of the NHPA and take into consideration the undertaking's effects on historic properties, defined as any property listed in, or eligible for listing in, the NRHP. A project on land owned or operated by a political subdivision of the State of Texas [22] is required under the ACT to assess whether it will impact cultural resources that meet the criteria for listing as an SAL.

A background literature review was performed for the proposed project's footprint. . The background literature review identified two cultural resources within the approximately 1,629-acre project area

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[20] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[21] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List. https://ipac.ecosphere.fws.gov/location/index.

[22] Political subdivision entities include any county, municipality, special district, river authority or compact, Title 4 Water Code District, soil and water conservation district, county or municipal improvement district, regional planning commission, council of government, or utility that is public-owned. Refer to Texas Water Code (TWC) §2254.021.

(Table 5.2.6-7) [23]. These cultural resources are two archaeological sites (41HY543 and 41HY572). Site 41HY572 is ineligible for NRHP-listing, while 41HY543 remains undetermined for listing on the NRHP. Additionally, the historical map review identified 25 potential historic-age buildings/structures that are within the project area [24].

A probability model was used to assess the overall potential of buried prehistoric archaeological deposits in the project area, which included low, moderate, and high potential zones. The model indicated that 92% of the project area had a high likelihood of containing significant unidentified archaeological resources, and 8% had a low likelihood. Areas with high archaeological probability were considered to be located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score for the project area was developed, which considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area. Next, the cultural resources within the project area were evaluated according to its NRHP eligibility and SAL designation. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts and properties or archaeological sites, SALs, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, Recorded Texas Historical Landmarks, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, Freedom Colonies, and historical markers each received 1 point. The points for all cultural resources within the project area were tabulated and added to the mean score for a total cultural assessment score.

According to the background review results, two archaeological sites and 25 potential historic-age structures are located within the project area; the probability model indicates a high likelihood of buried deposits; and the project assessment score is 90.8. Based on these results, a cultural resources assessment for the final design plan will likely be necessary.

Table 5.2.6-7 Cultural Resources Results for the County Line SUD – Trinity Project

Resource Name	Resource Type	Prehistoric/Historic	NRHP Eligibility
41HY543	Archaeological site	Multicomponent	Ineligible
41HY572	Archaeological site	Multicomponent	Undetermined
None (N=25)	Buildings / Structures	Historic	–
Assessment Score Total	**All**	**All**	**90.8**

[23] Texas Historical Commission (THC). 2024. Texas Archeological and Historical Sites Atlas. Available at: https://atlas.thc.texas.gov/. Accessed December 2024.
[24] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed December 2024.

County Line SUD – Brackish Edwards Project

Vegetation, Land Use, and Agricultural Resources

The project area occurs in the Blackland Prairie ecoregion, and the project vicinity contains high-density residential development, agricultural fields, and a small amount of uncleared woodland. As mapped by TPWD,[25] the dominant vegetation types in the project area are disturbance or tame grassland, row crops, urban low intensity, deciduous woodland, and mesquite shrubland. Based on the TPWD mapping, the project area contains 439 acres mapped as row crops and 772 acres mapped as disturbance or tame grassland which could be used for grazing or hay production.

Construction of the WTP would result in conversion of native herbaceous and woody vegetation into industrial use. Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing, woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species which are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each water management strategy to determine the best course of action regarding revegetation.

Aquatic Resources

One artificial path, three intermittent streams including Plum Creek and Clear Fork Plum Creek, their associated floodplains, and one pipeline are mapped in the project area. The NWI mapping shows 36.4 acres of ponds and riverine wetlands in the project area.

The Texas Integrated Report of 303(d) listed water bodies identifies the water bodies or segments in Texas that do not meet assigned water quality standards. Segment 1810 of Plum Creek, a tributary of the San Marcos River, is listed as impaired. The project area does not contain ecologically significant stream segments as designated by TPWD.

The project will require an on-site delineation of streams, ponds, and wetlands. Stream crossings for pipeline construction, if applicable, would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58 – Utility Line Activities for Water and other Substances. A preconstruction notification to the USACE is required under certain conditions, including if there would be permanent impacts to over 0.1 acre of waters of the United States. The USACE permit requires that there will be no change in preconstruction contours of waters of the United States. Utility crossings under stream (e.g., through horizontal directional drilling) would not require a USACE permit.

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[25] Elliott, L.F., A. Treuer-Kuehn, C.F. Blodgett, C.D. True, D. German, and D.D. Diamond. 2009-2014. Ecological Systems of Texas: 391 Mapped Types. Phase 1 – 6, 10-meter resolution Geodatabase, Interpretive Guides, and Technical Type Descriptions. Texas Parks & Wildlife Department and Texas Water Development Board, Austin, Texas. Documents and Data Available at: https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that may occur in Hays County [26, 27]. Suitable habitat for the federally endangered whooping crane (*Grus americana*) and the federal candidate monarch butterfly may occur in the project area. The whooping crane would be expected to occur only during migration. The project will require an on-site habitat assessment to determine if suitable habitat for federally listed species is present within this area.

Suitable habitat may occur for the state threatened species interior least tern (*Sternula antillarum anthalassos*), white-faced ibis (*Plegadis ibis*), wood stork (*Mycteria americana*), Texas troglobitic water slater (*Lirceolus smithii*), Guadalupe darter (*Percina apristis*), headwater catfish (*Isctalurus lupus*), Cagle's map turtle (*Graptemys caglei*), and Texas horned lizard (*Phrynosoma cornutum*). Potentially suitable habitat may occur for numerous state wildlife, plant, and insect species designated by TPWD as SGCN. These species do not have formal protected status but are being monitored by TPWD.

Site-specific field surveys would be required to determine the quality of habitat and potential for impacts to federal and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD would likely be required to obtain their recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may occur or nest in the project area. The federal Migratory Bird Treaty Act (MBTA) protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct pre-construction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15. Pre-construction surveys for active bird nests are recommended.

Cultural Considerations

Projects in Texas can come under the purview of the NHPA and the ACT. Both are administered by lead federal agencies and the SHPO at the THC in Austin, Texas. Projects that are permitted, licensed, or partially funded by the federal government must comply with Section 106 of the NHPA and take into consideration the undertaking's effects on historic properties, defined as any property listed in, or eligible for listing in, the NRHP. A project on land owned or operated by a political subdivision of the State of Texas[28] is required under the ACT to assess whether it will impact cultural resources that meet the criteria for listing as an SAL.

A background literature review was performed for the proposed project's footprint. . The background literature review identified two cultural resources within the approximately 1,629-acre project area

[26] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[27] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List. https://ipac.ecosphere.fws.gov/location/index.

[28] Political subdivision entities include any county, municipality, special district, river authority or compact, Title 4 Water Code District, soil and water conservation district, county or municipal improvement district, regional planning commission, council of government, or utility that is public-owned. Refer to Texas Water Code (TWC) §2254.021.

(Table 5.2.6-8) [29]. These cultural resources are two archaeological sites (41HY543 and 41HY572). Site 41HY572 is ineligible for NRHP-listing, while 41HY543 remains undetermined for listing on the NRHP. Additionally, the historical map review identified 25 potential historic-age buildings/structures that are within the project area [30].

A probability model was used to assess the overall potential of buried prehistoric archaeological deposits in the project area, which included low, moderate, and high potential zones. The model indicated that 92% of the project area had a high likelihood of containing significant unidentified archaeological resources, and 8% had a low likelihood. Areas with high archaeological probability were considered to be located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score for the project area was developed, which considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area. Next, the cultural resources within the project area were evaluated according to its NRHP eligibility and SAL designation. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts and properties or archaeological sites, SALs, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, Recorded Texas Historical Landmarks, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, Freedom Colonies, and historical markers each received 1 point. The points for all cultural resources within the project area were tabulated and added to the mean score for a total cultural assessment score.

According to the background review results, two archaeological sites and 25 potential historic-age structures are located within the project area; the probability model indicates a high likelihood of buried deposits; and the project assessment score is 90.8. Based on these results, a cultural resources assessment for the final design plan will likely be necessary.

Table 5.2.6-8 Cultural Resources Results for the County Line SUD – Brackish Edwards Project

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility
41HY543	Archaeological site	Multicomponent	Ineligible
41HY572	Archaeological site	Multicomponent	Undetermined
None (N=25)	Buildings / Structures	Historic	–
Assessment Score Total	**All**	**All**	**90.8**

[29] Texas Historical Commission (THC). 2024. Texas Archeological and Historical Sites Atlas. Available at: https://atlas.thc.texas.gov/. Accessed December 2024.
[30] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed December 2024.

Maxwell SUD – Trinity Project

Vegetation, Land Use, and Agricultural Resources

The project area occurs mostly in the Edwards Plateau ecoregion with a small area on the eastern edge within the Texas Blackland Prairies ecoregion. The project vicinity contains low-density residential development. As mapped by TPWD [31], the dominant vegetation types in the project area are deciduous oak/evergreen motte and woodland, oak/hardwood motte and woodland, savanna grassland, and Ashe juniper motte and woodland. Based on TPWD vegetation mapping, the project would not affect area mapped as row crops but has the potential to impact 2 acres of agricultural resources mapped as tame/disturbance grassland that may include pasture areas used for grazing or hay production. Construction of the WTP would result in conversion of native herbaceous and woody vegetation areas to industrial use.

Construction of project facilities would result in conversion of native herbaceous and woody vegetation to industrial use. Pipeline construction would require removal of woody vegetation and long-term maintenance (mowing, woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species which are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each water management strategy to determine the best course of action regarding revegetation.

Aquatic Resources

One intermittent stream and one lake/pond are mapped in the project area. The NWI mapping shows small areas in the project vicinity, approximately 2.0 acres, mapped as wetlands or ponds. The Texas Integrated Report of 303(d) listed water bodies[32] identifies the water bodies or segments in Texas that do not meet assigned water quality standards. There are no streams within one mile of the project area listed as impaired. The project area does not contain ecologically significant stream segments as designated by TPWD.

The project has a low likelihood of affecting wetlands. Well facilities and small WTPs can typically be sited to avoid impacts to waters of the United States. including wetlands. The project will require an on-site delineation of streams, ponds, and wetlands. Stream crossings for pipeline construction would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58 – Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including if there would be permanent impacts to over 0.1 acre of waters of the United States. The USACE permit requires that there will be no change in pre-construction contours of waters of the United States. Utility crossings under stream (e.g., through horizontal directional drilling) would not require a USACE permit.

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[31] Elliott, L.F., A. Treuer-Kuehn, C.F. Blodgett, C.D. True, D. German, and D.D. Diamond. 2009-2014. Ecological Systems of Texas: 391 Mapped Types. Phase 1 – 6, 10-meter resolution Geodatabase, Interpretive Guides, and Technical Type Descriptions. Texas Parks & Wildlife Department and Texas Water Development Board, Austin, Texas. Documents and Data Available at: https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/.

[32] Texas Commission on Environmental Quality. 2024. *2024 Draft Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that may occur in Hays County [33, 34]. Suitable habitat for the federally endangered golden-cheeked warbler (*Setophaga chrysoparia*), whooping crane (*Grus americana*) (during migration), Austin blind salamander (*Eurycea waterlooensis*), Texas blind salamander (*Eurycea rathbuni*), and the federal candidate monarch butterfly may occur in the project area. The project will require an on-site habitat assessment to determine if suitable habitat for federally listed species is present within this area.

Suitable habitat may occur for the state threatened species interior least tern (*Sternula antillarum anthalassos*), white-faced ibis (*Plegadis ibis*), wood stork (*Mycteria americana*), Texas troglobitic water slater (*Lirceolus smithii*), Guadalupe darter (*Percina apristis*), headwater catfish (*Isctalurus lupus*), Cagle's map turtle (*Graptemys caglei*), and Texas horned lizard (*Phrynosoma cornutum*). Potentially suitable habitat may occur for numerous state wildlife, plant, and insect species designated by TPWD as SGCN. These species do not have formal protected status but are being monitored by TPWD.

Site-specific field surveys would be required to determine the quality of habitat and potential for impacts to federal and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD would likely be required to obtain their recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request pre-construction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may occur or nest in the project area. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct pre-construction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15. Pre-construction surveys for active bird nests are recommended.

Cultural Considerations

Projects in Texas can come under the purview of the NHPA and the ACT. Both are administered by lead federal agencies and the SHPO at the THC in Austin, Texas. Projects that are permitted, licensed, or partially funded by the federal government must comply with Section 106 of the NHPA and take into consideration the undertaking's effects on historic properties, defined as any property listed in, or eligible for listing in, the NRHP. A project on land owned or operated by a political subdivision of the State of Texas [35] is required under the ACT to assess whether it will impact cultural resources that meet the criteria for listing as an SAL.

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[33] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[34] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List. https://ipac.ecosphere.fws.gov/location/index.

[35] Political subdivision entities include any county, municipality, special district, river authority or compact, Title 4 Water Code District, soil and water conservation district, county or municipal improvement district, regional planning commission, council of government, or utility that is public-owned. Refer to Texas Water Code (TWC) §2254.021.

In the State of Texas, all human burials are protected by law [36], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project area and the remains are determined to be Native American, they will be handled in accordance with procedures established through coordination with the THC, and work in the affected area could only resume in accordance with THC authorization.

A background literature review was performed for the proposed project's footprint. . The background literature review identified two cultural resources within the approximate 308-acre project area (Table 5.2.6-9) [37]. These cultural resources are one cemetery (HY-C011), with an associated OTHM (Marker No. 10318). Additionally, the historical map review identified seven potential historic-age buildings/structures that are within the project area [38].

A probability model was used to assess the overall potential of buried prehistoric archaeological deposits in the project area, which included low, moderate, and high potential zones. The model indicated that 99% of the project area had a high likelihood of containing significant unidentified archaeological resources, and 1% had a moderate likelihood. Areas with high archaeological probability were considered to be located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score for the project area was developed, which considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area. Next, the cultural resources within the project area were evaluated according to its NRHP eligibility and SAL designation. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts and properties or archaeological sites, SALs, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, Recorded Texas Historical Landmarks, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, Freedom Colonies, and historical markers each received 1 point. The points for all cultural resources within the project area were tabulated and added to the mean score for a total cultural assessment score.

According to the background review results, one cemetery with an associated historical marker, and seven potential historic-age structures are located within the project area; the probability model indicates a high likelihood of buried deposits; and the project assessment score is 79.5. Based on these results, a cultural resources assessment for the final design plan will likely be necessary, as well as a buffer zone of at least 100 feet between the cemetery and the proposed development.

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[36] As per the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

[37] Texas Historical Commission (THC). 2024. Texas Archeological and Historical Sites Atlas. Available at: https://atlas.thc.texas.gov/. Accessed December 2024.

[38] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed December 2024.

Table 5.2.6-9 Cultural Resources Results for the Maxwell SUD – Trinity Project

Resource Name	Resource Type	Prehistoric/Historic	NRHP Eligibility
San Marcos – Blanco	Cemetery / OTHM	Historic	Undetermined
None (N=7)	Buildings / Structures	Historic	–
Assessment Score Total	**All**	**All**	**79.5**

S S WSC – Brackish Carrizo-Wilcox Project

Vegetation, Land Use, and Agricultural Resources

The project area occurs in the East Central Texas Plains ecoregion, with the majority of the project area mapped as post oak motte/woodlands and savanna grassland by TPWD [39]; the project area is mostly open fields and woodlands with some residential development. Based on the TPWD mapping, the project area does not contain row crops or tame/disturbance grassland; there are 5 acres mapped as sandyland grassland that may be used for grazing or hay production.

The proposed well pads and treatment facility would result in conversion of land use from undeveloped fields to small areas of industrial use. Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing, woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed.

Aquatic Resources

The project area contains one artificial path, one mapped intermittent stream, one intermittent lake/pond, and one perennial lake/pond. The project area does not contain any mapped wetlands. The project would not affect impaired stream segments as defined by TCEQ [40] or ecologically significant stream segments as designated by TPWD.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that may occur in the project areas for this WMS [41, 42]. Suitable habitat for the federal candidate monarch butterfly (*Danaus plexippus*) may occur within the project area. Suitable habitat may occur for the state listed endangered species interior least tern (*Sternula antillarum athalassos*), and state threatened species swallow-tailed kite (*Elanoides forficatus*), white-faced ibis (*Plegadis chihi*), wood stork (*Mycteria*

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[39] Elliott, L.F., A. Treuer-Kuehn, C.F. Blodgett, C.D. True, D. German, and D.D. Diamond. 2009-2014. Ecological Systems of Texas: 391 Mapped Types. Phase 1 – 6, 10-meter resolution Geodatabase, Interpretive Guides, and Technical Type Descriptions. Texas Parks & Wildlife Department and Texas Water Development Board, Austin, Texas. Documents and Data Available at: https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/.

[40] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Draft Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d)*. https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir

[41] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[42] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List. https://ipac.ecosphere.fws.gov/location/index.

americana), white-nosed coati (*Nasua narica*), Texas horned lizard (*Phrynosoma cornutum*), and Texas tortoise (*Gopherus berlandieri*). There is potential for suitable habitat for numerous wildlife species designated by TPWD as SGCN including SGCN bat species which may utilize structures and could therefore occur in developed areas. The SGCN list also includes numerous plant species, including many for which detailed habitat requirements have not been developed by TPWD. SGCN species do not have formal protected status but are being monitored by TPWD.

Site-specific field surveys would be required to determine the quality of habitat for federal and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be required to obtain their recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request pre-construction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may occur or nest in the project area. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct pre-construction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15.

Cultural Considerations

Projects in Texas can come under the purview of the NHPA and the ACT. Both are administered by lead federal agencies and the SHPO at the THC in Austin, Texas. Projects that are permitted, licensed, or partially funded by the federal government must comply with Section 106 of the NHPA and take into consideration the undertaking's effects on historic properties, defined as any property listed in, or eligible for listing in, the NRHP. A project on land owned or operated by a political subdivision of the State of Texas [43] is required under the ACT to assess whether it will impact cultural resources that meet the criteria for listing as an SAL.

A background literature review was performed for the proposed project's footprint, which includes a 1.9-mile-long project alignment within the project area boundary. The background literature review determined that no previously recorded cultural resources intersect the approximate 943-acre project area [44]. The historical map review did not identify any potential historic-age buildings/structures within the project area [45].

A probability model was used to assess the overall potential of buried prehistoric archaeological deposits in the project area, which included low, moderate, and high potential zones. The model indicated that the entirety of the project area had a low likelihood of containing significant, unidentified archaeological resources. Areas with higher archaeological probability would have been considered to

[43] Political subdivision entities include any county, municipality, special district, river authority or compact, Title 4 Water Code District, soil and water conservation district, county or municipal improvement district, regional planning commission, council of government, or utility that is public-owned. Refer to Texas Water Code (TWC) §2254.021.
[44] Texas Historical Commission (THC). 2024. Texas Archeological and Historical Sites Atlas. Available at: https://atlas.thc.texas.gov/. Accessed December 2024.
[45] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed December 2024.

be located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score for the project area was developed, which considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area. Next, the cultural resources within the project area were evaluated according to its NRHP eligibility and SAL designation. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts and properties or archaeological sites, SALs, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, Recorded Texas Historical Landmarks, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, Freedom Colonies, and historical markers each received 1 point. The points for all cultural resources within the project area were tabulated and added to the mean score for a total cultural assessment score.

According to the background review results, no cultural resources or potential historic-age structures are located within the project area; the probability model indicates a low likelihood of buried deposits; and the project assessment score is 11.5. Based on these results, a cultural resource assessment is not likely to be necessary for the final design plan; however, cultural resource investigations may be required depending on whether regulatory triggers are present.

5.2.6.4 Engineering and Costing

Preliminary engineering and costing analyses have been performed using the 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Tool, which includes standard costing procedures and method for calculating unit costs. The estimated costs include all facilities required for water production, collection, transmission, and treatment. Given the anticipated TDS concentration of the water, treatment for desalination and disinfection is assumed to be necessary to meet drinking water standards for all projects. In addition, it is assumed that brine concentrate will be disposed via deep well injection well(s).

A summary of the projected cost estimates for development of brackish groundwater projects is provided in Table 5.2.6-10. Infrastructure was sized to deliver the sponsor's Envisioned Yield, but because the project is MAG-limited, the annual unit costs were calculated using the MAG-Constrained Yield in the first decade of implementation. All cost estimates consider infrastructure and capacities necessary to deliver the sponsor's Envisioned Yield, despite the lack of groundwater availability. TWDB Costing Tool Cost Estimate Summaries for the Fresh Groundwater Development WMS are provided in Appendix 5E.

Table 5.2.6-10 Cost Estimate Summary for the Brackish Groundwater Development WMS

Water User Group	Total Cost of Facilities	Total Cost of Project	Annual Cost	Annual Cost of Water ($ per acft)
Caldwell Brackish Partnership Project	$ 208,281,000	$ 292,793,000	$ 40,904,000	$ 6,490
Gonzales & Guadalupe Brackish Partnership Project	$ 300,344,000	$ 421,443,000	$ 56,005,000	$ 6,125

Water User Group	Total Cost of Facilities	Total Cost of Project	Annual Cost	Annual Cost of Water ($ per acft)
County Line SUD - Trinity Project	$ 40,044,000	$ 56,315,000	$ 9,979,000	$ 19,958
County Line SUD - Brackish Edwards Project	$ 14,622,000	$ 20,907,000	$ 7,492,000	$ 14,984
Maxwell SUD - Trinity Project	$ 12,782,000	$ 18,050,000	$ 2,674,000	$ 11,626
S S WSC - Brackish Carrizo-Wilcox Project	$ 37,734,000	$ 52,902,000	$ 8,815,000	$ 12,504

Caldwell Brackish Partnership Project

Facilities in the Caldwell Brackish Partnership Project will consist of an 11 MGD RO WTP, well field, two injection wells, and a 30-inch diameter, 18-mile transmission pipeline.

Gonzales & Guadalupe Brackish Partnership Project

Facilities in the Gonzales & Guadalupe Brackish Partnership Project will consist of a 14.3 MGD RO WTP, well field, two injection wells, and a 30-inch diameter, 32-mile transmission pipeline with a booster pump station.

County Line SUD – Trinity Project

Facilities in Phase 1 of the County Line SUD – Trinity Project will consist of two wells, infrastructure for brackish groundwater treatment, one injection well, and a 1 million gallon (MG) ground storage tank. Phase 2 will consist of one additional well. Well pumps will be sized to deliver raw water to the water treatment infrastructure. The cost estimate does not include delivery of treated water to the County Line SUD distribution system. Costs associated with land acquisition, WTP, injection well, and pump station are shared with the County Line SUD – Brackish Edwards Project, which is co-located with this WMS.

County Line SUD – Brackish Edwards Project

Facilities in Phase 1 of the County Line SUD – Brackish Edwards Project will consist of two production wells, one injection well, and infrastructure for desalination and disinfection. Phases 2 and 3 will each consist of one additional production well for each phase in the existing wellfield. Well pumps will be sized to deliver raw water to the water treatment infrastructure. The cost estimate does not include delivery of treated water to the County Line SUD distribution system. Costs associated with land acquisition, WTP, injection well, and pump station are shared with the County Line SUD – Trinity Project, which is co-located with this WMS.

Maxwell SUD – Trinity Project

Facilities in the Maxwell SUD – Trinity Project will include a new production well, an injection well, collector pipelines, GST, and a WTP. Well pumps will be sized to deliver the raw water to the water treatment infrastructure and storage tank. Treated water will be delivered to Maxwell SUD's distribution system via a new 16-inch pipeline that will replace the existing 6- and 8-inch pipelines.

S S WSC – Brackish Carrizo-Wilcox Project

The engineering and costing analysis for S S WSC Brackish Carrizo-Wilcox Project includes all facilities required for water production from the Carrizo-Wilcox Aquifer, including wells, collector pipeline, water treatment utilizing RO technology, treated water pipeline and pump stations, and disposal of concentrate to deep injection wells. The well field consists of three brackish water supply wells, two miles of collector pipelines with a diameter of 12 inches. The treated water facilities consist of a short 12 inch diameter transmission pipeline, a pump station, and integration into the existing distribution system. A concentrate disposal well, ground storage tank, pipelines, and facilities are planned near the Sutherland Springs Road Plant. The target disposal of the concentration will be deep well injection into depleted or partially depleted oil and gas producing reservoirs (Austin Chalk or Edwards Limestone).

The required secondary Maximum Contaminant Level (MCL) for TDS is 1,000 mg/L. The design of the water treatment facilities is to produce potable water with a TDS concentration of about 400 to 500 mg/L. The preliminary water treatment design includes: 1) pretreatment of all raw water; 2) about 60% of this water will be sent to the desalination WTP; and 3) the remaining 40% will be blended with the desalinated water. The desalination plant recovery rate using conventional RO with raw water having a TDS of about 1,200 mg/L is estimated to be 85%, meaning that 85% of the water entering the desalination plant becomes purified water and 15% of the water remains as concentrated brine. The desalinated water and the treated brackish water are blended to produce treated water with a TDS of about 480 mg/L. This process converts about 90% of the quantity of raw water produced from the well field into potable water. The remaining 10% is a concentrate and is discharged to a deep injection well.

5.2.6.5 Implementation Considerations

Implementation of the Brackish Groundwater Development WMS includes the following considerations:

- Verification of available groundwater quantity and well productivity;
- Verification of water quality for concentrations of constituents, such as TDS, chloride, sulfate, iron, manganese, and hydrogen sulfide;
- Verification of the potential for deep well injection of concentrate;
- Verification that desalinated water is compatible with other water sources being used by customers and will meet all water quality requirements in the end user’s distribution system;
- Verification of impacts to the aquifer source;
- Verification that groundwater is compatible with other water sources being used by the sponsor and/or its customers and that it will meet all water quality requirements in the end user’s distribution system;
- Potential for differing water qualities/chemical constituents in the water;
- Regulations by and obtaining permits from the Gonzales County Underground WCD, including the renewal of pumping permits at 5 year intervals;
- Regulations by TCEQ;
- Regulations by and obtaining permits from local GCDs, including potential permit renewals;
- Permitting Class 1 disposal wells for deep well injection of desalination concentrate through TCEQ General Permit;
- Experience in operating and maintaining a desalination WTP;

- Depending on the level and types of project impacts, the following natural and cultural resources studies and agency coordination may be required:
  - Stream/wetland delineations to support USACE Section 404 permitting;
  - Site-specific evaluations for threatened/endangered species habitat;
  - Presence/absence surveys for threatened/endangered species if suitable habitat occurs;
  - USFWS and TPWD coordination if protected species may be affected; and
  - Structured cultural resources surveys of project impact areas, and THC coordination in compliance with the ACT and NHPA, if applicable.
- Because of the generalized nature and planning-level detail of this evaluation, each individual entity or WUG should conduct more thorough and site-specific evaluations for any new well. It is recommended that the owner or WUG evaluate infrastructure capabilities specific to their existing system and their local hydrogeologic conditions to determine feasibility and to refine cost estimates accordingly;
- During times of drought, WUGs should be aware that the saturated thickness and, therefore, the associated well capacity, may be impacted by drawdown from nearby operating wells; and
- Competition with others in the area for groundwater in the Carrizo-Wilcox Aquifer may include the following:
  - Private water purveyors;
  - public water purveyors in the area; and/or
  - future oil and gas drilling operations.

Caldwell Brackish Partnership Project

Implementation of the Caldwell Brackish Partnership Project WMS will require permits and approvals from TCEQ, the Plum Creek CD, and the Gonzales County UWCD.

Gonzales & Guadalupe Brackish Partnership Project

Implementation of the Gonzales & Guadalupe Brackish Partnership Project WMS will require permits and approvals from TCEQ, the Guadalupe County GCD, and the Gonzales County UWCD.

County Line SUD – Trinity Project

Implementation of the County Line SUD – Trinity Project WMS will require permits and approvals from TCEQ and the EAA. Given the approximate location of the well field, the proposed wells could be regulated by Plum Creek CD, BSEACD, or EAA.

County Line SUD – Brackish Edwards Project

Implementation of the County Line SUD – Brackish Edwards Project WMS will require permits and approvals from TCEQ and the EAA. Given the approximate location of the well field, the proposed wells could be regulated by Plum Creek CD, BSEACD, or EAA.

Maxwell SUD – Trinity Project

Implementation of the Maxwell SUD – Trinity Project WMS will require permits and approvals from TCEQ, the EAA, and the BSEACD.

S S WSC – Brackish Carrizo-Wilcox Project

Implementation of the S S WSC – Brackish Carrizo-Wilcox Project WMS will require permits and approvals from the TCEQ and the Evergreen UWCD.

5.2.7 Groundwater Conversions

The SCTRWPG identified the Groundwater Conversions WMS as a potentially feasible strategy. However, for the 2026 Regional Water Plan, the SCTRWPG designated the Groundwater Conversions WMS as considered and evaluated but not recommended because there are no sponsoring entities under this strategy.

5.2.7.1 Description of Water Management Strategy

The Groundwater Conversions WMS is intended to be used by WUGs where the Fresh Groundwater Development WMS (Section 5.2.5) would be the primary recommended strategy to meet their needs, but no groundwater is available because of existing permits and/or MAG constraints. This strategy includes purchasing and/or leasing existing irrigation or mining groundwater permits and changing the type of use to municipal use. The Local Groundwater Conversions are intended to be used within the same county between willing sellers and willing buyers.

For the 2026 SCTRWP, no strategies were identified that would be appropriate for utilizing Groundwater Conversions as a WMS through conversions.

5.2.7.2 Available Yield

This WMS has zero firm yield as there are no sponsoring entities. Table 5.2.7-1 provides a summary of the available yield for the Groundwater Conversions WMS.

Table 5.2.7-1 Available Yield for the Groundwater Conversions WMS (acft/yr)

WMS	2030	2040	2050	2060	2070	2080
Groundwater Conversions	0	0	0	0	0	0

The available supply from the Groundwater Conversions WMS would be limited to the firm supply under existing irrigation or mining groundwater permits and surplus availabilities within the same county as the municipal WUG seeking to acquire additional supply via use type conversion.

5.2.7.3 Environmental and Cultural Considerations

Environmental and cultural issues associated with the local groundwater conversions are anticipated to be limited. The projects may result in agricultural impacts in the form of reductions in irrigated acreage.

5.2.7.4 Engineering and Costing

The cost associated with the local groundwater conversions WMS is limited to the negotiations between willing sellers and willing buyers. Details associated with the costs necessary to develop groundwater infrastructure, if able to complete a successful transaction, can be found in the Fresh Groundwater Development WMS (Section 5.2.5).

5.2.7.5 Implementation Considerations

Implementation would require the ability to execute contractual agreements between the municipal WUG and the irrigators or mining entities and the ability to amend existing groundwater permits at the groundwater conservation district to add municipal use as a type. If the rules of the groundwater conservation district do not explicitly allow for the conversion of groundwater permits between use types, then such rules would need to be amended.

5.2.8 Facilities Expansion

The SCTRWPG identified the Facilities Expansion as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.8.1 Description of Water Management Strategy

Several WUGs are interested in projects to expand major components of their existing infrastructure (facilities) so they can continue to provide a safe and reliable water supply to their customers during the planning period. These facilities expansions are considered to be independent of any potential WMSs to acquire a new water supply and instead, are intended to address expected future improvements to the water system, such as the installation of new water transmission facilities or additional water treatment. Additionally, these facilities expansions could include new transmission facilities designated to move waters from multiple WMSs throughout an area.

Facilities expansions projects are included in the 2026 SCTRWP at the request of project sponsors (i.e., WUGs and WWPs). Given the localized impacts of these projects, there are no significant impacts to environmental factors or cultural resources. However, This WMS does not include an environmental assessment, as any environmental issues would likely be localized. Furthermore, cost estimates for each of these facilities expansions are limited and compiled herein using information from the sponsoring entity. Cost estimate summaries for each of these projects are included in Appendix 5E.

CRWA Lake Dunlap WTP Expansion

CRWA is seeking an expansion of its Lake Dunlap WTP and transmission facilities to meet future needs. The facility currently has a capacity of 14.4 MGD or 16,100 acft/yr and the expansion is expected to provide an additional 2 MGD (2,300 acft/yr) of capacity in the 2030 decade. Current WMS supplies may be limited by availability and are only made consistent with TWDB data. Available yield volumes are not representative of the physical project.

CRWA Hays Caldwell WTP Expansion

CRWA is planning to expand its Hays Caldwell WTP to treat an additional 2 MGD (2,300 acft/yr). This expansion is currently planned for the 2030 decade. Current WMS supplies may be limited by availability and are only made consistent with TWDB data. Available yield volumes are not representative of the physical project.

County Line SUD SH-21 Booster Site

County Line SUD (CLSUD) plans to expand the SH-21 Booster Site, which receives 1,308 acft/yr of surface water from the CRWA Hays-Caldwell WTP up to a peak amount of approximately 1.5 MGD. Additional water supplies from CRWA, such as the CRWA Wells Ranch (Phase 3) WMS, would be delivered to this booster site. To accommodate these additional water supplies, the SH-21 Booster Site will require expansion, including additional ground storage, pumps, piping, and electrical upgrades. It is estimated that such expansions would occur by 2040 .

County Line SUD High Road Booster Site

CLSUD is seeking an expansion of their High Road Booster Site to enable delivery of future water sources to CLSUD's distribution system. The High Road Booster Site will receive approximately 0.25 MGD (290 acft/yr) of water from future ARWA groundwater projects. The initial phase is anticipated for implementation by 2030. Additionally, ARWA plans to develop future phases to deliver increased water volumes to customers. With the additional ARWA supplies, CLSUD will expand the facility in the future, which would likely include a second ground storage tank, pumps, piping, electrical upgrades, and a generator. It is estimated that additional, future expansions would be implemented by 2040.

County Line SUD Bobwhite Booster Site

CLSUD plans to develop a new 2.8 MGD WTP at an existing booster site location to allow delivery of future water sources and pumping to CLSUD's distribution system. The project is anticipated to be implemented by 2030. The Bobwhite Booster Site will be designed to treat, store, and pump 2,419 acft/yr of groundwater from GBRA, with the flexibility for expansion to accommodate potential future sources of supply. Future expansions will likely include expanded ground storage, pumps, piping, and electrical and would likely occur in the mid-2030s.

GBRA Western Canyon WTP Expansion

GBRA is seeking an expansion of its Western Canyon WTP and transmission facilities to meet future needs in western Comal County. The WTP expansion is expected to increase the treatment capacity and transmission pump stations of the plant from 11 MGD to 16 MGD – an increase of 5 MGD (5,600 acft/yr). GBRA expects these expansions to be online in the 2030 decade. Current WMS supplies may be limited by availability and are only made consistent with TWDB data. Available yield volumes are not representative of the physical project.

NBU South WTP Expansion

NBU is seeking an expansion of its South WTP and transmission facilities to meet future needs of the service area. The WTP expansion is expected to increase the treatment capacity of the plant from 8 MGD to 16 MGD (8,960 acft/yr increase). Improvements to transmission pump stations will increase capacity to 16 MGD. NBU expects these facilities to be developed by 2030. Current WMS supplies are limited by availability and are only made consistent with TWDB data. Available yield volumes are not representative of the physical project.

The design and bidding of the SWTP is expected to be complete by the end of 2025 and construction is expected to be complete by the end of 2028. The SWTP is anticipated to be online by early 2029 producing additional 8 mgd of potable water. The water is meant to meet NBU's demand.

To produce this 8 mgd of potable water, an additional treatment train is being added consisting of rapid mix chamber, flocculation chamber, clarification basin with inclined plate settlers, filters, junction chamber, storage tank, decantation basin, and sludge drying beds. A new chemical building will be added, and the high service pump station will see additional pumps installed to support both existing and proposed treatment trains.

Part of the SWTP site is located in the FEMA designated 100-year flood zone. Therefore, the design has incorporated improvements to make the new treatment train a hardened facility, with the entire train raised above the 100-year flood elevation. The only existing grade level access into the filter gallery will have a flood-proof door. The new chlorine, liquid ammonia sulfate, fluoride building, electrical building and raw water pump station electrical equipment are also raised above the 100-year flood elevation.

NBU South WTP 2 and Two Expansions

NBU is looking to construct the South WTP and expansion over the next several years. The project is tentatively sited north of the existing WTP on a plot of land that NBU has already purchased. A Preliminary Feasibility Study evaluated the most appropriate water treatment capacity and construction year for the South WTP. Initial completion of the South WTP construction is anticipated in the late 2030 decade, resulting in an initial capacity of 8,400 acft/yr. The first expansion of the plant will be implemented by 2050, adding another 4,200 acft/yr. The final expansion will occur in 2060 and will add the remaining 4,200 ac-ft/yr with an ultimate plant capacity of 16,800 acft/yr. Current WMS supplies may be limited by availability and are only made consistent with TWDB data. Available yield volumes are not representative of the physical project.

NBU-Seguin Interconnect

NBU is looking to construct an interconnect with the City of Seguin to receive an additional 2.2 MGD (2,500 acft/yr). This strategy includes a 26,300 foot long 14-inch pipeline and a new pumping station. These facility expansions would provide an increased capacity of 2.2 MGD (2,500 acft/yr). NBU expects these facilities to be developed in the 2030 decade. This project aims to maximize the production capacity with the capability to fully utilize NBU's existing water rights and recharge NBU's planned ASR well field as quickly as excess water supply is available.

SAWS Southeast Integration Pipeline (Phase 2)

SAWS plans to develop a new, 36-inch Southeast Integration Pipeline, which will be designed to increase the operational flexibility to integrate water as a segment off the Eastern Integration Pipeline (also known as the ASR transmission line) in the high growth area of southeast Bexar County. The Southeast Integration Pipeline will convey treated water from either Artesia, Mission, or SAWS H_2Oaks Center to a newly constructed production facility in this southeast region. The rated capacity of the pipeline will be at least 20 MGD to accommodate full buildout of the new production facility. Construction is scheduled for 2035 and the pipeline is expected to be in service by 2040.

SAWS Expanded ASR Treatment Plant

SAWS plans to expand its existing ASR Treatment Plant, known as the SAWS H_2Oaks Center. The expansion is planned to be implemented by 2030, and is necessary to accommodate additional water from the Expanded Local Carrizo Project and to allow larger volumes of stored ASR water to be recovered during severe, multi-year droughts. This will decrease demand on the Edwards Aquifer, which benefits the region by staving off deeper critical period reductions. The Expanded ASR Treatment Plant will increase the plant's capacity by 30 MGD (33,600 acft/year), resulting in a future total capacity of 60 MGD. Costs and discussion here are only related to the expansion of the ASR WTP. Infrastructure and costs associated with the SAWS Expanded Local Carrizo Project are discussed in detail in Section 5.2.25.

Springs Hill WSC Zone 2 Transmission Main

Springs Hill WSC is seeking implementation of a new Zone 2 Transmission Pipeline. The project includes 11,800 linear feet of 16-inch pipe, a new pump station, and a new 16-inch pipeline bored under the Guadalupe River along SH-46, which would increase capacity by 2030. The bored pipeline would be approximately 1,000 linear feet.

Springs Hill WSC Gamecock WTP

Springs Hill WSC is interested in constructing the new Gamecock WTP at the intersection of Gamecock Road and FM 725. The WTP is expected to have a treatment capacity of 4 MGD (4,480 act/yr) and be implemented by 2040 . Other infrastructure will include a 1 MG ground storage tank, new intake, and pump station from Lake Placid, and conveyance pipelines from the intake to the WTP. Sources of supply to be treated at the Gamecock WTP include surface water from Lake Placid (Guadalupe Run-of-River) and water purchased from the SSLGC interconnect. Current WMS supplies may be limited by availability and are only made consistent with TWDB data. Available yield volumes are not representative of the physical project.

CPS Energy Direct Recycle Pipeline (Bexar Co. Steam-Electric)

City Public Services (CPS) Energy is considering a direct reuse pipeline from SAWS' Steven M. Clouse Water Recycling Center (WRC) to its CPS Energy power plant lakes (Calaveras Lake and Lake Braunig). For purposes of the 2026 SCTRWP, Bexar County Steam-Electric Power is identified as the sponsor of this project. The capacity of the pipeline 44.6 MGD (50,000 acft/yr) and the available yield of recycled water from SAWS to CPS Energy is 4.46 MGD (5,000 acft/yr) in the 2030 decade.

5.2.8.2 Available Yield

Table 5.2.8-1 provides a summary of the projects associated with the Facilities Expansion WMS, including the decade of implementation, capacity of expansion, and supply to be developed from this WMS. WMS supplies may differ from the capacities of infrastructure because facilities are frequently designed to meet peak demand, whereas the WMS supply is based on water availability and average flows. In some cases, water availability is limited by the MAG or water rights. Additionally, facilities are frequently designed for capacities larger than current supplies in order to meet future demands as a result of growth. Engineering and costing information associated with these facilities expansion projects is summarized in Section 5.2.8.4.

Table 5.2.8-1 Capacities and Available Yields for the Facilities Expansion WMS (acft/yr)

Project Name	Implementation Decade	Capacity of Expansion	2030 Yield	2040 Yield	2050 Yield	2060 Yield	2070 Yield	2080 Yield
CRWA Lake Dunlap WTP Expansion (2 MGD)	2030	2,300	59	59	59	2,300	2,300	2,300
CRWA Hays Caldwell WTP Expansion (2 MGD)	2030	2,300	406	406	406	2,165	2,165	2,165
County Line SUD SH-21 Booster Site	2040	N/A[B]	0	N/A[B]	N/A[B]	N/A[B]	N/A[B]	N/A[B]
County Line SUD High Road Booster Site	2030	N/A[B]	N/A[B]	N/A[B]	N/A[B]	N/A[B]	N/A[B]	N/A[B]
County Line SUD Bobwhite Booster Site	2040	N/A[B]	0	N/A[B]	N/A[B]	N/A[B]	N/A[B]	N/A[B]
GBRA Western Canyon WTP Expansion (5 MGD)	2030	5,600	1,245	1,245	1,245	1,245	1,245	1,245
NBU South WTP Expansion (8 MGD)	2030	8,400	See note A	See note A	See note A	See note A	See note A	See note A

Project Name	Implementation Decade	Capacity of Expansion	2030 Yield	2040 Yield	2050 Yield	2060 Yield	2070 Yield	2080 Yield
NBU South WTP 2 (8 MGD)	2040	8,400	0	See note A	See note A	See note A	See note A	See note A
NBU South WTP 2 Expansion 1 (4 MGD)	2050	4,200	0	0	See note A	See note A	See note A	See note A
NBU South WTP 2 Expansion 2 (4 MGD)	2060	4,200	0	0	0	See note A	See note A	See note A
NBU-Seguin Interconnect	2030	2,500	2,500	2,500	2,500	2,500	2,500	2,500
SAWS Southeast Integration Pipeline (Phase 2)	2040	N/A[B]	0	N/A[B]	N/A[B]	N/A[B]	N/A[B]	N/A[B]
SAWS Expanded ASR Treatment Plant (30 MGD)	2040	33,600	0	33,600	33,600	33,600	33,600	33,600
Springs Hill WSC Zone 2 Transmission Main	2030	N/A[B]	N/A[B]	N/A[B]	N/A[B]	N/A[B]	N/A[B]	N/A[B]
Springs Hill WSC Gamecock WTP (4 MGD)	2040	4,480	0	3,200	3,200	3,200	3,200	3,200
CPS Energy Direct Recycle Pipeline from the Steven M. Clouse WRC to Calaveras Lake (Bexar Co. Steam-Electric)	2030	50,000	5,000	5,000	5,000	5,000	5,000	5,000

[A] The four NBU WTP projects are for infrastructure only. These infrastructure projects are all associated with the same 6,800 acft/yr of remaining contract supply volume. The total yield available for all four projects is 6,800 acft/yr.

[B] Conveyance facilities expansion projects are for infrastructure only. These infrastructure projects do not include available yields as the supply source is associated with the WUG's existing surplus or other WMS.

5.2.8.3 Environmental and Cultural Considerations

Facilities expansions typically include addition of or expansion to WTPs, pipelines, pump stations, ground storage tanks, or elevated storage tanks. Many of these projects are located on land and easements that are already secured by the WUG or WWP. These projects are not expected to have significant impacts on effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico, agricultural resources, wildlife habitats, and cultural resources. During the permitting process for these facilities expansions, some facilities may require habitat studies and surveys for protected species and a cultural review. Detailed field surveys would typically be required for expansion projects involving new pipeline construction and/or expansion of facilities requiring extensive vegetation clearing, soil disturbance, or stream/wetland impacts. If a significant negative impact appears likely, some modifications to the project may be required. Mitigation may include compensation for net losses of wetlands where impacts are unavoidable. Appendix 5D provides a summary of threatened and endangered species and SGCN that may occur in the project area [1, 2].

The Facilities Expansion WMS was evaluated to determine its potential impacts on environmental factors. A summary of the evaluation is presented in Table 5.2.8-2.

Table 5.2.8-2 Potential Project Effects on Environmental Factors for the Facilities Expansion WMS

Consideration	Potential Impacts
Vegetation, Land Use, and Agricultural Resources	• Possible impacts on native vegetation, depending on project location and whether it is temporary or permanent. Temporary construction impacts provide an opportunity to plant native herbaceous species which are beneficial to native wildlife. • Permanent impacts may include conversion of vegetation to pipeline easements and other industrial uses. • Possible impacts to land use and agricultural resources if they are permanently converted for use by the project, depending on project location. • No apparent negative impacts on state water resources; benefit accrues to demand centers by more efficient use of available water supplies; no effect on navigation.
Aquatic Resources	• No anticipated impacts to water quality, environmental water needs, instream flows, or effects on bays, estuaries, and arms of the Gulf of Mexico. • Possible impacts on wetlands and waters of the United States, depending on project location. Site-specific stream and wetland delineations would be required to determine the extent of impacts, and to see if project adjustments can be made to reduce or avoid impacts to sensitive aquatic features.
Threatened and Endangered Species and SGCN	• Appendix 5D provides a summary of threatened and endangered species, and SGCN that may occur in the counties where the projects are located. • Possible impacts for listed species, depending on project location and habitat requirements.
Cultural Resources	• Possible impacts, depending on project location. Cultural resources survey of the final design plan may need to be

[1] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.
[2] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List. https://ipac.ecosphere.fws.gov/location/index.

	performed to accurately assess the presence and significance of identified and unrecorded cultural resources within the footprint of the project.

5.2.8.4 Engineering and Costing

Preliminary engineering and costing analyses were performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs.

A summary of the projected cost estimates associated with the Facilities Expansion WMS is provided in Table 5.2.8-3. Infrastructure was sized to deliver the sponsor's Envisioned Yield or Infrastructure Capacity, but because the available yield is limited for some projects, the annual unit costs were calculated using the available yield in the first decade of implementation. All cost estimates consider infrastructure and capacities necessary to deliver the sponsor's Envisioned Yield or Infrastructure Capacity, despite the lack of water supply availability. TWDB Costing Tool Cost Estimate Summaries for the Facilities Expansion WMS are provided in Appendix 5E.

Table 5.2.8-3 Cost Estimate Summary for the Facilities Expansion WMS

Project	Total Project Cost	Total Annual Cost
CRWA Lake Dunlap WTP Expansion (2 MGD)	$13.78M	$1.86M
CRWA Hays Caldwell WTP Expansion (2 MGD)	$13.78M	$1.86M
County Line SUD SH 21 Booster Site	$2.1M	$0.22M
County Line SUD High Road Booster Site	$1.4M	$0.14M
County Line SUD Bobwhite Booster Site	$2.8M	$0.31M
GBRA Western Canyon WTP Expansion (5 MGD)	$23.73M	$2.98M
NBU South WTP Expansion (8 MGD)	$33.65M	$4.1M
NBU South WTP 2 (8 MGD)	$84.58M	$10.33M
NBU South WTP 2 (Expansion 1) (4 MGD)	$20.42M	$2.61M
NBU South WTP 2 (Expansion 2) (4 MGD)	$20.42M	$2.61M
NBU-Seguin Interconnect	$16.02M	$1.61M
SAWS Southeast Integration Pipeline (Phase 2)	$76.99M	$6.58M
SAWS Expanded ASR Treatment Plant (30 MGD)	$92.59M	$11.16M
Springs Hill WSC Zone 2 Transmission Main	$58.54M	$4.61M
Springs Hill WSC Gamecock WTP (4 MGD)	$64.33M	$7.89M
CPS Energy Direct Recycle Pipeline (Bexar Co. Steam-Electric)	$85.2M	$7.49M

5.2.8.5 Implementation Considerations

Implementation of the Facilities Expansion WMS includes the following considerations:

- Impacts and considerations are dependent on the type of project, location, source of supply, interested parties, and other factors;
- Project sponsors will need to secure and/or verify availability of water supply source(s);
- Securing permits, authorizations, or applicability of regulations by agencies and entities, such as TCEQ, TxDOT, GLO, USACE, GCDs, EAA, and other local entities; and
- Additional implementation considerations may include impacts on the following:
  - Endangered and threatened species;
  - Cultural resources;
  - Baseflow in streams; and
  - Wetlands.

5.2.9 Recycled Water

The SCTRWPG identified the Recycled Water WMS as a potentially-feasible strategy. The SCTRWPG designated all Recycled Water strategies and projects as Recommended strategies in the 2026 Regional Water Plan, with the exception of the SAWS Direct Potable Reuse project. At the request of SAWS, the SAWS Direct Potable Reuse Project was designated as an Alternative strategy in the 2026 Regional Water Plan.

5.2.9.1 Description of Water Management Strategy

This strategy consists of projects that utilize treated effluent from domestic WWTPs as a water supply, reducing the overall demand for potable water supply. Recycled water typically involves a capital project connecting the WWTP discharge facilities to an individual area that has a relatively high, localized use. Examples most frequently include the irrigation of golf courses and other public lands and specific industries or industrial use areas. Currently, a few entities use all of their effluent for reclaimed water purposes; however, it is likely that increased pressure on water supplies will result in increased emphasis on recycled water in the future.

The Recycled Water strategy assumes that downstream needs, both water rights and environmental instream uses, would be met before any remaining flows could be utilized for reclaimed water purposes. Virtually any water supply entity with a WWTP could pursue a recycled water alternative, provided that downstream water rights do not have a claim for the entire return flow.

Recycled water quality and system design requirements are regulated by the TCEQ under 30 TAC §210. TCEQ allows two types of recycled water as defined by the use of the water and the required water quality:

- Type 1 – Public or food crops generally can come in contact with recycled water.
- Type 2 – Public or food crops cannot come in contact with recycled water.

Current TCEQ criteria for recycled water are shown in Table 5.2.9-1. Trends across the country indicate that criteria for unrestricted recycled water will likely tend to become more stringent over time. The water quality required for Type 1 recycled water is more stringent with lower requirements for oxygen demand (five-day biochemical oxygen demand [BOD_5] or five-day carbonaceous biochemical oxygen demand [$CBOD_5$]), turbidity, and fecal coliform levels.

A general evaluation of recycled water for multiple WUGs with needs and potential wastewater sources were utilized to evaluate a broad range of potential recycled water supplies.

Table 5.2.9-1 TCEQ Criteria for Recycled Water (Allowable Levels)

Parameter	Type 1	Type 2 For a System Other Than a Pond	Type 2 For a Pond System
BOD_5 or $CBOD_5$	5 mg/L	20 mg/L	30 mg/L
Turbidity	3 NTU	3 NTU	3 NTU
Fecal Coliform [1]	20 CFU/100 mL [1]	200 CFU/100 mL [1]	200 CFU/100 mL [1]
Fecal Coliform (not to exceed) [2]	75 CFU/100 mL [2]	800 CFU/100 mL [2]	800 CFU/100 mL [2]

Parameter	Type 1	Type 2 For a System Other Than a Pond	Type 2 For a Pond System
Enterococci [1]	4 CFU/100 mL [1]	35 CFU/100 mL [1]	35 CFU/100 mL [1]
Enterococci (not to exceed) [2]	9 CFU/100 mL [2]	89 FU/100 mL [2]	89 FU/100 mL [2]

[1] Geometric mean
[2] Single grab sample
NTU - nephelometric turbidity unit; CFU - colony forming units; mL - milliliter.

5.2.9.2 Evaluation of Submitted Reuse Water Management Strategies

This WMS has 10 projects with varying firm yields and implementation decades. Table 5.2.9-2 provides a summary of the available yields for the Recycled Water WMS.

Table 5.2.9-2 Available Yield for the Recycled Water WMS (acft/yr)

WUG, Project Name	2030	2040	2050	2060	2070	2080
Boerne, Direct Non-Potable Reuse	1,500	1,500	1,785	2,000	2,250	2,250
County Line SUD, Direct Non-Potable Reuse	560	1,120	1,680	2,240	2,800	3,360
Fair Oaks Ranch, Direct Non-Potable Reuse	425	500	525	525	525	525
GBRA, Direct Non-Potable Reuse	1,064	6,778	10,587	10,587	10,587	10,587
Kyle, Direct Non-Potable Reuse	3,105	4,786	4,786	4,786	4,786	4,786
New Braunfels, Direct Potable Reuse	0	0	7,800	12,600	14,200	15,800
San Antonio River Authority, Direct Non-Potable Reuse	1,000	6,750	12,500	18,200	21,100	24,000
SAWS, Direct Non-Potable Reuse	5,000	5,000	15,000	25,000	40,000	40,000
SAWS, Direct Potable Reuse (Alternative)	0	0	0	25,000	25,000	25,000
San Marcos, Direct Non-Potable Reuse	1,971	1,971	1,971	1,971	1,971	1,971
San Marcos, Direct Potable Reuse	0	0	4,705	4,705	4,705	4,705

Boerne (Direct Non-Potable)

Boerne, located in Kendall County, currently supplies direct reclaimed water for municipal irrigation uses and is considering expansion of their WWTP, enabling them to increase reclaimed water supplies. Boerne is currently completing a study to assess an expansion of their WWTP, which would include infrastructure upgrades and expanded capacity that would yield increased effluent. It is anticipated that the additional return flows would be treated the reclaimed water quality standards and provided to reuse customers.

Boerne currently has infrastructure in place for distributing reclaimed water; as such, it is assumed that most costs associated with this strategy will be related to additional storage and pumping capacity due to increased WWTP return flows. For purposes of this WMS, new infrastructure includes a storage tank and high service pump station (HSPS). Table 5.2.9-3 provides a summary of the available yield for the project.

Table 5.2.9-3 Boerne Reuse Available Yield (acft/yr)

WUG, Project Name	2030	2040	2050	2060	2070	2080
Boerne, Direct Non-Potable Reuse	1,500	1,500	1,785	2,000	2,250	2,250

County Line SUD (Direct Non-Potable)

County Line SUD, located in Caldwell and Hays Counties, is planning a phased project to develop a new direct reclaimed water distribution system for the future. In the first phase, County Line SUD will provide reclaimed water to a nearby concrete plant (approximately 60,000 gallons per day [gpd]) and several residential subdivisions to irrigate their parks and green spaces. Potential residential end users include existing and new subdivisions. The concrete plant should have consistent demands and use of reclaimed water; however, residential users' demands will fluctuate seasonally due to rainfall, weather, and growing seasons for turfgrass and plants.

County Line SUD has constructed a purple pipe that will link the reuse pump station to landscape/park irrigation meters within a subdivision that is being built and another that is expected to start construction in the near future. Current proposed projects include a non-potable reuse pump station and waterline improvements to deliver non-potable water to one of the water system's highest volume users. The construction of a new 12-inch potable waterline will allow County Line SUD to convert an existing 4-inch potable water pipe along that same route alignment to reclaimed water, which will deliver the reuse water to the concrete plant. Other future improvements will be determined as potential non-potable water users are targeted. Table 5.2.9-4 provides a summary of the available yield for the project.

Table 5.2.9-4 County Line SUD Reuse Available Yield (acft/yr)

WUG, Project Name	2030	2040	2050	2060	2070	2080
County Line SUD, Direct Non-Potable Reuse	560	1,120	1,680	2,240	2,800	3,360

Fair Oaks Ranch (Direct Non-Potable)

Fair Oaks Ranch, located in Kendall, Comal, and Bexar Counties, currently has a successful water reuse program that provides direct non-potable reuse water from its WWTP to a golf course for irrigation. The city is contractually obligated to provide all effluent from the WWTP to the golf course. The existing reuse system consists of a network of lines ranging from 6 to 8 inches, two chlorine stations, and three effluent storage ponds.

The City is planning to upgrade the WWTP effluent pump station and conveyance lines to 12 inches to increase throughput. The golf course is also planning to construct an additional effluent storage pond. As the reuse program expands, irrigation with potable water will be reduced on a gallon-for-gallon basis. Table 5.2.9-5 provides a summary of the available yield for the project.

Table 5.2.9-5 Fair Oaks Ranch Reuse Available Yield (acft/yr)

WUG, Project Name	2030	2040	2050	2060	2070	2080
Fair Oaks Ranch, Direct Non-Potable Reuse	425	500	525	525	525	525

GBRA (Direct Non-Potable)

GBRA currently provides reclaimed water from the Stein Falls WWTP located in Comal County to the Calpine Guadalupe Energy Center, which is a natural gas fired combined cycle power plant located in Guadalupe County. Stein Falls WWTP currently sends all of their wastewater effluent to the power plant, resulting in zero discharge for many years. GBRA plans to expand the Stein Falls WWTP, which would increase the amount of direct non-potable reclaimed water available for existing and potential new customers. The recycled water is anticipated to meet Type I reclaimed water standards, requiring additional treatment at the WWTP. The project costs include additional treatment, conveyance, and storage facilities. Table 5.2.9-6 provides a summary of the available yield for the project.

Table 5.2.9-6 GBRA Reuse Available Yield (acft/yr)

WUG, Project Name	2030	2040	2050	2060	2070	2080
GBRA, Direct Non-Potable Reuse	1,064	6,778	10,587	10,587	10,587	10,587

Kyle (Direct Non-Potable)

Recycled water has been in use in Kyle for well over two decades, providing reclaimed water to the Plum Creek Golf Course for irrigation since 1998. The city is currently expanding their WWTF from 3.0 to 4.5 MGD and expects to expand shortly thereafter to 9 MGD. Additionally, the city recently expanded their reuse pump station, enabling them to provide up to 1,936 acft/yr of reclaimed water to existing customers. Kyle, located in Hays County, plans to expand upon their existing reclaimed water system to provide reclaimed water to new customers, including parks, athletic fields, residential developments, and commercial developments. Table 5.2.9-7 provides a summary of the available yield for the project.

Table 5.2.9-7 Kyle Reuse Available Yield (acft/yr)

WUG, Project Name	2030	2040	2050	2060	2070	2080
Kyle, Direct Non-Potable Reuse	3,105	4,786	4,786	4,786	4,786	4,786

New Braunfels (Direct Potable)

NBU, located in Comal and Guadalupe Counties, currently owns and operates several WWTPs that provide direct non-potable reclaimed water to customers, including the Gruene Road WWTP, McKenzie WWTP, and North and South Kuehler WWTPs. NBU plans to develop and implement direct potable reuse beginning in the 2050 decade at the North and South Kuehler WWTPs, and expand it to include the McKenzie WWTP beginning in the 2060 decade. In 2023, NBU, the City of New Braunfels, and GBRA launched One Water New Braunfels, which is an interagency collaboration to develop a comprehensive approach to water planning. One Water is a planning and implementation approach that considers all water flows, including reclaimed water, stormwater, and rainwater as viable water resources. As such, expansion of reclaimed water resources will continue to be an area of focus in New Braunfels for the anticipated future.

The current NBU recycled water system provides direct non-potable reuse water to a 29-acre mixed use development called Sundance Park. Delivery of the recycled water is through approximately 0.75 mile of 10-inch pipeline from the Gruene Road WWTP. Three ponds at Sundance Park store effluent. The Gruene Road WWTP is located in the northeastern quadrant of the city on the Guadalupe River, upstream of the confluence with the Comal River.

The North and South Kuehler WWTPs are located south of IH-35 on the Guadalupe River, below the confluence with the Comal River. NBU plans to retrofit and expand the existing wastewater treatment trains at the North and South Kuehler WWTPs to provide direct potable reclaimed water to users. Completion of the treatment systems will occur by the 2050 decade with an initial combined reuse yield of 7,800 acft/yr from both WWTPs. The city plans to expand the treatment system to provide an additional combined reuse yield of 800 acft/yr each decade through 2080.

The McKenzie WWTP is located southeast of New Braunfels off SH-46 on Elley Lane. NBU plans to retrofit and expand the existing treatment trains to provide direct potable reclaimed water to users. The initial direct potable reuse system will be constructed to provide 4,000 acft/yr of reclaimed water by the 2060 decade. The city plans to expand the treatment system to provide an additional combined reuse yield of 800 acft/yr each decade through 2080.

NBU will ensure that any direct potable reuse project complies with all applicable federal and state laws, regulations, rules, guidelines, and design criteria to produce safe drinking water. Table 5.2.9-8 provides a summary of the available yield for the project.

Table 5.2.9-8 New Braunfels Reuse Available Yield (acft/yr)

WUG, Project Name	2030	2040	2050	2060	2070	2080
New Braunfels, Direct Potable Reuse	0	0	7,800	12,600	14,200	15,800

San Antonio River Authority (Direct Non-Potable)

The San Antonio River Authority owns and operates three WWTPs, including Martinez II, Martinez IV, and Salitrillo Creek WWTPs in Bexar County. Although the San Antonio River Authority is not considered a WUG for regional water planning purposes, they provide reclaimed water to several customers, including the City of Universal City (WUG recipient is Universal City), Alamo Community College (WUG recipient is Live Oak), and Texas Landfill Management, LLC (WUG recipient is East Central SUD). The total combined contracted flow commitments for the aforementioned entities currently totals approximately 677 acft/yr.

Developing a recycled water program may provide a cost-effective regional strategy for meeting current and future water needs. In the future, the San Antonio River Authority aims to discharge the base flow required by SB-3 and utilize the rest of the WWTP effluent for direct or indirect reuse. According to a previous San Antonio River Authority study, the base flow requirements for Martinez and Salitrillo Creeks will total 4,344 acft/yr in 2080, which leaves approximately 24,000 acft/yr for the recycled water program in 2080. Direct or indirect potable reuse water from the Salitrillo or Martinez WWTPs for a

WMS is considered available for implementation beginning in the 2030 decade. Table 5.2.9-9 provides a summary of the available yield for the project.

Table 5.2.9-9 San Antonio River Authority Reuse Available Yield (acft/yr)

WUG, Project Name	2030	2040	2050	2060	2070	2080
San Antonio River Authority, Direct Non-Potable Reuse	6,750	12,500	18,200	21,100	24,000	24,000

SAWS (Direct Non-Potable and Potable)

SAWS currently supplies direct and indirect non-potable reclaimed water to retail customers and electrical generation end users. Reclaimed water is produced by SAWS' Leon Creek Water Recycling Center Wastewater Treatment Facility and the Steven M. Clouse Water Recycling Center, both in Bexar County.

SAWS plans to increase its direct non-potable reuse program incrementally beginning in 2030 and expanding it to 40,000 acft/yr by 2080. In addition, SAWS requested inclusion of a direct potable reuse strategy that would be considered as an Alternative strategy. The project would develop 25,000 acft/yr of direct potable reclaimed water beginning in the 2060 decade. The strategy would include advanced treatment technologies to treat wastewater effluent to drinking water standards. The treatment facilities would be located at the Steven M. Clouse Water Recycling Center site, then route the potable reclaimed water to the SAWS H2Oaks Center for direct blending and integration into SAWS' existing potable water distribution system. Table 5.2.9-10 provides a summary of the available yield for the potable and non-potable reuse projects.

Table 5.2.9-10 SAWS Reuse Available Yield (acft/yr)

WUG, Project Name	2030	2040	2050	2060	2070	2080
SAWS, Direct Non-Potable Reuse	5,000	5,000	15,000	25,000	40,000	40,000
SAWS, Direct Potable Reuse (Alternative)	0	0	0	25,000	25,000	25,000

San Marcos (Direct Non-Potable and Potable)

San Marcos is planning to expand and enhance its existing direct non-potable reuse system in the near future and initiate direct potable reuse as soon as the 2050 decade to provide potable water to customers. The existing San Marcos WWTP, located in Hays County, is expected to undergo a 5 MGD expansion prior to 2030, bringing the total capacity to 14 MGD. San Marcos is also planning to construct a new 2 MGD WWTP near FM 1978, which would come online prior to 2030. San Marcos aims to recycle 100 percent of its WWTP effluent by 2080.

The existing recycled water conveyance system consists of an 18-inch diameter main from the San Marcos WWTP to a power plant. There is a 12-inch diameter extension to a cement plant and a planned extension to the proposed Paso Robles Golf Course. Current contracts for recycled water provide a commitment to the power plant but supply other users only on the basis of available supply. Although much of the city's parklands are maintained without supplemental irrigation, the parks along the San Marcos River are the centerpiece of the city's recreational tourist economy. The city's parks department has suggested that irrigating these parklands with recycled water could provide environmental and social benefits by reducing erosion potential along the river and improving the level of service of the local parks.

A previous study identified potential new customers along the existing recycled water pipeline and along the route of a proposed pipeline to serve the Kissing Tree Development and Texas State University's thermal plants. Making recycled water available to the university would reduce demand for San Marcos River water and provide a benefit by allowing increased river flows through the areas of critical habitat. Additional extensions to serve the city's soccer complex and Gary ball fields would reduce potable water demands. Potential industrial users identified by the study include a concrete products manufacturer and a concrete batch plant.

The effluent produced by the existing San Marcos WWTP is already treated to Type 1 reclaimed water standards. Expansion of the direct non-potable system should not require significant additional costs for treatment to non-potable standards. For the direct potable reuse project, advanced treatment technologies would be necessary to meet drinking water standards. Therefore, costs include advanced water treatment, conveyance, and concentrate disposal. Table 5.2.9-11 provides a summary of the available yield for the project.

Table 5.2.9-11 San Marcos Reuse Available Yield (acft/yr)

WUG, Project Name	2030	2040	2050	2060	2070	2080
San Marcos, Direct Non-Potable Reuse	1,971	1,971	1,971	1,971	1,971	1,971
San Marcos, Direct Potable Reuse	0	0	4,705	4,705	4,705	4,705

5.2.9.3 Environmental Factors

The Recycled Water was evaluated to determine its potential impacts on environmental factors. A summary of the evaluation is presented in Table 5.2.9-12.

Table 5.2.9-12 Potential Project Effects on Environmental Factors for the Recycled Water WMS

Consideration	Potential Impacts
Vegetation, Land Use, and Agricultural Resources	• Possible impacts on native vegetation, depending on project location and whether it is temporary or permanent. Temporary construction impacts provide an opportunity to plant native herbaceous species which are beneficial to native wildlife. • Permanent impacts may include conversion of vegetation to pipeline easements and other industrial uses. • Irrigation of natural areas could be beneficial to native vegetation and wildlife. • Recycled water development could provide additional sources of water for agriculture. Irrigation of agricultural lands could be beneficial to the local and state agricultural economy. • Recycled water could provide additional sources of non-potable water for landscape irrigation. Use of drought- tolerant native species in landscapes would help conserve water and support native pollinator species, including the protected monarch butterfly. • Possible impacts to land use and agricultural resources if they are permanently converted for use by the project, depending on project location. • No apparent negative impacts on state water resources; benefit accrues to demand centers by more efficient use of available water supplies; no effect on navigation.
Aquatic Resources	• Possible negative water quality impacts if concentrate is discharged into surface water, depending on location and pollutant concentrations. • Possible low impact on environmental water needs, instream flows, and bays and estuaries because of decreased effluent being discharged into water bodies, depending on location. • Possible impacts on wetlands and waters of the United States, depending on project location. Site-specific stream and wetland delineations would be required to determine the extent of impacts, and to see if project adjustments can be made to reduce or avoid impacts to sensitive aquatic features.
Threatened, Endangered, and Species of Concern	• Appendix 5D provides a summary of threatened and endangered species, and SGCN that may occur in the counties where the projects are located, including Bexar, Caldwell, Comal, Guadalupe, Hays, and Kendall Counties. • Possible impacts, depending on project location and habitat requirements for listed species. • Native freshwater mussel species are particularly sensitive to reduced stream flow and negative water quality impacts. • Possible impacts, depending on changes in volume of effluent and locations of recycled water projects.
Cultural Resources	Possible impacts, depending on project location. Cultural resources survey of the final design plan may be performed to accurately assess the presence and significance of identified and unrecorded cultural resources within the footprint of project impacts.

A potential positive effect of the Recycled Water Strategies WMS is the potential reduced need for additional groundwater and/or surface water projects that may have greater negative environmental effects through aquifer or stream withdrawals and additional transmission pipelines.

5.2.9.4 Engineering and Costing

The required improvements to implement a recycled water program would be expected to vary considerably between entities according to the upgrades required both in treatment and distribution. Therefore, cost estimates received from participating entities were used when available. Recent reuse reports and costs were obtained for future development from County Line SUD [1], Fair Oaks Ranch [2], and San Marcos [3]. Other strategy information was obtained via direct communication with the WUG or WWP. The information provided was used to develop costs using the Texas Water Development Board Cost Estimating Tool reported in September 2023 dollars. A unit cost per acft of reuse supply was then applied to the first decade of implementation, and an interest rate of 3.5 percent was assumed for a debt service of 20 years.

The projected project, annual, and unit costs for each of the reuse strategies is presented in Table 5.2.9-13. TWDB Costing Tool Cost Estimate Summaries for Recycled Water strategies are provided in Appendix 5E.

Table 5.2.9-13 Cost Estimate Summary for the Recycled Water WMS

Entity	Initial Capacity (acft/yr)	Project Costs	Annual Costs	Unit Costs ($/acft)
Boerne	1,500	$9,991,000	$813,000	$542
County Line SUD	560	$52,736,000	$6,640,000	$11,857
Fair Oaks Ranch	425	$3,746,000	$308,000	$725
GBRA	1,064	$41,535,000	$3,968,000	$3,729
Kyle	3,105	$14,780,000	$1,319,000	$425
New Braunfels Utilities	7,800	$74,504,000	$8,098,000	$1,038
San Antonio River Authority	6,750	$142,108,000	$11,019,000	$1,632
SAWS (Non-Potable)	5,000	$396,046,000	$55,437,000	$11,087
SAWS (Potable)	25,000	$348,862,000	$46,321,000	$1,853
San Marcos (Non-Potable)	1,971	$9,933,000	$972,000	$493
San Marcos (Potable)	4,705	$122,317,000	$8,671,000	$1,536

[1] "County Line Reuse Plant Preliminary Cost Estimate." Southwest Engineers. Prepared for County Line SUD. May 9, 2019.
[2] "Final Draft Water, Wastewater, & Reuse Master Report." Freese and Nichols, Inc. Prepared for City of Fair Oaks Ranch. 2019.
[3] "Direct Water Reuse Expansion Feasibility Study." RPS. Prepared for The City of San Marcos and Texas State University. September 2013.

5.2.9.5 Implementation Considerations

Implementation of the Recycled Water WMS includes the following considerations:

- Each community that pursues recycled water will need to investigate concerns that would include, at a minimum, the following:
  - Amount of treated effluent available, taking into consideration downstream water commitments and discharge permit restrictions;
  - Potential users, primarily individual large-scale users that could utilize non-potable water (e.g., certain industries) and irrigated lands (e.g., golf courses and park areas); and
  - Capital costs of constructing needed distribution systems connecting the treatment facilities to the areas of recycled water.
- Additional implementation considerations include the following:
  - During project development and implementation, it is recommended to avoid and minimize impacts in or near the Edwards Aquifer recharge and contributing zones
  - Use of reclaimed water requires a 210 authorization from the TCEQ.
  - It may be necessary to obtain the following permits or authorizations for project infrastructure:
    - USACE Sections 10 and 404 dredge and fill permits;
    - TPDES Storm Water Pollution Prevention Plan;
    - General Land Office (GLO) sand and gravel removal permits;
    - GLO easement for use of state-owned land; and
    - TPWD sand, gravel, and marl permit.
- Acquisition of private land for construction of new facilities through either negotiations or condemnation;
- Infrastructure design; and
- Depending on the level and types of project impacts, the following natural and cultural resources studies and agency coordination may be required:
  - Stream/wetland delineations to support USACE Section 404 permitting;
  - Site-specific evaluations for threatened/endangered species habitat;
  - Presence/absence surveys for threatened/endangered species if suitable habitat occurs;
  - USFWS and TPWD coordination if protected species may be affected; and
  - Structured cultural resources surveys of project impact areas, and THC coordination in compliance with the ACT and NHPA, if applicable.

5.2.10 Brush Management

The SCTRWPG identified the Brush Management WMS as a potentially feasible strategy. However, for the 2026 Regional Water Plan, the SCTRWPG evaluated and considered the Brush Management WMS but did not identify it as a Recommended strategy because it does not demonstrate a firm yield under drought of record conditions. However, the SCTRWPG supports brush control practices and includes a legislative recommendation in Chapter 8 under the section entitled "Assistance for Alternative Rangeland Management".

5.2.10.1 Description of Water Management Strategy

Brush management is the targeted control of brush species that are detrimental to water conservation (e.g., juniper, mesquite, saltcedar) to increase available surface and ground water supplies. The interest in brush management to increase water supply has its roots in 1) the observation that Texas rangelands changed after settlement and use by Europeans from predominantly open grasslands to domination of brush; and 2) the significantly greater interception of water by brush than grasses. The former suggests that the "natural" character of Texas rangelands would be grasslands. The latter suggests the possibility of increasing aquifer recharge and streamflow by controlling and limiting growth of brush and trees in areas where grasslands would have naturally dominated.

The Texas Brush Control Program, created in 1985 and operated by the TSSWCB, served to study and implement brush control programs until September 2011. HB 1808 established the Water Supply Enhancement Program (WSEP) in 2012, with the purpose and intent of increasing available surface and ground water supplies through the selective control of brush species detrimental to water conservation. Beginning in 2019, the legislature has not appropriated funding to the Texas Brush Control Program; any further program activities would require action by the legislature to appropriate funding.

Under the Texas Brush Control Program, the TSSWCB collaborated with soil and water conservation districts and other local, regional, state, and federal agencies to identify watersheds across the state where it is feasible to implement brush control that enhances water supplies. Table 5.2.10-1 summarizes studies performed or sponsored by the TSSWCB within the SCTRWPA since 2000.

Table 5.2.10-1 TSSWCB Brush Control Planning, Assessment, and Feasibility Studies in Region L

TSSWCB Brush Control Planning, Assessment, and Feasibility Studies in Region L	Publication Date	Region L Counties included in Study
Brush Control Planning, Assessment, And Feasibility Study - Frio River Watershed	2000	Uvalde, Medina, Zavala, Frio, Dimmit, La Salle
Brush Control Planning, Assessment, and Feasibility Study - Nueces River Watershed	2000	Uvalde, Zavala, Dimmit, La Salle
Application of the EDYS Decision Tool for Modeling of Target Sites in Gonzales County for Water Yield Enhancement Through Brush Control	2012	Gonzales
Simulation of Streamflow and the Effects of Brush Management on Water Yields in the Upper Guadalupe River Watershed, South-Central Texas, 1995–2010	2012	Kendall, Comal

TSSWCB Brush Control Planning, Assessment, and Feasibility Studies in Region L	Publication Date	Region L Counties included in Study
Brush Management in Gonzales County as a Water Management Strategy	2015	Guadalupe, Caldwell, Gonzales
Effects of Huisache Removal on Rangeland Evapotranspiration in Victoria County, South-Central Texas, 2015–18	2020	Victoria

The evaluation of brush management as a WMS included an evaluation of existing brush control studies and coordination with TSSWCB, EAA, Evergreen UWCD, and Nueces River Authority. While the SCTRWPG supports the practice of brush management, it was not designated as a Recommended strategy in the 2026 Regional Water Plan because it shows zero firm yield during drought of record conditions. Specifically, Nueces River Authority, EAA and Poteet expressed interest in inclusion of brush management as a WMS. Support for the practice is expressed in Chapter 8 under Assistance for Alternative Rangeland Management.

A statewide TSSWCB initiative for brush control or brush management implementation currently does not exist. TSSWCB funding is available via the Water Quality Management Plan (WQMP) program for conservation practices. To qualify for potential funding, brush management for water supply enhancement must be viewed favorably by the RWPG where the proposed project is located. “Viewed favorably” is distinguished as a recommended or alternative Water Management Strategy or as a Policy Recommendation. Otherwise, the application is considered not to qualify for funding (State Water Supply Enhancement Plan, TSSWCB, July 2014).

5.2.10.2 Available Yield

This WMS has zero firm yield, as described in subsequent paragraphs. Table 5.2.10-2 provides a summary of the available yield for the Brush Management WMS.

Table 5.2.10-2 Available Yield for the Brush Management WMS (acft/yr)

WMS	2030	2040	2050	2060	2070	2080
Brush Management	0	0	0	0	0	0

Feasibility studies utilize water modeling to calculate project yields. For example, the Ecological Dynamics Simulation (EDYS) model incorporates precipitation, depth of groundwater, topography, soils, and vegetation in order to complete a water balance tracking rainfall, soil moisture, evapotranspiration, runoff of surface water, and recharge of groundwater. Information from these models can be used to approximate recharge to the aquifer in the areas that could potentially increase pumping in fully allocated aquifers, which could lead to a larger MAG, while still adhering to the DFCs adopted by local GMAs. However, models such as EDYS utilize average precipitation data over a period of time. The modeled benefit for the project, while realized long-term, has not been quantified for drought conditions.

In watersheds where WSEP funds were allocated, the TSSWCB worked through districts to deliver technical assistance to landowners to implement brush control activities for water supply enhancement. The 2017 State Water Supply Enhancement Plan incentivized 30,202 acres across the State in 19 project areas through cost share assistance. Projects implemented wholly or partially within the SCTRWPA improved 2,449 acres of land for a yield of 382 acft/yr. Table 5.2.10-3 provides a summary of the WSEP projects implemented in the SCTRWPA.

Table 5.2.10-3 Water Supply Enhancement Program 2017 Projects

Project	Population Served	No. of Acres Improved	Enhanced Water Yield (acft/yr)
Upper Guadalupe River Project	New Braunfels, San Marcos, Kyle, Buda, Boerne, Kerrville, and surrounding areas	1,483	107
Edwards Aquifer – Frio River Project	Concan, Knippa, and Leakey	67	57
Edwards Aquifer – Medina River Project	Castroville, Bandera, and Medina	105	59
Edwards Aquifer – Nueces River Project	Uvalde, Barksdale, and Camp Wood	685	132
Carrizo/Wilcox Aquifer Project	Guadalupe-Blanco River Authority, San Antonio Water System, Schertz-Seguin Local Government Corporation, Texas Water Alliance, and Gonzales County Water Supply Cooperation	109	27
Total		**2,449**	**382**

However, TSSWCB confirmed that projects required 18 inches of rain to realize reported yields; as such, these projects could not show a dependable, continuously available water supply in a repeat of the drought of record.

5.2.10.3 Environmental Factors

The Brush Management WMS was evaluated to determine its potential impacts on environmental factors. A summary of the evaluation is presented in Table 5.2.10-4.

Table 5.2.10-4 Potential Project Effects on Environmental Factors for the Brush Management WMS

Consideration	Potential Impacts
Vegetation, Land Use, and Agricultural Resources	• Possible positive impacts on native vegetation, depending on project location. • No apparent negative impacts on state water resources; benefit accrues to demand centers by more efficient use of available water supplies; no effect on navigation. • Potential to create grassland habitats suitable for livestock grazing.

Consideration	Potential Impacts
Aquatic Resources	• May have positive impact on environmental water needs, instream flows, and bays and estuaries, depending on location. • Possible impacts on wetlands and waters of the U.S., depending on project location.
Threatened, Endangered, and Species of Concern	• Appendix 5D provides a summary of threatened, endangered, and candidate species and species of concern that may occur in the counties where the projects are located. • Possible impacts, depending on project location and habitat requirements for listed species. • Best management practices should be implemented to minimize erosion/stream sedimentation during brush removal and until herbaceous vegetation has established. • Migratory birds may occur or nest in project areas. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or to avoid vegetation clearing during the general bird nesting season from March 15 to September 15. Preconstruction surveys for active bird nests are recommended. • May remove suitable habitat for woodland species, including golden-cheeked warbler, bats, and migratory birds, while creating habitat for grassland species.
Cultural Resources	Soil disturbance due to brush management may affect surficial or shallowly buried archaeological and historic artifacts.

5.2.10.4 Engineering and Costing

Texas A&M University provided a cost estimate for brush control as well as a cost for the associated monitoring program that was considered in the 2016 SCTRWP. The costs, updated for September 2023 dollars, assume initial clearing costs to be $304/acre and maintenance clearing costs to be $7.61/acre/year.

5.2.10.5 Implementation Considerations

To make a significant impact upon increasing the recharge of an aquifer, brush control would need to be practiced over a significant land area. Large-scale brush control would require support and cooperative agreements with numerous landowners with various land uses. To incentivize collaboration with landowners, additional subsidies or other considerations may be necessary, which could increase the cost for brush control implementation.

Most of the assumptions and results of brush management are based on computer modeling rather than in situ examples that have the benefit of several years of performance to demonstrate results. One critical implementation issue is how the increase in recharge resulting from brush control would be related to water supply yield in a permit application with the TCEQ. Key considerations include the following:

- Quantification of increased recharge rates attributable to brush control;
- Differences in recharge rates in various aquifers; and
- Impacts of recharge rate variations to MAG estimates.

Additional environmental considerations may include, but not be limited to, the following:

- Best management practices should be implemented to minimize erosion/stream sedimentation during brush removal and until herbaceous vegetation has established;
- Migratory birds may occur or nest in project areas. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or to avoid vegetation clearing during the general bird nesting season from March 15 to September 15. Preconstruction surveys for active bird nests are recommended; and
- Ashe juniper woodlands may contain habitat for the federally endangered golden-cheeked warbler. Habitat and, if appropriate, presence/absence surveys may need to be conducted to determine if brush management activities affect the golden-cheeked warbler.

5.2.11 Rainwater Harvesting

The SCTRWPG identified the Fresh Groundwater Development WMS as a potentially feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.11.1 Description of Water Management Strategy

The Rainwater Harvesting WMS is a new strategy included in the 2026 SCTRWP and is recommended for WUGs considering strategy implementation and County-Other WUGs. Rainwater harvesting is the collection, treatment, and use of stormwater runoff, typically from impermeable surfaces, such as roofs or paved surfaces. Rainwater may be stored and used later for potable and non-potable applications. For purposes of the 2026 RWP, the strategy assumes that potable rainwater harvesting would be implemented by individual homeowners that are considered County-Other; non-potable rainwater harvesting would be implemented individual homeowners within WUGs who request inclusion of the strategy as a supplemental supply that reduces demands for potable water. Figure 5.2.11-1 provides the approximate location of WUGs with the Rainwater Harvesting WMS.

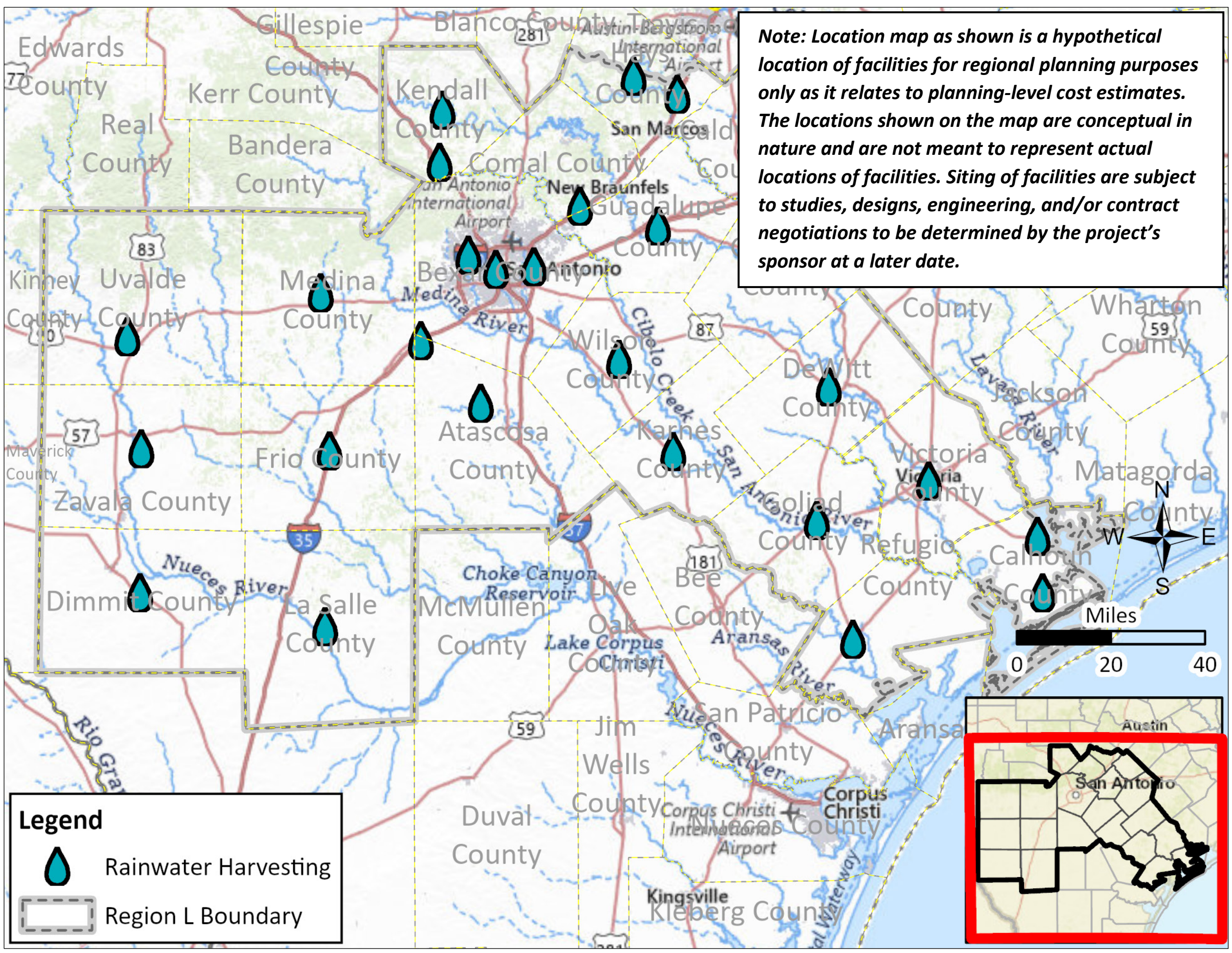

Figure 5.2.11-1 Approximate Locations of WUGs with the Rainwater Harvesting WMS

Implementation of rainwater harvesting as a WMS is dependent upon the catchment area, storage capacity, rainfall frequency, and water demand of the end user. Typically, rooftops serve as the catchment area for rainwater harvesting systems, either from a single residence or a group of buildings. A catchment area of 2,000 square feet yields about 1,000 gallons for 1 inch of rainfall. The required storage capacity is a function of the rainfall frequency and water demand. The variability of rainfall requires consideration of the size, design, and storage over a multi-month period in order to balance rainfall with water demand.

If rainwater harvesting is considered for secondary non-potable uses, as opposed to being a primary water supply, the significance of storage is lessened, and the only remaining concern is the distribution system to deliver the water. This distribution system typically consists of a pump and pressure tank. However, some rainwater catchment systems are gravity driven, where pressurized systems may not be required. If rainwater harvesting is considered as the primary potable water supply, additional considerations concerning filtration and disinfection must be considered. The filtration is available with cloth and carbon filtration units. Disinfection is available with either chemical or ultraviolet systems. Like the non-potable use, a distribution system is required and includes a pump and pressure tank.

5.2.11.2 Available Yield

This WMS firm yield is dependent on drought-year rainfall and will be implemented in the 2040 decade. Table 5.2.11-1 provides a summary of the available yield for the Rainwater Harvesting WMS.

Table 5.2.11-1 Available Yield for the Rainwater Harvesting WMS

Water User Group	2030	2040	2050	2060	2070	2080
Boerne	0	51	69	90	114	141
County-Other, Atascosa	0	2	2	2	2	2
County-Other, Bexar	0	6	8	9	9	7
County-Other, Caldwell	0	1	3	2	3	5
County-Other, Calhoun	0	3	3	3	3	3
County-Other, Comal	0	37	52	114	152	199
County-Other, DeWitt	0	11	11	11	11	11
County-Other, Dimmit	0	2	2	2	2	2
County-Other, Frio	0	2	2	2	2	2
County-Other, Goliad	0	8	8	8	8	8
County-Other, Gonzales	0	2	2	2	2	2
County-Other, Guadalupe	0	4	7	9	12	15
County-Other, Hays	0	27	44	118	199	329
County-Other, Karnes	0	3	4	4	4	4
County-Other, Kendall	0	31	37	45	55	65
County-Other, La Salle	0	2	2	2	2	2
County-Other, Medina	0	10	10	9	9	9
County-Other, Refugio	0	4	4	4	4	4

Water User Group	2030	2040	2050	2060	2070	2080
County-Other, Uvalde	0	6	6	6	6	6
County-Other, Victoria	0	39	40	40	39	39
County-Other, Wilson	0	9	9	9	9	9
County-Other, Zavala	0	1	1	1	1	1
Kirby	0	16	16	16	16	16
Kyle	0	132	180	201	208	214
Leon Valley	0	28	28	28	28	28
Port Lavaca	0	17	17	17	17	17
Poteet	0	3	3	3	3	3
Total	**0**	**457**	**570**	**757**	**920**	**1,143**

Rainfall throughout the area is not distributed uniformly during the year and, as a result, implementation of rainwater harvesting as a WMS should consider water demands and supplies over a multi-month period. Yields reflect rainfall data from 2011, the peak of the drought of record, when counties across the SCTRWPG received approximately 13 to 18 inches of rain.

For the purposes of planning, it was assumed that 10% of households (one catchment area of about 2,000 square feet per household) will implement rainwater harvesting starting in 2040. Table 5.2.11-2 provides a summary of household implementation, including yield by household limited by either drought of record rainfall or storage capacity.

Table 5.2.11-2 Rainwater Harvesting WMS Household Implementation

WUG	Type of Rainwater Harvesting	Number of Households Implementing WMS by 2080	Drought-Year Capture per Household (gallons/yr)	Drought-Year Capture per Household (acft/yr)
Boerne	Non-Potable	3,732	12,340	0.038
County-Other, Atascosa	Potable	312	13,270	0.041
County-Other, Bexar	Potable	4,343	15,000	0.046
County-Other, Caldwell	Potable	3,159	15,000	0.046
County-Other, Calhoun	Potable	2,187	15,000	0.046
County-Other, Comal	Potable	129,543	15,000	0.046
County-Other, DeWitt	Potable	7,246	15,000	0.046
County-Other, Dimmit	Potable	329	12,910	0.040
County-Other, Frio	Potable	927	10,380	0.032
County-Other, Goliad	Potable	4,702	15,000	0.046

WUG	Type of Rainwater Harvesting	Number of Households Implementing WMS by 2080	Drought-Year Capture per Household (gallons/yr)	Drought-Year Capture per Household (acft/yr)
County-Other, Gonzales	Potable	962	15,000	0.046
County-Other, Guadalupe	Potable	9,608	15,000	0.046
County-Other, Hays	Potable	214,315	15,000	0.046
County-Other, Karnes	Potable	2,703	15,000	0.046
County-Other, Kendall	Potable	42,569	15,000	0.046
County-Other, La Salle	Potable	1,172	9,980	0.031
County-Other, Medina	Potable	5,970	14,860	0.046
County-Other, Refugio	Potable	1,807	14,050	0.043
County-Other, Uvalde	Potable	4,271	13,150	0.040
County-Other, Victoria	Potable	25,476	15,000	0.046
County-Other, Wilson	Potable	3,875	15,000	0.046
County-Other, Zavala	Potable	919	12,470	0.038
Kirby	Non-Potable	393	13,370	0.041
Kyle	Non-Potable	5,220	13,340	0.041
Leon Valley	Non-Potable	685	13,370	0.041
Port Lavaca	Non-Potable	412	13,770	0.042
Poteet	Non-Potable	79	11,250	0.035

5.2.11.3 Environmental Factors

Environmental Considerations

Rainwater harvesting would not adversely affect land use, agricultural resources, aquatic resources, or threatened and endangered species. Harvested rainwater may be used to replace potable water use for landscape watering. Combined with the use of native landscaping plants, rainwater harvesting could result in benefits to native pollinator species.

Cultural Considerations

Construction of rainwater harvesting facilities for a historic building or in a designated historic district may require Texas Historical Commission review/approval to ensure that significant historic resources are not negatively impacted. Some cities or counties also have local ordinances or regulations governing protection of historic structures and historic districts.

5.2.11.4 Engineering and Costing

The project costs of rainwater harvesting systems are borne by individual system owners, although some WUGs may provide incentives to these individuals such as rebates and tax credits. The actual cost of a rainwater harvesting system is proportional to the water demand to be served by the system.

It is assumed that a single-family household potable rainwater harvesting system consists of 15,000 gallons of storage, a pump and pressure tank, an ultraviolet disinfection system, filtration and miscellaneous piping. All equipment is assumed to be located on the footprint of the homeowner's property. The capital cost for this system is about $21,000 for a system with a 30-year life and 30-year debt service, as is possible that these costs will be passed to developers for new-build homes and paid over the life of the mortgage.

It is assumed that a single-family household non-potable rainwater harvesting system consists of 2,000 gallons of storage, a pump and pressure tank, filtration and miscellaneous piping. All equipment is assumed to be located on the footprint of the homeowner's property. The capital cost for this system is about $8,000 for a system with a 30-year life and 10-year debt service.

Preliminary engineering and costing analyses were performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model methodology, which includes standard costing procedures and methods for calculating facility costs, project costs, annual costs, and unit costs. O&M costs were estimated to be 1% of the annual costs. Table 5.2.11-3 provides a cost estimate summary for the Rainwater Harvesting WMS. The unit cost during wet years may be lower, as the yield is based on drought-year rainfall and storage.

Table 5.2.11-3 Cost Estimate Summary for the Rainwater Harvesting WMS

Water User Group	Total Cost of Facilities	Total Cost of Project	Annual Cost	Annual Cost of Water ($ per 1,000 gal)
Boerne	$29,856,000	$29,856,000	$3,888,560	$84.64
County-Other, Atascosa	$819,000	$819,000	$53,190	$81.62
County-Other, Bexar	$3,045,000	$3,045,000	$196,450	$86.13
County-Other, Caldwell	$2,205,000	$2,205,000	$142,050	$87.19
County-Other, Calhoun	$1,533,000	$1,533,000	$98,330	$100.59
County-Other, Comal	$90,678,000	$90,678,000	$5,836,780	$90.01
County-Other, DeWitt	$5,082,000	$5,082,000	$326,820	$91.18
County-Other, Dimmit	$1,197,000	$1,197,000	$76,970	$118.11
County-Other, Frio	$1,302,000	$1,302,000	$84,020	$128.92
County-Other, Goliad	$3,612,000	$3,612,000	$232,120	$89.04
County-Other, Gonzales	$798,000	$798,000	$50,980	$78.23
County-Other, Guadalupe	$6,720,000	$6,720,000	$432,200	$88.42
County-Other, Hays	$150,024,000	$150,024,000	$9,657,240	$90.08

Water User Group	Total Cost of Facilities	Total Cost of Project	Annual Cost	Annual Cost of Water ($ per 1,000 gal)
County-Other, Karnes	$1,890,000	$1,890,000	$121,900	$93.52
County-Other, Kendall	$29,799,000	$29,799,000	$1,917,990	$90.56
County-Other, La Salle	$1,638,000	$1,638,000	$105,380	$161.70
County-Other, Medina	$4,179,000	$4,179,000	$268,790	$91.65
County-Other, Refugio	$1,764,000	$1,764,000	$113,640	$87.19
County-Other, Uvalde	$3,213,000	$3,213,000	$207,130	$105.94
County-Other, Victoria	$17,829,000	$17,829,000	$1,147,290	$90.28
County-Other, Wilson	$4,116,000	$4,116,000	$265,160	$90.42
County-Other, Zavala	$777,000	$777,000	$49,770	$152.74
Kirby	$3,144,000	$3,144,000	$409,440	$78.53
Kyle	$41,760,000	$41,760,000	$5,438,600	$77.99
Leon Valley	$5,480,000	$5,480,000	$713,800	$78.23
Port Lavaca	$3,296,000	$3,296,000	$428,960	$77.44
Poteet	$632,000	$632,000	$82,320	$84.21

5.2.11.5 Implementation Considerations

The Rainwater Harvesting WMS includes the following implementation considerations:

- There may be additional THC and local regulatory requirements if adding a rainwater harvesting system to certain existing historic structures.

5.2.12 Surface Water Rights

The SCTRWPG identified the Surface Water Rights WMS as a potentially feasible strategy. However, for the 2026 Regional Water Plan, the SCTRWPG evaluated and considered the Surface Water Rights WMS but did not identify it as a Recommended strategy because there are no sponsoring entities.

5.2.12.1 Description of Water Management Strategy

The Surface Water Rights WMS is included in the 2026 SCTRWP to explicitly recognize that use of water supplies made available under existing water rights by lease or purchase agreements between willing buyers and willing sellers is an activity consistent with the 2026 SCTRWP. The additions of diversion points or types and places of use for existing surface water rights are also activities consistent with the 2026 SCTRWP; if necessary, authorizations would be obtained pursuant to TCEQ rules and applicable law. Essentially, this strategy is to develop or enhance water supplies through lease or purchase of existing right(s) having consumptive use and/or impoundment authorizations. Diversion point(s), use type(s), and/or place(s) of use may be amended as long as no associated adverse impact on other water rights or the environment are greater than that with full use prior to amendment (the "No Injury" rule).

It is important to note that this WMS is intended to address existing water rights (within currently authorized annual and instantaneous maximum diversion rates) and not applications for new surface water appropriations. Furthermore, this strategy focuses on maximizing beneficial use of existing run-of-river water rights as opposed to the development of new major reservoirs. As described in Chapter 3, existing firm supplies from major reservoirs are either committed to current steam-electric power generation uses (Coleto Creek Reservoir, Victor Braunig Lake, and Calaveras Lake) or contracted for multiple uses (Canyon Reservoir).

Key applicable water law regarding amendment of existing water rights to facilitate lease/purchase agreements is found in TWC §11.122. which requires water rights holders to obtain authorization from TCEQ to "change the place of use, purpose of use, point of diversion, rate of diversion, acreage to be irrigated, or otherwise alter a water right." §11.122 further provides that "an amendment, except an amendment to a water right that increases the amount of water authorized to be diverted or the authorized rate of diversion, shall be authorized if the requested change will not cause adverse impact on other water right holders or the environment on the stream of greater magnitude than under circumstances in which the permit, certified filing, or certificate of adjudication that is sought to be amended was fully exercised according to its terms and conditions as they existed before the requested amendment." This section is identified in the TCEQ rules as the "No Injury" rule. Pursuant to the "No Injury" rule, restrictions may be placed upon a right for which amendment is being sought in order to protect senior water rights. An example of such restrictions is subordination of an amended right to water rights situated between the existing and amended diversion locations.

5.2.12.2 Available Yield

This WMS has zero firm yield as there are no sponsoring entities. Table 5.2.12-1 provides a summary of the available yield for the Surface Water Rights WMS.

Table 5.2.12-1 Available Yield for the Surface Water Rights WMS (acft/yr)

WMS	2030	2040	2050	2060	2070	2080
Surface Water Rights	0	0	0	0	0	0

Available yield of run-of-river surface water rights, whether before or after lease/purchase under the Surface Water Rights WMS, is typically determined using the applicable WAM. The Guadalupe-San Antonio River basin WAM and the Nueces River basin WAM are the primary tools applicable for consideration of water rights in the SCTRWPA. These WAMs perform the complex calculations accounting for relative seniority, authorized annual diversion, type(s) of use, maximum diversion rate, instream flow requirements, physical location, and authorized storage associated with a particular water right. These calculations are completed in the context of historical hydrology, as necessary to quantify firm diversion or available yield subject to DOR conditions. Information regarding current surface water rights in Region L is summarized in Chapter 3.

5.2.12.3 Environmental Factors

Impacts of the Surface Water Rights WMS on environmental factors are location-dependent and project-specific. Because the WMS does not have sponsoring entities in the 2026 RWP, impacts on environmental factors are general in nature.

Potential environmental issues associated with implementation of the Surface Water Rights WMS are limited compared to other strategies because the source of water is existing water rights having prior authorizations for consumptive use. If an amendment to an existing water right is necessary to implement the strategy, §11.122 of the Texas Water Code indicates that only adverse impacts on the environment on the stream of greater magnitude than under circumstances in which the right sought to be amended was fully exercised prior to the amendment need be addressed. Construction of a new diversion intake structure, storage, transmission, treatment, and/or integration facilities necessary to use water available under existing rights must be addressed in accordance with applicable state and federal requirements, as they may result in minor to moderate impacts to vegetation, land use, agricultural resources, aquatic resources, cultural resources, and threatened, endangered, and species of concern. Individual projects would require site-specific reviews to determine requirements for environmental permitting and field data collection, if needed.

5.2.12.4 Engineering and Costing

This WMS has zero costs, as there are no sponsoring entities. Estimated costs for purchase or lease of existing surface water rights are highly variable depending on location, reliability, and negotiations between willing buyers and sellers. Future acquisitions of specific water rights are not addressed herein.

5.2.12.5 Implementation Considerations

The Surface Water Rights WMS includes the following implementation considerations:

- Any potential effects on other water rights, streamflows, and freshwater inflows to bays and estuaries must be considered and quantified to the extent required by TCEQ rules and applicable state and federal law;
- Changes in the point of diversion may necessitate subordination of an amended right to water rights situated between the existing and amended diversion locations;
- Interbasin transfer of water made available under existing surface water rights may involve additional regulatory requirements to amend place of use and may introduce changes in relative priority and inflow passage for environmental flow needs; and
- Run-of-river water rights often require storage and/or groundwater to firm up supply for municipal water use; feasibility studies may be necessary to determine which alternatives are the most economically and operationally feasible.

5.2.13 Balancing Storage

The SCTRWPG identified the Balancing Storage WMS as a potentially feasible strategy. However, for the 2026 Regional Water Plan, the SCTRWPG evaluated and considered the Balancing Storage WMS but did not identify it as a Recommended strategy because there are no sponsoring entities.

5.2.13.1 Description of Water Management Strategy

The Balancing Storage WMS is included in the 2026 SCTRWP to explicitly recognize that storage is needed to 1) firm up supplies from run-of-river diversions or interruptible groundwater sources; and 2) ensure that supplies delivered through long distance conveyance facilities are available to meet daily and seasonal demands.

In general, strategies and projects are sized and scheduled to meet seasonal and daily variations of demand, but without storage, some current and proposed supplies may not be fully reliable during extended droughts. Several recommended strategies involve long distance pipelines of more than 40 miles in length that will be supplied from a combination of run-of-river diversions and groundwater. Thus, surface reservoirs, large scale ASR systems, or multipurpose reservoirs that are adequate in size to store surplus flows of surface water during periods of high streamflows, including flood flows, need to be available during extended periods of drought. The Balancing Storage WMS involves implementing such ASR and/or surface storage facilities to assist in satisfying applicable needs.

5.2.13.2 Available Yield

This WMS has zero firm yield, as there are no sponsoring entities. Table 5.2.13-1 provides a summary of the available yield for the Balancing Storage WMS.

Table 5.2.13-1 Available Yield for the Balancing Storage WMS (acft/yr)

WMS	2030	2040	2050	2030	2040	2050
Balancing Storage	0	0	0	0	0	0

Available yield associated with the Balancing Storage WMS is typically determined using the applicable surface WAM to simulate operations of the respective WMSs. The Guadalupe-San Antonio River Basin WAM, Nueces River Basin WAM, FRAT, GAMs, and spreadsheet models are the primary tools applicable for consideration of surface and groundwater flows in Region L.

5.2.13.3 Environmental Factors

Impacts of the Balancing Storage WMS on environmental factors are location-dependent and project-specific. Because the WMS does not have sponsoring entities in the 2026 SCTRWP, impacts on environmental factors are general in nature.

Impacts would primarily be associated with terrestrial habitats, as the strategy would use existing surface water or groundwater rights and authorizations and the storage would be either off-channel or underground. Construction or upgrades of storage facilities could result in minor to moderate impacts to vegetation, land use, agricultural resources, aquatic resources, cultural resources, and threatened, endangered, and species of concern. Individual projects would require site-specific reviews to determine requirements for environmental permitting and field data collection, if needed.

5.2.13.4 Engineering and Costing

This WMS has zero costs, as there are no sponsoring entities. Estimated costs for development of balancing storage are highly variable depending on location, source water reliability, availability of embankment construction materials, and/or aquifer characteristics.

5.2.13.5 Implementation Considerations

The Balancing Storage WMS includes the following implementation considerations:

- Quantification and consideration of any potential effects on water rights, streamflows, and freshwater inflows to bays and estuaries to the extent required by TCEQ rules and applicable state and federal law;
- Run-of-river water rights often require surface storage and/or groundwater to firm up supply for municipal water use; feasibility studies may be necessary to determine which alternatives are the most economically and operationally feasible;
- Acquisition of state, federal, and local permits;
- Environmental studies; and
- Relocations of affected roads, railroads, utilities, and cultural resources.

5.2.14 ARWA Carrizo-Wilcox Project (Phase 2)

The SCTRWPG identified the ARWA Carrizo-Wilcox Project (Phase 2) WMS as a potentially feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.14.1 Description of Water Management Strategy

ARWA Carrizo-Wilcox Project (Phase 2) includes development of raw groundwater supply from the Carrizo-Wilcox Aquifer in Caldwell County.

The project is designed to supply 21,000 acft/yr of treated water by the 2040 decade; however, the available yield varies because of MAG limitations. Planned facilities for Phase 2 include a new well field in Caldwell County for ARWA from the Carrizo-Wilcox Aquifer to increase groundwater supply, a new 28 MGD WTP, an expansion to increase the capacity of the booster pump station that was implemented in Phase 1, two 10 MG GSTs at the expanded booster pump station, and supplementary delivery volumes to the ARWA delivery points. An additional 48-inch diameter pipeline parallel to the Phase 1 pipeline to the booster station is also planned for Phase 2. The approximate location of the project is shown on Figure 5.2.14-1. Phase 2 implementation is planned for the 2040 decade.

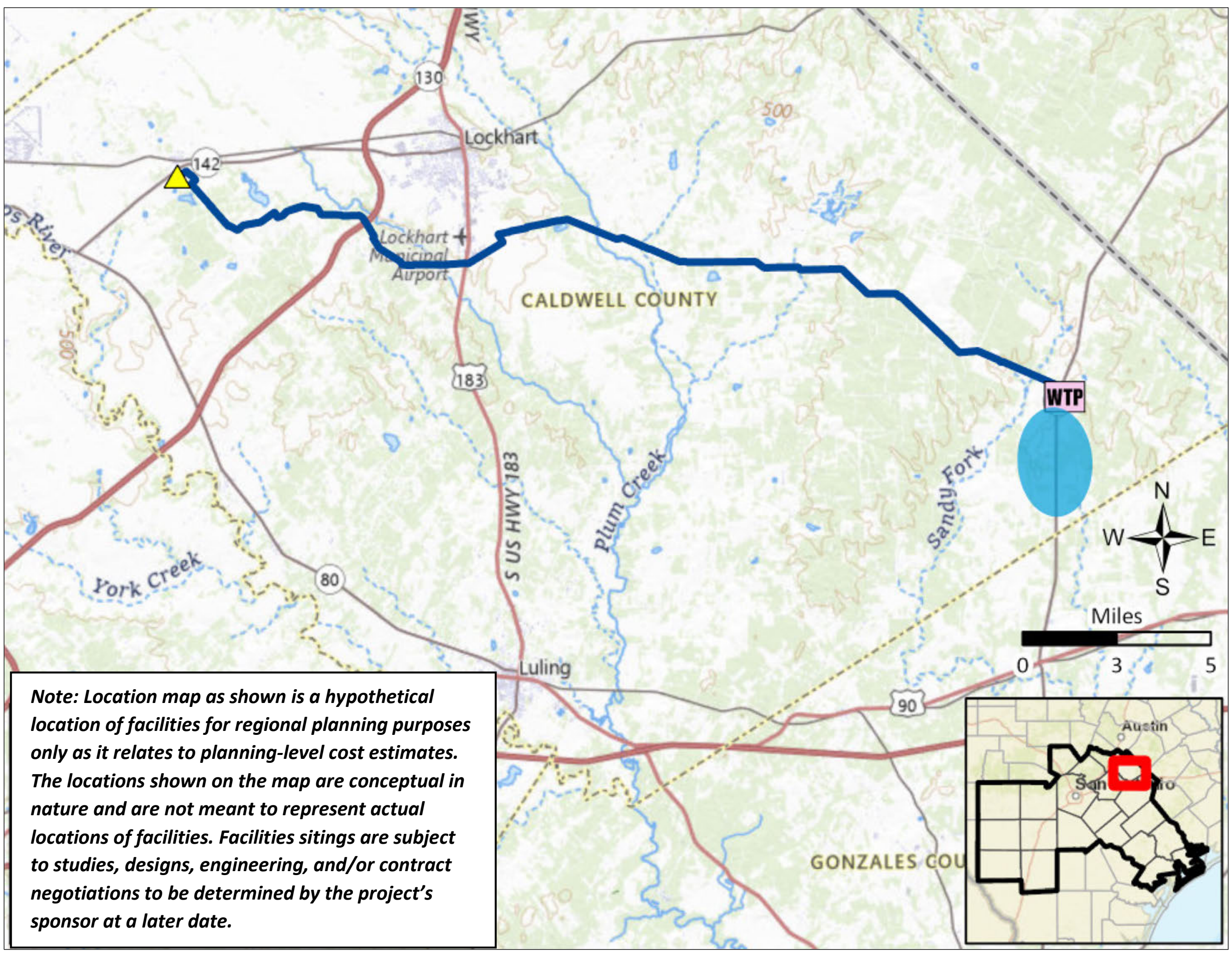

Figure 5.2.14-1 Approximate Location of the ARWA Carrizo-Wilcox Project (Phase 2)

5.2.14.2 Available Yield

This WMS is planned for full completion by 2040 and has an available yield that varies by decade because of MAG limitations. Table 5.2.14-1 provides a summary of the yield as envisioned by the sponsor (Envisioned Yield) and the yield available considering MAG constraints (MAG-Constrained Yield) for the ARWA Carrizo-Wilcox Project (Phase 2) WMS. The MAG-Constrained Yield is the available yield included in DB27.

Table 5.2.14-1 Envisioned and MAG-Constrained Yields for the ARWA Carrizo-Wilcox Project (Phase 2) (acft/yr)

Yield Type	2030	2040	2050	2060	2070	2080
Envisioned Yield	0	21,000	21,000	21,000	21,000	21,000
MAG-Constrained Yield	0	2,392	8,429	10,397	12,844	12,818

The Gonzales County UWCD regulates groundwater production, well spacing, and other requirements in the Carrizo-Wilcox Aquifer in Gonzales County. In 2021, Groundwater Management Area (GMA)-13 established DFCs for the Carrizo-Wilcox Aquifer [1]. On the basis of the approved DFCs, the TWDB determined that the MAG estimate for the Carrizo-Wilcox Aquifer is 30,087 acft/yr for Gonzales County in 2080 [2].

Production and/or drilling permits for these wells may be required in accordance with specific GCD rules. For most aquifers in the region, GCDs have adopted DFCs. In some GCDs, full use of all groundwater supplies (permitted, grandfathered and exempt) may result in non-achievement of the DFCs for an aquifer. To ensure consistency with the DFCs, TWDB requires that groundwater availability for each aquifer be limited for planning purposes to the MAG for the discrete geographic-aquifer unit (i.e., aquifer/county/basin unit). In some instances, the sum of existing supplies and future supplies (as groundwater-based WMSs) are greater than the MAG or groundwater availability for a discrete geographic-aquifer unit. This has resulted, for regional water planning purposes only, in adjustments to available yields shown in this plan, and a lack of firm water available for future projects in this plan for some areas for certain time periods. This should not be construed as recommending or requiring that GCDs make these adjustments or deny future permit applications. As described in Guiding Principle V (refer to Appendix 5A), this is not intended to influence or interfere with the regulatory decisions made by the governing boards of permitting entities. The SCTRWPG recognizes and supports the ability of permit holders to exercise their rights to groundwater use in accordance with their permits and it recognizes and supports a GCD's discretion to issue permits and grandfather historical users for amounts in excess of the MAG. The SCTRWPG may not modify groundwater permits that GCDs have already issued or limit future permits that GCDs may issue. If MAG estimates are modified during or after this planning cycle, the SCTRWPG may amend this plan to adjust WMS supply volumes that are affected by the modified MAG estimate(s).

[1] Texas Water Development Board, Groundwater Management Area 13 – Desired Future Conditions. https://www.twdb.texas.gov/groundwater/dfc/docs/summary/GMA13_DFC_2021.pdf

[2] Wade, S.C. 2022. Groundwater Availability Model (GAM) Run 21-018 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers in GMA-13: TWDB. https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR21-018_MAG.pdf

The ARWA Carrizo-Wilcox Project (Phase 2) will provide additional treated water volumes to all eight ARWA delivery locations and customers. These additional volumes are detailed in Table 5.2.14-2 for both the Envisioned Yield and the MAG-Constrained Yield.

Table 5.2.14-2 Delivery Points and Annual Volumes for ARWA Carrizo-Wilcox Project (Phase 2) (acft/yr)

Delivery Point	Yield Type	2030	2040	2050	2060	2070	2080
Crystal Clear SUD (Delivery Point 1)	Envisioned Yield	0	3,297	3,297	3,297	3,297	3,297
	MAG-Constrained Yield	0	376	1,323	1,632	2,017	2,012
Crystal Clear SUD (Delivery Point 2)	Envisioned Yield	0	288	288	288	288	288
	MAG-Constrained Yield	0	33	116	143	176	176
Green Valley SUD	Envisioned Yield	0	2,232	2,232	2,232	2,232	2,232
	MAG-Constrained Yield	0	254	896	1,105	1,365	1,362
San Marcos (Delivery Point 1)	Envisioned Yield	0	3,523	3,523	3,523	3,523	3,523
	MAG-Constrained Yield	0	401	1,414	1,744	2,155	2,151
San Marcos (Delivery Point 2)	Envisioned Yield	0	4,007	4,007	4,007	4,007	4,007
	MAG-Constrained Yield	0	456	1,608	1,984	2,450	2,446
County Line SUD	Envisioned Yield	0	670	670	670	670	670
	MAG-Constrained Yield	0	76	269	332	410	409
Kyle Delivery Point	Envisioned Yield	0	5,916	5,916	5,916	5,916	5,916
	MAG-Constrained Yield	0	674	2,375	2,929	3,618	3,611
Buda Delivery Point [1]	Envisioned Yield	0	1,067	1,067	1,067	1,067	1,067
	MAG-Constrained Yield	0	122	428	528	653	651

[1] Buda is a WUG in Region K.

For the ARWA Carrizo-Wilcox Project (Phase 2), ARWA plans to develop a well field that would supply a total of 21,000 acft/yr from the Carrizo-Wilcox Aquifer. A total of 15 wells are proposed, with two of the 15 wells recommended as contingency for operational flexibility or backup raw water supply. These 15 wells are in addition to the 11 existing wells in Phase 1 of the ARWA project. Well field details and project yield for the ARWA Carrizo-Wilcox Project (Phase 2) are provided in Table 5.2.14-3.

Table 5.2.14-3 Well Field Details and Envisioned Project Yield for the ARWA Carrizo-Wilcox Project (Phase 2)

Description	Phase 2
Envisioned Project Yield (acft/yr)	21,000
Number of Wells	15
Average Well Production Capacity (gpm)	1,012

Description	Phase 2
Well Depth (ft)	~700
TDS Concentration (mg/L)	200

5.2.14.3 Environmental Factors

The project was evaluated to determine its potential impacts on environmental factors. Table 5.2.14-4 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.14-4 Summary of Potential Project Effects on Environmental Factors for the ARWA Carrizo-Wilcox Project (Phase 2)

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	89
Potential Species Impact Score	8
Potential Habitat Impact Score	2
Potential Stream Construction Impact Score	4
Potential Stream Flow / Water Quality Impact Score	2
Potential Cultural Resources Impact Score	71.7

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project area is located in the Post Oak Savannah and Blackland Prairie ecoregions and crosses a variety of vegetation types, mostly open fields, pastures, and riparian zones along streams. As mapped by TPWD [3], dominant vegetation types in the project area are savanna grassland, yaupon motte and woodland, post oak motte and woodland, mesquite shrubland, and disturbance/tame grassland. The linear components of the project cross riparian vegetation zones along streams, mapped by TPWD as floodplain and riparian herbaceous vegetation, floodplain and riparian hardwood forest, floodplain and riparian deciduous shrubland, and riparian hardwood/evergreen forest. Riparian vegetation zones within the Phase 2 well field site are mapped by TPWD as floodplain and riparian herbaceous vegetation, hardwood/evergreen forest, deciduous and evergreen shrublands, and live oak and hardwood forests.

Based on TPWD vegetation mapping, the project may have the potential to impact 89 acres of agricultural resources, including 4 acres mapped as row crops, and 85 acres of disturbance or tame grassland which may include pasture areas used for grazing.

Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing and woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species

[3] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/.

that are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each water management strategy to determine the best course of action regarding revegetation. Pipeline easements may also continue to be used for agricultural purposes.

Aquatic Resources

The project pipeline alignment does not cross any major rivers but crosses several mapped streams and their floodplains, including Clear Fork Plum Creek, Plum Creek, Big West Fork Plum Creek, and Buck Branch within the Guadalupe River basin. The NWI mapping shows 3.3 acres of ponds and riverine wetlands in the project area. The well field site contains approximately 52.1 acres of mapped ponds and riverine wetlands.

The pipeline alignment crosses Segment 1810 of Plum Creek, which is designated as an impaired water body in the Texas Integrated Report of 303(d) listed water bodies [4]. This list identifies the water bodies or segments in Texas that do not meet assigned water quality standards. The project pipeline does not cross any ecologically significant stream segments designated by TPWD.

The project will require an on-site delineation of streams, ponds, and wetlands. Stream crossings for pipeline construction would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including cases where there would be permanent impacts to more than 0.1 acre of waters of the United States. The USACE permit requires that there will be no change in preconstruction contours of waters of the United States. Utility crossings under streams (e.g., through horizontal directional drilling) would not require a USACE permit.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened, endangered, and candidate species and species of concern that may occur in Caldwell County [5, 6]. Streams in the project area may contain suitable habitat for the federally endangered false spike (*Fusconaia mitchelli*) and Guadalupe orb (*Cyclonaias necki*) freshwater mussels. The federally endangered whooping crane (*Grus americana*) and black rail (*Laterallus jamaicensis*) may occur in or fly over the project area during migration. Suitable habitat is also likely to occur for the monarch butterfly (*Daneus plexippus*), which is a candidate species for federal listing as a threatened or endangered species.

Suitable habitat may occur for several state-listed threatened species, including the swallow-tailed kite (*Elanoides forficatus*), white-faced ibis (*Plegadis chihi*), wood stork (*Mycteria americana*), false spike, Guadalupe orb, and Texas horned lizard. Potentially suitable habitat may occur for numerous wildlife, plant, and insect species designated by TPWD as SGCN, particularly species associated with sandy soil

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[4] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir .

[5] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Caldwell County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[6] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Caldwell County. https://ipac.ecosphere.fws.gov/location/index.

habitats. These species do not have formal protected status but are being monitored by TPWD. Migratory birds may occur in the project area, particularly in riparian zones and wetland areas.

Suitable freshwater mussel habitat may occur in perennial streams and perennial pools of intermittent streams. If any such habitat would be affected by construction, presence/absence surveys and relocation of native mussel species would be required. Handling and relocation of mussels and other aquatic species must be conducted by USFWS- and TPWD-permitted personnel and in accordance with an approved Aquatic Resources Relocation Plan.

Site-specific field surveys would be required to determine the quality of habitat for state-listed species. Coordination with TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be required to obtain its recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat is present, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may nest in the project area. The federal MBTA protects birds, nests, and eggs from impacts unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or to avoid vegetation clearing during the general bird nesting season from March 15 to September 15.

Cultural Considerations

For linear portions of the project (i.e., project alignment), a background literature review was performed for the alignment a 300-foot radius around the project alignment. For the area portion of the project (i.e., project area), A background literature review of just the area portion. The background literature review identified 16 cultural resources that intersect with the approximate 3,245-acre project area and alignment (Table 5.2.14-5). The project area contains one cemetery (i.e., Smith Cemetery), and the project alignment contains 15 archaeological sites (i.e., 41CW117, 41CW118, 41CW119, 41CW186, 41CW187, 41CW188, 41CW191, 41CW192, 41CW194, 41CW195, 41CW196, 41CW197, 41CW198, 41CW202, and 41CW203) [7]. Out of the archaeological sites, only one is ineligible for listing on the NRHP (i.e., 41CW117), while the rest remain undetermined for listing on the NRHP. Additionally, the historical map review identified 16 potential historic-age structures that intersect with the project area and alignment or are immediately adjacent (i.e., within 300 feet) to the project's pipeline alignment [8].

Table 5.2.14-5 Cultural Resources Results for the ARWA Carrizo-Wilcox Project (Phase 2)

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Archaeological Site (41CW117)	Lithic scatter	Prehistoric	Ineligible (THC 8/28/2009; 5/4/2022)	Intersect
Archaeological Site (41CW118)	Open camp	Prehistoric	Undetermined (THC 8/28/2009; 5/4/2022)	Intersect

[7] Texas Historical Commission (THC). 2024. Texas Archeological and Historical Sites Atlas. Available at: https://atlas.thc.texas.gov/. Accessed September 2024.
[8] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed September 2024.

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Archaeological Site (41CW119)	Open camp	Prehistoric	Undetermined (THC 8/28/2009; 5/4/2022)	Intersect
Archaeological Site (41CW186)	Farmstead	Historic	Undetermined	Intersect
Archaeological Site (41CW187)	Lithic scatter / Farmstead	Multicomponent	Undetermined	Intersect
Archaeological Site (41CW188)	Residence	Historic	Undetermined	Intersect
Archaeological Site (41CW191)	Residence	Historic	Undetermined	Intersect
Archaeological Site (41CW192)	Lithic scatter / historic artifact scatter	Multicomponent	Undetermined	Intersect
Archaeological Site (41CW194)	Camp site	Prehistoric	Undetermined	Intersect
Archaeological Site (41CW195)	Quarry / Procurement site	Prehistoric	Undetermined	Intersect
Archaeological Site (41CW196)	Lithic procurement site	Prehistoric	Undetermined	Intersect
Archaeological Site (41CW197)	Lithic procurement site	Prehistoric	Undetermined	Intersect
Archaeological Site (41CW198)	Farmstead	Historic	Undetermined	Intersect
Archaeological Site (41CW202)	Farmstead	Historic	Undetermined	Intersect
Archaeological Site (41CW203)	Farmstead	Historic	Undetermined	Intersect
Smith Cemetery	Cemetery	Historic	Undetermined	Intersect
None (N=16)	Buildings/Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**71.7**

In the State of Texas, all human burials are protected by law[9], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project area and alignment and the remains are determined to be Native American, they will be handled in accordance with procedures

[9] According to the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

established through coordination with the THC, and work in the affected area could only resume per THC authorization.

A cultural assessment score was developed for the project area and alignment that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area and alignment. Next, the cultural resources within the project area were evaluated according to its NRHP eligibility. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts, properties or archaeological sites, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. The points for all cultural resources within the project area and alignment were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for this project equaled 71.7.

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, 15 archaeological sites, one cemetery, and 16 potential historic-age structures are located within the project area and alignment; the probability model indicates a low likelihood of buried deposits; and the project assessment score is 71.7. Based on these results, a cultural resources assessment for the final design plan is likely necessary, as well as a buffer zone of at least 100 feet between the cemetery and the proposed development.

5.2.14.4 Engineering and Costing

Preliminary engineering and costing analyses were performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required for a new groundwater well field, a new WTP, and conveyance of potable water to existing integration pipelines that currently deliver water recovered from the existing local projects.

A cost estimate summary for ARWA Carrizo-Wilcox Project (Phase 2) is provided in Table 5.2.14-6. Infrastructure was sized to deliver the sponsor’s Envisioned Yield, but because the project is MAG-limited, the annual unit costs were calculated using the MAG-Constrained Yield in the first decade of implementation. All cost estimates consider infrastructure and capacities necessary to deliver the sponsor’s Envisioned Yield, despite the lack of groundwater availability.

Table 5.2.14-6 Cost Estimate Summary for the ARWA Carrizo-Wilcox Project (Phase 2)

Item	Estimated Costs
Transmission Pipeline (48 in. dia., 27.7 miles)	$150,352,000
Transmission Pump Station(s) & Storage Tank(s)	$3,569,000
Well Fields (Wells, Pumps, and Piping)	$28,086,000
Water Treatment Plant (28 MGD)	$10,808,000
Integration, Relocations, Backup Generator & Other	$493,000

Item	Estimated Costs
TOTAL COST OF FACILITIES	**$193,308,000**
Planning (3%)	$5,799,000
Design (7%)	$13,532,000
Construction Engineering (1%)	$1,933,000
Legal Assistance (2%)	$3,866,000
Fiscal Services (2%)	$3,866,000
Pipeline Contingency (15%)	$22,553,000
All Other Facilities Contingency (20%)	$8,591,000
Environmental & Archaeology Studies and Mitigation	$1,492,000
Land Acquisition and Surveying (421 acres)	$566,000
Interest During Construction (3.5% for 1 year with a 0.5% ROI)	$8,288,000
TOTAL COST OF PROJECT	**$263,794,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$18,526,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$1,825,000
Water Treatment Plant	$3,567,000
Pumping Energy Costs (26,633,630 kW-hr @ 0.09 $/kW-hr)	$2,397,000
TOTAL ANNUAL COST	**$26,315,000**
Available Project Yield (acft/yr)	2,392
Annual Cost of Water ($ per acft)*	$11,001
Annual Cost of Water After Debt Service ($ per acft)*	$3,256
Annual Cost of Water ($ per 1,000 gallons)*	$33.76
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$9.99
*Based on a peaking factor of 1.5.	

5.2.14.5 Implementation Considerations

Information presented in this WMS was provided by ARWA and represents the current plan, which is based on the sponsor's current understanding of the system. The actual well capacities and water quality may vary, depending on site-specific conditions. Implementation of the ARWA Carrizo-Wilcox Project (Phase 2) WMS includes the following considerations:

- Verification of available groundwater quantity and well productivity;
- Verification of water quality for concentrations of constituents, such as TDS, chloride, sulfate, iron, manganese, and hydrogen sulfide;
- Regulations by TCEQ; and
- Regulations by the Gonzales County UWCD and/or the Plum Creek CD.

Additional considerations may include the following:

- Impacts on the following:
  - Endangered and threatened species;
  - Baseflow in streams; and
  - Wetlands.
- Competition with others in the area for groundwater in the Carrizo Aquifer, including the following:
  - Private water purveyors;
  - Public water purveyors in the area; and/or
  - Future oil and gas drilling operations.

5.2.15 ARWA DPR Project (Phase 3)

The SCTRWPG identified the ARWA DPR Project (Phase 3) WMS as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.15.1 Description of Water Management Strategy

For the ARWA DPR Phase 3 Project, ARWA plans to develop a DPR WTP that would provide approximately 5,494 acft/yr of water supply for ARWA's customers. Phase 3 expands upon two prior projects: an existing, joint project with GBRA called the ARWA/GBRA Project (Phase 1); and the ARWA Carrizo-Wilcox Project (Phase 2) (refer to Section 5.2.14). Water developed in Phase 3 would be commingled with water from Phase 1 and Phase 2, then be delivered via existing delivery points to customers. Phase 3 is planned for full completion by the 2060 decade.

Phase 3 includes advanced treatment of wastewater effluent from the San Marcos WWTP for direct potable reuse and construction of new pipelines for delivery of treated water and disposal of blended effluent concentrate. Planned facilities will be located within Caldwell and Hays Counties. The planned facilities and features for the ARWA Project (Phase 3) include the following:

- Construction of a 5.0 MGD DPR WTP near the San Marcos WWTP that would provide advanced treatment of the San Marcos WWTP effluent to DPR standards;
- A 5.0 MGD pump station at the DPR WTP;
- A 5.0 MGD expansion to an existing booster station;
- An 18-inch diameter pipeline to deliver the DPR treated drinking water to the existing booster station;
- A 16-inch pipeline for the blended effluent concentrate;
- A 1 MG ground storage tank; and
- Supplementary delivery volumes to the ARWA delivery points.

The approximate location of the project is shown on Figure 5.2.15-1.

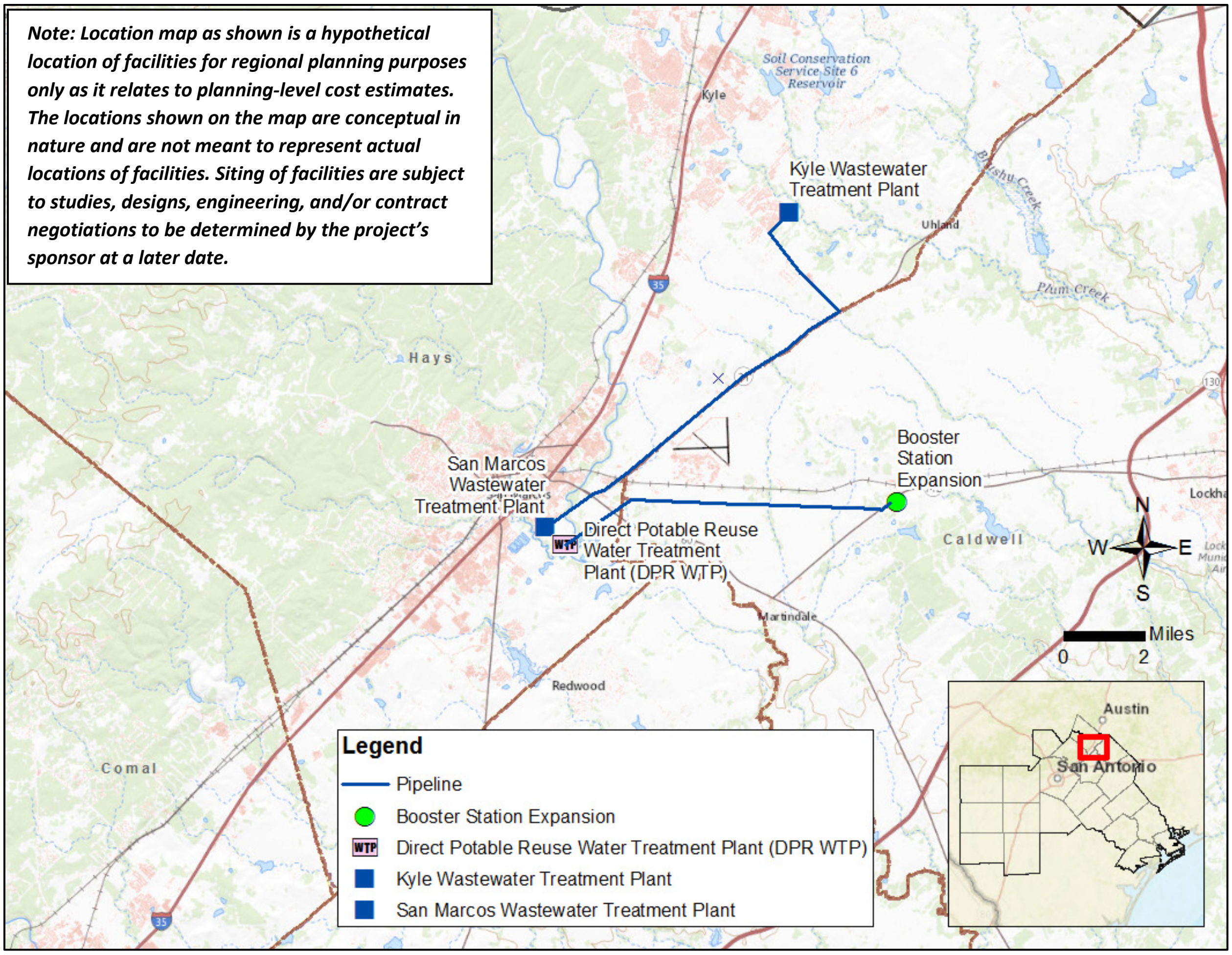

Figure 5.2.15-1 Approximate Location for the ARWA DPR Project (Phase 3)

5.2.15.2 Available Yield

This WMS has a firm yield of 5,494 acft/yr and is planned for completion by 2060. Table 5.2.15-1 provides a summary of the available yield for the ARWA DPR Project (Phase 3) WMS.

Table 5.2.15-1 Available Yield for the ARWA DPR Project (Phase 3) WMS (acft/yr)

WMS	2030	2040	2050	2060	2070	2080
ARWA DPR Project (Phase 3)	0	0	0	5,494	5,494	5,494

Phase 3 will provide an additional 5,494 acft/yr of water by treating effluent from the San Marcos WWTP and Kyle WWTP via RO at a planned 5.0 MGD DPR WTP. Treated water will be conveyed through an 18-inch diameter pipeline to the booster station for blending with other ARWA water sources and then distributed to customers. All eight of the ARWA delivery locations are expected to receive additional treated water as detailed in Table 5.2.15-2. The concentrate waste stream from the DPR WTP will be blended with effluent from the San Marcos WWTP, pumped to the Kyle WWTP via a 16-inch diameter pipeline, and then blended with the Kyle WWTP effluent prior to discharge.

Table 5.2.15-2 Delivery Points and Annual Volumes for the ARWA Phase 2 and ARWA Phase 3 Projects (acft/yr)

Delivery Point	Phase 2 [1]	Phase 3	Total
Crystal Clear SUD (Delivery Point 1)	3,297	953	4,250
Crystal Clear SUD (Delivery Point 2)	288	0	288
Green Valley SUD	2,232	594	2,826
San Marcos (Delivery Point 1)	3,523	937	4,460
San Marcos (Delivery Point 2)	4,007	1,065	5,072
County Line SUD	669	178	847
Kyle Delivery Point	5,916	1,573	7,489
Buda Delivery Point [2]	1,067	178	1,245
Total	**20,999**	**5,494** [3]	**26,493**

1. Refer to Section 5.2.14 for more details on the ARWA Expanded Carrizo-Wilcox Project (Phase 2).
2. Buda is a WUG in Region K.
3. Phase 3 also includes 16 acft/yr of unassigned volumes to ARWA, for a total of 5,494 acft/yr.

5.2.15.3 Environmental Factors

The project was evaluated to determine its potential impacts on environmental factors. Table 5.2.15-3 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.15-3 Summary of Potential Project Effects on Environmental Factors for the ARWA DPR Project (Phase 3) WMS

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	139
Potential Species Impact Score	8
Potential Habitat Impact Score	2
Potential Stream Construction Impact Score	2
Potential Stream Flow / Water Quality Impact Score	1
Potential Cultural Resources Impact Score	103

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project area is located in the Blackland Prairie ecoregion and crosses a variety of vegetation types, mostly open fields, pastures, and riparian zones along streams. As mapped by TPWD [1], dominant vegetation types in the project area are disturbance/tame grassland, row crops, savanna grassland, and

[1] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/

low-density residential. The project crosses riparian vegetation zones along streams, mapped by TPWD as floodplain and riparian herbaceous vegetation, floodplain and riparian hardwood forest, and floodplain and riparian deciduous shrubland.

Based on TPWD vegetation mapping, the project may have the potential to impact 139 acres of agricultural resources, including 67 acres mapped as row crops, and 72 acres of disturbance or tame grassland which may include pasture areas used for grazing.

Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing, woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species that are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each WMS to determine the best course of action regarding revegetation. Pipeline easements may continue to be used for agricultural purposes.

Aquatic Resources

The project pipeline alignment crosses the Blanco River, Clear Fork Plum Creek, Hemphill Creek, and Morrison Creek and their floodplains associated with the San Marcos River within the Guadalupe River basin. The NWI mapping shows 3.2 acres of ponds and riverine wetlands in the project area.

The project pipeline does not cross any streams designated as impaired stream segments in the Texas Integrated Report of 303(d)-listed water bodies [2]. This list identifies the water bodies or segments in Texas that do not meet assigned water quality standards. The project pipeline does not cross any ecologically significant stream segments designated by TPWD. Plum Creek would receive discharge from the Kyle Wastewater Treatment Plant. The project will require an on-site delineation of streams, ponds, and wetlands. Stream crossings for pipeline construction would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including if there would be permanent impacts to over 0.1 acre of waters of the United States. The USACE permit requires that there will be no change in preconstruction contours of waters of the United States. Utility crossings under streams (e.g., through horizontal directional drilling) would not require a USACE permit.

[2] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that may occur in Caldwell and Hays counties [3, 4, 5, 6]. The project area may contain suitable habitat for the federally endangered Guadalupe orb (*Cyclonaias necki*), proposed endangered tricolored bat (*Perimyotis subflavus*), and the monarch butterfly (*Danaus plexippus*), which is a candidate for listing as a federally threatened or endangered species.

Suitable habitat may occur for several state-listed threatened species including Texas horned lizard (*Phrynosoma cornutum*), white-faced ibis (*Plegadis chihi*), and Guadalupe darter (*Percina apristis*). Potentially suitable habitat may occur for numerous wildlife, plant, and insect species designated by TPWD as SGCN, particularly species associated with sandy soil habitats. These species do not have formal protected status but are being monitored by TPWD. Migratory birds may occur in the project area, particularly in riparian zones and wetland areas.

Suitable habitat for federally endangered freshwater mussels and the state-threatened Guadalupe darter may occur in perennial streams and perennial pools of intermittent streams. If any such habitat would be affected by construction, presence/absence surveys, and relocation of native mussel species would be required. Handling and relocation of mussels and other aquatic species must be conducted by TPWD-permitted personnel and in accordance with an approved Aquatic Resources Relocation Plan. Site-specific field surveys would be required to determine the quality of habitat for federally and state-listed species. Coordination with TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be required to obtain its recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may nest in the project area. The federal MBTA protects birds, nests, and eggs from impacts unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15.

Cultural Considerations

For linear portions of the project, a background literature review was performed for the alignment a 300-foot radius around the project alignment. The background literature review identified 22 cultural resources that intersect with or are immediately adjacent (i.e., within 300 feet) to the approximate 220-acre project alignment (Table 5.2.15-4). Seventeen of these cultural resources intersect the project alignment and include eight archaeological sites (i.e., 41CW53, 41CW96, 41CW206, 41CW208, 41HY324,

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[3] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Caldwell County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[4] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation (IPaC) Resource List – Caldwell County. https://ipac.ecosphere.fws.gov/location/index.

[5] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Hays County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[6] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation (IPaC) Resource List – Hays County. https://ipac.ecosphere.fws.gov/location/index.

41HY383, 41HY402, and 41HY466), one historic trail (i.e., El Camino Real de Los Tejas), and one NRHP-eligible historic district containing seven NRHP-eligible properties (i.e., Hohenberg-Mittendorf Farm) [7, 8]. Five cultural resources are adjacent to the project alignment and include four archaeological sites (i.e., 41CW223, 41CW228, 41HY292, and 41HY611) and one cemetery (i.e., Santa Maria Aida Cemetery). Among the total 12 archaeological sites located within or adjacent to the project alignment, six are ineligible for listing on the NRHP (i.e., 41CW53, 41CW96, 41HY324, 41HY402, 41HY466, and 41HY611), and other six remain undetermined (i.e., 41CW206, 41CW208, 41CW223, 41CW228, 41HY292, and 41HY383) for listing on the NRHP. Additionally, the historical map review identified three potential historic-age structures that intersect with the project alignment [9].

In the State of Texas, all human burials are protected by law [10], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project alignment and the remains are determined to be Native American, they will be handled in accordance with procedures established through coordination with the THC, and work in the affected area could only resume in accordance with THC authorization.

A probability model was used to assess the overall archaeological site potential, which included low, medium, and high potential zones. The model indicated that 88% of the project alignment had a high likelihood of containing significant unidentified archaeological resources and 12% had a moderate likelihood. No areas were identified by the model as having a low probability. Areas with high archaeological probability are located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project alignment that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project alignment. Next, the cultural resources within the project alignment were evaluated according to its NRHP eligibility. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts, properties or archaeological sites, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. The points for all cultural resources within the project alignment were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for the project equaled 103.

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[7] Texas Historical Commission (THC). 2024. Texas Archeological and Historical Sites Atlas. Available at: https://atlas.thc.texas.gov/. Accessed July 2024.
[8] Texas Department of Transportation (TxDOT). 2024. TxDOT Historic Resources Aggregator, TxDOT Environmental Affairs Division. Austin, Texas Available at: https://txdot.maps.arcgis.com/apps/webappviewer/index.html?id=e13ba0aa78bf4548a8e98758177a8dd5. Accessed July 2024.
[9] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed September 2024.
[10] According to the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

Table 5.2.15-4 Cultural Resources Results for the ARWA DPR Project (Phase 3) WMS

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Archaeological Site (41CW53)	Camp Site	Prehistoric	Ineligible (THC 12/9/2022)	Intersect
Archaeological Site (41CW96)	Lithic Scatter, and Artifact Scatter	Prehistoric, and Historic	Ineligible (THC 3/8/2007)	Intersect
Archaeological Site (41CW206)	Historic Dump	Historic	Undetermined	Intersect
Archaeological Site (41CW208)	Lithic Scatter, and Farmstead	Prehistoric, and Historic	Undetermined	Intersect
Archaeological Site (41CW223)	Camp Site	Historic	Undetermined (THC 6/24/1998)	Adjacent
Archaeological Site (41CW228)	Quarry, and Farmstead	Prehistoric, and Historic	Undetermined	Adjacent
Archaeological Site (41HY292)	Lithic Scatter	Prehistoric	Undetermined	Adjacent
Archaeological Site (41HY324)	Farmstead	Historic	Ineligible (THC 12/10/2019)	Intersect
Archaeological Site (41HY383)	Lithic Scatter, and Artifact Scatter	Prehistoric, and Historic	Undetermined	Intersect
Archaeological Site (41HY402)	Household	Historic	Ineligible (THC 3/8/2007)	Intersect
Archaeological Site (41HY466)	Lithic Scatter	Prehistoric	Ineligible (THC 5/27/2010)	Intersect
Archaeological Site (41HY611)	Household	Historic	Ineligible (THC 11/27/2023)	Adjacent
Santa Maria Aida Cemetery (CW-C071)	Cemetery	Historic	Undetermined	Adjacent
El Camino Real De Los Tejas	Historic Trail	Historic	Listed (segments)	Intersect
Hohenberg-Mittendorf Farm	Historic District	Historic	Eligible (since 2021)	Intersect
Farm Building (1)	Historic Property (Contributing Resource)	Historic	Eligible	Intersect
Farm Building (2)	Historic Property (Contributing Resource)	Historic	Eligible	Adjacent
Farm Building (3)	Historic Property (Contributing Resource)	Historic	Eligible	Adjacent

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Leser House	Historic Property (Contributing Resource)	Historic	Eligible	Adjacent
Mayfield-Gutsch Estate	Historic Property (Contributing Resource)	Historic	Eligible	Adjacent
Mount Bonell	Historic Property (Contributing Resource)	Historic	Eligible	Adjacent
Radkey` House	Historic Property (Contributing Resource)	Historic	Eligible	Adjacent
None (N=3)	Buildings/Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**103**

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, the project alignment contains eight archaeological sites, one NRHP district with seven contributing resources, one historic trail, and three potential historic-age structures; in addition, four archaeological sites and one cemetery are located immediately adjacent to the project's pipeline alignment. The probability model for the project indicates a high likelihood of buried deposits; and the project assessment score is 103. Based on these results, a cultural resources assessment for the final design plan is likely necessary, as well as a buffer zone of at least 100 feet between the cemetery and the proposed development.

5.2.15.4 Engineering and Costing

Preliminary engineering and costing analyses have been performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required for advanced water treatment, transmission, and integration. A cost estimate summary for the ARWA DPR Project (Phase 3) WMS is provided in Table 5.2.15-5.

Table 5.2.15-5 Cost Estimate Summary for the ARWA DPR Project (Phase 3) WMS

Item	Estimated Costs
Intake Pump Stations (5.2 MGD)	$10,689,000
Transmission Pipeline (16-18 in. dia., 14.3 miles)	$23,156,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,784,000
Advanced Water Treatment Facility (5 MGD)	$42,724,000
Integration, Relocations, Backup Generator & Other	$7,039,000
TOTAL COST OF FACILITIES	**$85,392,000**
Planning (3%)	$2,562,000
Design (7%)	$5,977,000
Construction Engineering (1%)	$854,000
Legal Assistance (2%)	$1,708,000
Fiscal Services (2%)	$1,708,000
Pipeline Contingency (15%)	$3,473,000
All Other Facilities Contingency (20%)	$12,447,000
Environmental & Archaeology Studies and Mitigation	$517,000
Land Acquisition and Surveying (188 acres)	$1,479,000
Interest During Construction (3.5% for 1 year with a 0.5% ROI)	$3,762,000
TOTAL COST OF PROJECT	**$119,879,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$8,408,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$320,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$267,000
Advanced Water Treatment Facility	$5,568,000
Pumping Energy Costs (6,266,181 kW-hr @ 0.09 $/kW-hr)	$564,000
TOTAL ANNUAL COST	**$15,127,000**
Available Project Yield (acft/yr)	5,494
Annual Cost of Water ($ per acft)*	$2,753
Annual Cost of Water After Debt Service ($ per acft)*	$1,223
Annual Cost of Water ($ per 1,000 gallons)*	$8.45
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$3.75
*Based on Peaking Factor of 1.0	

5.2.15.5 Implementation Considerations

Information presented in this WMS was provided by ARWA and represents the current approach, which is based on the sponsor's current understanding of the system. Implementation of the ARWA DPR Project (Phase 3) WMS will require permits and approvals from the TCEQ. Additional implementation considerations include the following:

- Adequate treatment of WWTP effluent to drinking water quality standards;
- Verification of water quality for concentrations of constituents, such as TDS, chloride, sulfate, iron, manganese, and hydrogen sulfide;
- The TCEQ has not previously approved potable reuse projects that combine effluent from multiple WWTPs; additional effluent source water characterization studies may be required; and
- Uncertain TCEQ regulatory requirements for DPR WTPs and for blending DPR treated water with other water sources.

5.2.16 CRWA Expanded Brackish Carrizo-Wilcox Project

The SCTRWPG identified the CRWA Expanded Brackish Carrizo-Wilcox Project as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.16.1 Description of Water Management Strategy

The CRWA Expanded Brackish Carrizo-Wilcox Project includes developing a brackish groundwater supply from the Carrizo-Wilcox Aquifer in Guadalupe and Wilson counties for members of CRWA with service areas in Bexar, Guadalupe, and Wilson counties. The project is designed to supply 14,700 acft/yr of treated water (13.1 MGD) with a peak demand of 17.1 MGD by the 2040 decade; however, the available yield varies because of MAG limitations. The well fields are planned for northern Wilson County and southern Guadalupe County, along Highway 123. The WTP and site of concentrate disposal will be in the vicinity of the well fields. Treated water will be transferred to the existing Liessner Booster Station for distribution to participating water utilities.

This strategy builds on a preliminary assessment of potential brackish groundwater supplies from the Carrizo-Wilcox Aquifer in a target area that is generally a 10 to 20 mile wide band that is south of Interstate 10 and between Loop 410 and Seguin [1]. The study and a summary of the findings are briefly discussed in Subsection 5.2.21.2.

Planned facilities for the CRWA Brackish Carrizo-Wilcox Project include two new well fields from the Carrizo-Wilcox Aquifer in Wilson and Guadalupe counties; wells, pumps, and collector pipelines; a 17.1 MGD WTP with desalination; a 12 mile treated water transmission pipeline, pump stations, and one ground storage tank; and five injection wells for disposal of desalination concentrate. The approximate location of the project is shown on Figure 5.2.16-1.

The desalination WTP, disposal well for the concentrate, and pump station will be located near the intersection of TX Hwy 123 and FM 1681. A raw water collector pipeline is planned to deliver brackish Carrizo-Wilcox water from the wells to the WTP, where it will undergo treatment and desalination.

Water treatment will consist of pretreatment and desalination. Pretreatment will include filtration and possibly other processes to remove particulates such as iron or manganese and to condition the water for optimal desalination. Desalination treatment is expected to be completed by RO. The required secondary MCL for TDS is 1,000 mg/L. The design of the water treatment facilities is to produce potable water with a TDS concentration between 400 and 450 mg/L. Preliminary water treatment design includes (1) pretreatment of all raw water, (2) approximately 70 percent of the water will be sent to the desalination WTP, and (3) the remaining 30 percent of the water will be blended with the desalinated water. A desalination plant recovery rate of 80 percent is obtained by treating raw water with a TDS concentration of approximately 1,200 mg/L with conventional RO. Thus, 80 percent of the water entering the desalination plant becomes potable water and 20 percent of the water remains as concentrated brine. The desalinated water and the pretreated brackish water are blended to produce a treated water with a TDS concentration of approximately 420 mg/L, which is reasonably consistent with water currently being used by customers in the area. This process converts nearly 86 percent of the quantity of raw water produced from the well fields into potable water. The remaining 14 percent concentrate is discharged into the deep injection wells.

[1] HDR Engineering, Inc. February 2008. *Preliminary assessment of potential water supplies from the Carrizo-Wilcox Aquifer in Parts of Bexar, Guadalupe, and Wilson Counties*. Prepared for San Antonio River Authority.

The treated water facilities consist of a transmission pipeline, which connects to an existing 30 inch pipeline, a pump station and booster station, and a GST at each station, and integration into the Liessner Booster Station. A 12 mile, 30 inch treated water pipeline is planned to deliver treated water to the Liessner Booster Station and will require a 17.1 MGD pump station at the WTP. The system is designed to provide treated water at an annual average of 13.1 MGD and a peak demand of 17.1 MGD.

A concentrate disposal well, GST, pipelines, and facilities are planned at or near the WTP. A concentrate water pipeline will deliver reject water to a GST. A small pump and a pipeline are planned to transport the concentrate to a new deep injection well field near the plant. The project will likely require five injection wells. The target disposal of the concentrate will be deep well injection into depleted or partially depleted oil and gas producing reservoirs (Austin Chalk or Edwards Limestone).

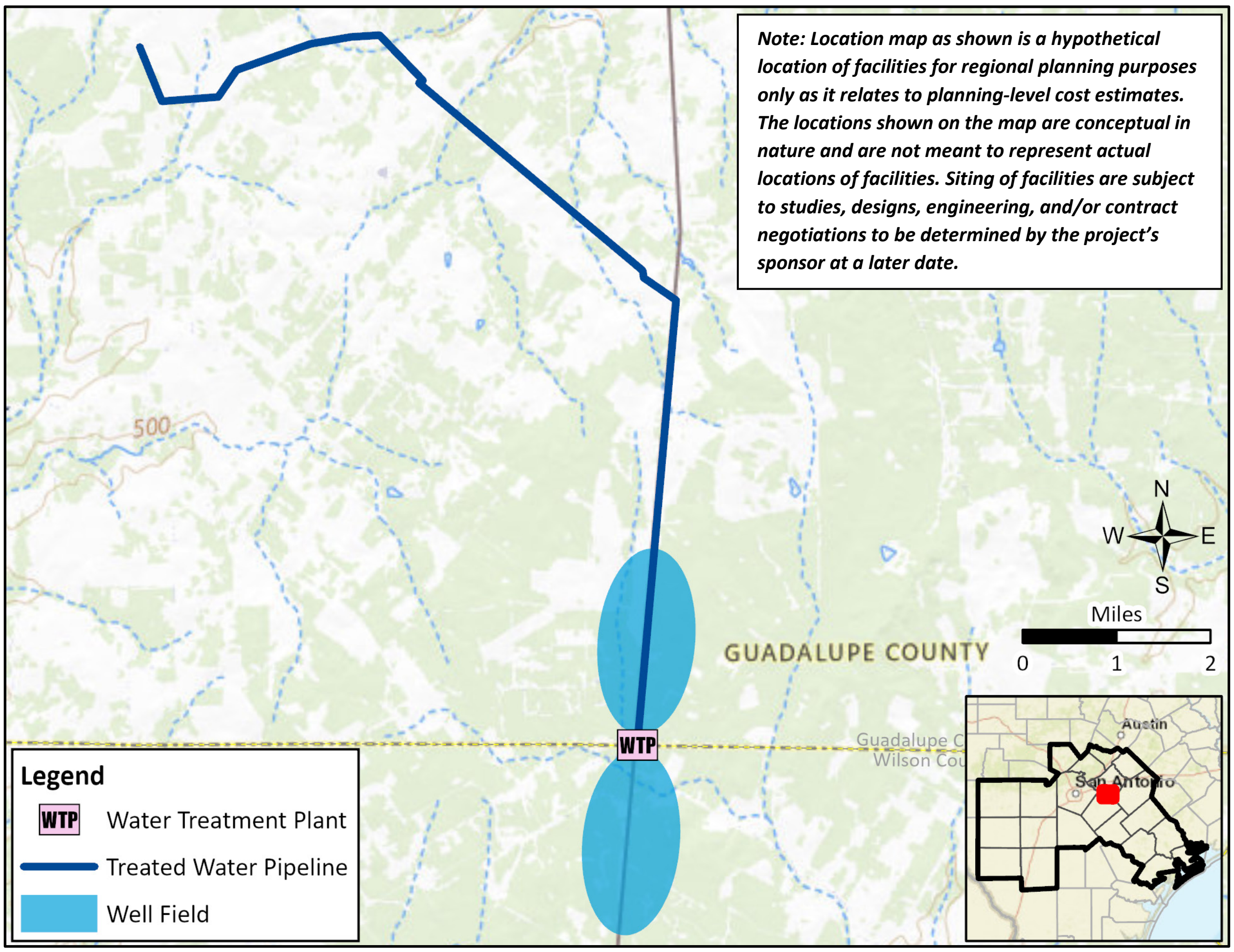

Figure 5.2.16-1 Approximate Location of the CRWA Expanded Brackish Carrizo-Wilcox Project

5.2.16.2 Available Yield

This WMS is planned for full completion by 2040 and has an available yield that varies by decade because of MAG limitations. Table 5.2.16-1 provides a summary of the yield as envisioned by the sponsor (Envisioned Yield) and the yield available considering MAG constraints (MAG-Constrained Yield) for the CRWA Expanded Brackish Carrizo-Wilcox Project WMS. The MAG-Constrained Yield is the available yield included in DB27.

Table 5.2.16-1 Envisioned and MAG-Constrained Yields for the CRWA Expanded Brackish Carrizo-Wilcox Project (acft/yr)

Yield Type	2030	2040	2050	2060	2070	2080
Envisioned Yield	0	14,700	14,700	14,700	14,700	14,700
MAG-Constrained Yield	0	6,514	8,044	10,206	11,536	11,405

The Evergreen Underground WCD and the Guadalupe County GCD regulate groundwater production, well spacing, and other requirements in the Carrizo-Wilcox Aquifer in Wilson County and Guadalupe County, respectively. In 2021, GMA-13 established DFCs for the Carrizo-Wilcox Aquifer [2]. On the basis of the approved DFCs, the TWDB determined that the MAG estimate for the Carrizo-Wilcox Aquifer is 125,670 acft/yr in Wilson County in 2080, and is 41,659 acft/yr in Guadalupe County in 2080 [3].

Production and/or drilling permits for these wells may be required in accordance with specific GCD rules. For most aquifers in the region, GCDs have adopted DFCs. In some GCDs, full use of all groundwater supplies (permitted, grandfathered and exempt) may result in non-achievement of the DFCs for an aquifer. To ensure consistency with the DFCs, TWDB requires that groundwater availability for each aquifer be limited for planning purposes to the MAG for the discrete geographic-aquifer unit (i.e., aquifer/county/basin unit). In some instances, the sum of existing supplies and future supplies (as groundwater-based WMSs) are greater than the MAG or groundwater availability for a discrete geographic-aquifer unit. This has resulted, for regional water planning purposes only, in adjustments to available yields shown in this plan, and a lack of firm water available for future projects in this plan for some areas for certain time periods. This should not be construed as recommending or requiring that GCDs make these adjustments or deny future permit applications. As described in Guiding Principle V (refer to Appendix 5A), this is not intended to influence or interfere with the regulatory decisions made by the governing boards of permitting entities. The SCTRWPG recognizes and supports the ability of permit holders to exercise their rights to groundwater use in accordance with their permits and it recognizes and supports a GCD's discretion to issue permits and grandfather historical users for amounts in excess of the MAG. The SCTRWPG may not modify groundwater permits that GCDs have already issued or limit future permits that GCDs may issue. If MAG estimates are modified during or after this planning cycle, the SCTRWPG may amend this plan to adjust WMS supply volumes that are affected by the modified MAG estimate(s).

According to the previous study performed for the San Antonio River Authority, "favorable" and "most favorable" areas for brackish water wells in the Carrizo-Wilcox Aquifer were identified (Figure 5.2.16-2). The study identified trends and patterns of well depths, well yields, and concentrations of TDS, chlorides, and sulfates in the target area. The study relied on well data from the TWDB and oil and gas well logs from the TCEQ. Using information from the previous study, the CRWA Brackish Carrizo-Wilcox Project was sited to provide a reliable, safe yield for CRWA.

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[2] Texas Water Development Board, Groundwater Management Area 13 – Desired Future Conditions. https://www.twdb.texas.gov/groundwater/dfc/docs/summary/GMA13_DFC_2021.pdf

[3] Wade, S.C. 2022. GAM Run 21-018 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers in GMA-13: TWDB. https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR21-018_MAG.pdf

Wells for this project will be located in the vicinity of the Guadalupe-Wilson County line and Highway 123, which was identified as the "most favorable" area in a previous study (Figure 5.2.16-2). According to TWDB well data and sand thicknesses included in the previous study, potential well yields in the "favorable" and "most favorable" areas are expected to be 500 to 800 gpm and 700 to 1,000 gpm, respectively. Concentrations of TDS are expected to range between 1,000 and 1,500 mg/L in the "favorable" area and 800 and 1,200 mg/L for the "most favorable" area. The Carrizo-Wilcox wells are expected to be between 1,200 and 1,700 feet deep. Well field details and project yield for the CRWA Brackish Carrizo-Wilcox Project are provided in Table 5.2.16-2.

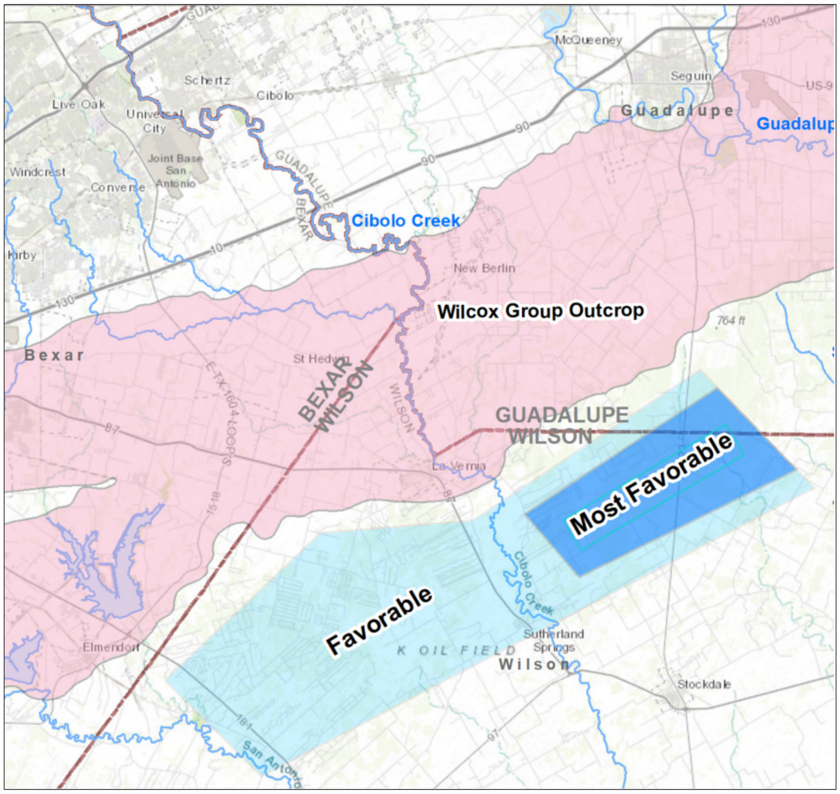

Figure 5.2.16-2 Location of Favorable and Most Favorable Areas for Groundwater Development in Carrizo-Wilcox Aquifer, as identified by HDR Engineering, Inc. (2008)

Table 5.2.16-2 Well Field Summary for the CRWA Expanded Brackish Carrizo-Wilcox Project

Description	Southern Guadalupe County Well Field	Northern Wilson County Well Field
Requested Project Yield (acft/yr)	14,700	
Number of Wells	9	8
Average Well Production Capacity (gpm)	800	800
Well Depth (ft)	1,200 – 1,700	1,200 – 1,700
TDS Concentration (mg/L)	1,000 – 1,500	1,000 – 1,500

5.2.16.3 Environmental Factors

The project was evaluated to determine its potential impacts on environmental factors. Table 5.2.16-3 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.16-3 Summary of Potential Project Effects on Environmental Factors for the CRWA Expanded Brackish Carrizo-Wilcox Project

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	5
Potential Species Impact Score	4
Potential Habitat Impact Score	2
Potential Stream Construction Impact Score	2
Potential Stream Flow / Water Quality Impact Score	1
Potential Cultural Resources Impact Score	31

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project area is located in the Post Oak Savanna ecoregion and crosses mostly pastures and post oak woodlands. As mapped by TPWD [4], the project pipeline crosses primarily savannah grassland and post oak motte and woodland. Vegetation within the well field sites consists mostly of post oak motte and woodland and grassland.

Based on TPWD vegetation mapping, the project may affect less than 1 acre of agricultural resources mapped as row crops. The project impact area also contains 2 acres mapped as tame/disturbance grassland and 2 acres mapped as sandyland grassland which may include pasture areas used for grazing or hay production.

Construction of well fields would result in conversion of woody and herbaceous vegetation and agricultural areas to industrial land use for facilities. Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing, woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species that are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each water management strategy to determine the best course of action regarding revegetation. Pipeline easements may continue to be used for agricultural purposes.

Aquatic Resources

The project area includes several intermittent streams, and the NWI shows approximately 20.7 acres of freshwater and riverine wetlands in the project area. Project well field locations are traversed by TCEQ Segment No. 1901F of Ecleto Creek, a tributary of the San Marcos River. This creek is listed as impaired

[4] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/

for depressed dissolved oxygen in the Texas Integrated Report of 303(d) listed water bodies [5]. The 303(d) list identifies the water bodies or segments in Texas that do not meet designated water quality standards. The project pipeline does not cross any streams identified as impaired stream segments. The project area does not include any ecologically significant stream segments designated by TPWD.

The project will require an on-site delineation of streams, ponds, and wetlands. Stream crossings for pipeline construction would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including if there would be permanent impacts to over 0.1 acre of waters of the United States. The USACE permit requires that there will be no change in preconstruction contours of waters of the United States. Utility crossings under stream (e.g., through HDD) would not require a USACE permit.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened, endangered, and candidate species and species of concern that have the potential to occur in Guadalupe and Wilson counties [6,7,8,9]. Suitable habitat may occur for the proposed federally endangered tricolored bat (*Perimyotis subflavus*) and the monarch butterfly (*Danaus plexippus*), which is a candidate for federal listing as a threatened or endangered species. The federally endangered whooping crane (*Grus americana*) has low potential to occur during migration.

Suitable habitat may occur for the state listed threatened white-faced ibis (*Plegadis chihi*), Texas horned lizard (*Phrynosoma cornutum*) and Texas tortoise (*Gopherus berlandieri*). Potentially suitable habitat may occur for numerous wildlife, plant and insect species designated by TPWD as SGCN, particularly species associated with sandy soil habitats. These species do not have formal protected status but are being monitored by TPWD. Migratory birds may occur in the project area, particularly in riparian zones and wetland areas.

Site-specific field surveys would be required to determine the quality of habitat for federally and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be required to obtain their recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area. Migratory birds may occur in the project area during spring or fall migration. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to

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[5] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir

[6] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Guadalupe County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[7] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation (IPaC) Resource List – Guadalupe County. https://ipac.ecosphere.fws.gov/location/index.

[8] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Wilson County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[9] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation (IPaC) Resource List – Wilson County. https://ipac.ecosphere.fws.gov/location/index.

conduct preconstruction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15.

Cultural Considerations

In the State of Texas, all human burials are protected by law [10], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project area and alignment and the remains are determined to be Native American, they will be handled in accordance with procedures established through coordination with the THC, and work in the affected area could only resume in accordance with THC authorization.

For linear portions of the project (i.e., project alignment), a background literature review was performed for the alignment and a 300-foot radius around the project alignment. For the area portion of the project (i.e., project area), a background literature review was conducted of the area portion only. The background literature review determined that cultural resources do not intersect with the approximate 2,187-acre project area and alignment, but identified one cultural resource immediately adjacent (i.e., within 300 feet) of the project alignment (Table 5.2.16-4) [11]. Elm Creek Community Cemetery (also known as Elm Creek Methodist Cemetery) (GU-C044) is found immediately adjacent to the project alignment in its northern portion. The cemetery is a designated Historic Texas Cemetery. Additionally, the historical map review identified nine potential historic-age structures that intersect with the project area and alignment or are immediately adjacent (i.e., within 300 feet) to the project's pipeline alignment [12].

A probability model was used to assess the overall potential of buried prehistoric archaeological deposits in the project area and alignment, which included low, medium, and high potential zones. The model indicated that 0.1% of the project area and alignment had a high likelihood of containing significant unidentified archaeological resources, 4.3% had a moderate likelihood, and 95.4% had a low likelihood. Areas with higher archaeological probability were considered to have been located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project area and alignment that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area and alignment. Next, the cultural resources within the project area and alignment were evaluated according to its NRHP eligibility and SAL designation. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts and properties or archaeological sites, SALs, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, Recorded Texas Historical Landmarks, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. The points for all cultural resources within the project area and alignment were

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[10] According to the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

[11] Texas Historical Commission (THC). 2024. *Texas Archeological and Historical Sites Atlas.* Available at: https://atlas.thc.texas.gov/. Accessed October 2024.

[12] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed October 2024.

tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for this project equaled 31.

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, one cemetery and nine potential historic-age structures are located within the project area and alignment; the probability model indicates a low likelihood of buried deposits; and the project assessment score is 31. Based on these results, a cultural resources assessment for the final design plan is likely necessary, as well as a buffer zone of at least 100 feet between the cemetery and the proposed development.

Table 5.2.16-4 Cultural Resources Results for the ARWA Carrizo-Wilcox Project (Phase 2)

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Elm Creek Community Cemetery	Cemetery	Historic	Undetermined	Adjacent
None (N=9)	Buildings / Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**31.0**

5.2.16.4 Engineering and Costing

Preliminary engineering and costing analyses were performed using the 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Tool, which includes standard costing procedures and methods for calculating unit costs. The engineering and costing analysis for the CRWA Expanded Brackish Carrizo-Wilcox Project includes all facilities required for a new brackish groundwater well field, a new desalination WTP, disposal of brine concentrate via deep well injection, and conveyance of potable water to existing integration pipelines that currently deliver water recovered from the existing local projects.

A cost estimate summary for CRWA Expanded Brackish Carrizo-Wilcox Project is provided in Table 5.2.16-5. Infrastructure was sized to deliver the sponsor’s Envisioned Yield, but because the project is MAG-limited, the annual unit costs were calculated using the MAG-Constrained Yield in the first decade of implementation. All cost estimates consider infrastructure and capacities necessary to deliver the sponsor’s Envisioned Yield, despite the lack of groundwater availability.

Table 5.2.16-5 Cost Estimate Summary for the CRWA Expanded Brackish Carrizo-Wilcox Project

Item	Estimated Costs
Primary Pump Station (17.1 MGD)	$11,103,000
Transmission Pipeline (30 in. dia., 12 miles)	$29,416,000
Well Fields (wells, pumps, and piping)	$74,370,000
Storage Tanks (Other Than at Booster Pump Stations)	$10,915,000
Water Treatment Plant (17.1 MGD)	$110,155,000

Item	Estimated Costs
Integration, Relocations, Backup Generator & Other	$251,000
TOTAL COST OF FACILITIES	**$236,210,000**
Planning (3%)	$7,086,000
Design (7%)	$16,535,000
Construction Engineering (1%)	$2,362,000
Legal Assistance (2%)	$4,724,000
Fiscal Services (2%)	$4,724,000
Pipeline Contingency (15%)	$4,412,000
All Other Facilities Contingency (20%)	$41,359,000
Environmental & Archaeology Studies and Mitigation	$2,185,000
Land Acquisition and Surveying (368 acres)	$2,460,000
Interest During Construction (3.5% for 1 year with a 0.5% ROI)	$10,459,000
TOTAL COST OF PROJECT	**$332,516,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$23,379,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$1,150,000
Intakes and Pump Stations (2.5% of cost of facilities)	$278,000
Water Treatment Plant	$20,531,000
Pumping Energy Costs (5,684,528 kWh @ 0.09 $/kWh)	$512,000
Purchase of Water (7,280 acft/yr @ 83.15 $/acft)	$605,000
TOTAL ANNUAL COST	**$46,455,000**
Available Project Yield (acft/yr)	6,514
Annual Cost of Water ($ per acft)*	$7,132
Annual Cost of Water After Debt Service ($ per acft)*	$3,543
Annual Cost of Water ($ per 1,000 gallons)*	$21.88
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$10.87
*Based on a peaking factor of 1.3.	

5.2.16.5 Implementation Considerations

Information presented in this WMS was provided by CRWA and previous reports and represents the current plan, which is based on the sponsor's current understanding of the system. Implementation of the CRWA Expanded Brackish Carrizo-Wilcox Project includes the following considerations:

- Verification of available groundwater quantity and well productivity;
- Verification of water quality for concentrations of dissolved constituents, such as TDS, chloride, sulfate, iron, manganese, and hydrogen sulfide;
- Verification of the potential for deep well injection of concentrate;
- Class I disposal well permit through the TCEQ for deep well injection of desalination concentrate;
- Regulations by TCEQ;
- Regulations by the Evergreen UWCD and Guadalupe County GCD;
- Verification that desalinated Carrizo-Wilcox Aquifer water is compatible with other water sources being used by customers and will meet all water quality requirements in the end user's distribution system; and
- Experience in operating and maintaining a desalination WTP.

Additional considerations may include the following:

- Impacts on the following:
  - Endangered and threatened species;
  - Water levels in the aquifer, including potential dewatering of the current artesian part of the aquifer;
  - Baseflow in streams; and
  - Wetlands.
- Competition with others in the area for groundwater in the Carrizo Aquifer, including the following:
  - Private water purveyors;
  - Public water purveyors in the area; and/or
  - Future oil and gas drilling operations.

5.2.17 CRWA Siesta Project

The SCTRWPG identified the CRWA Siesta Project as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.17.1 Description of Water Management Strategy

The CRWA Siesta Project includes diversions from Cibolo Creek in Wilson County under existing and amended water rights along with treated effluent from treatment facilities operated by the San Antonio River Authority, Cibolo Creek Municipal Authority (CCMA), the City of Marion, and/or Green Valley SUD. Should treated effluent from wastewater treatment facilities not be available, the project could include brackish groundwater as an alternate backup source. The CRWA Siesta Project involves the acquisition/lease of additional water rights and the amendment of surface water right CA #19-1155 presently held by CRWA to increase authorized diversions from Cibolo Creek by CRWA from 42 acft/yr to 5,042 acft/yr. The firm yield of the CRWA Siesta Project at the Siesta Cattle Company site is to be available to the CRWA members via the existing CRWA Mid-Cities Pipeline (Figure 5.2.17-1).

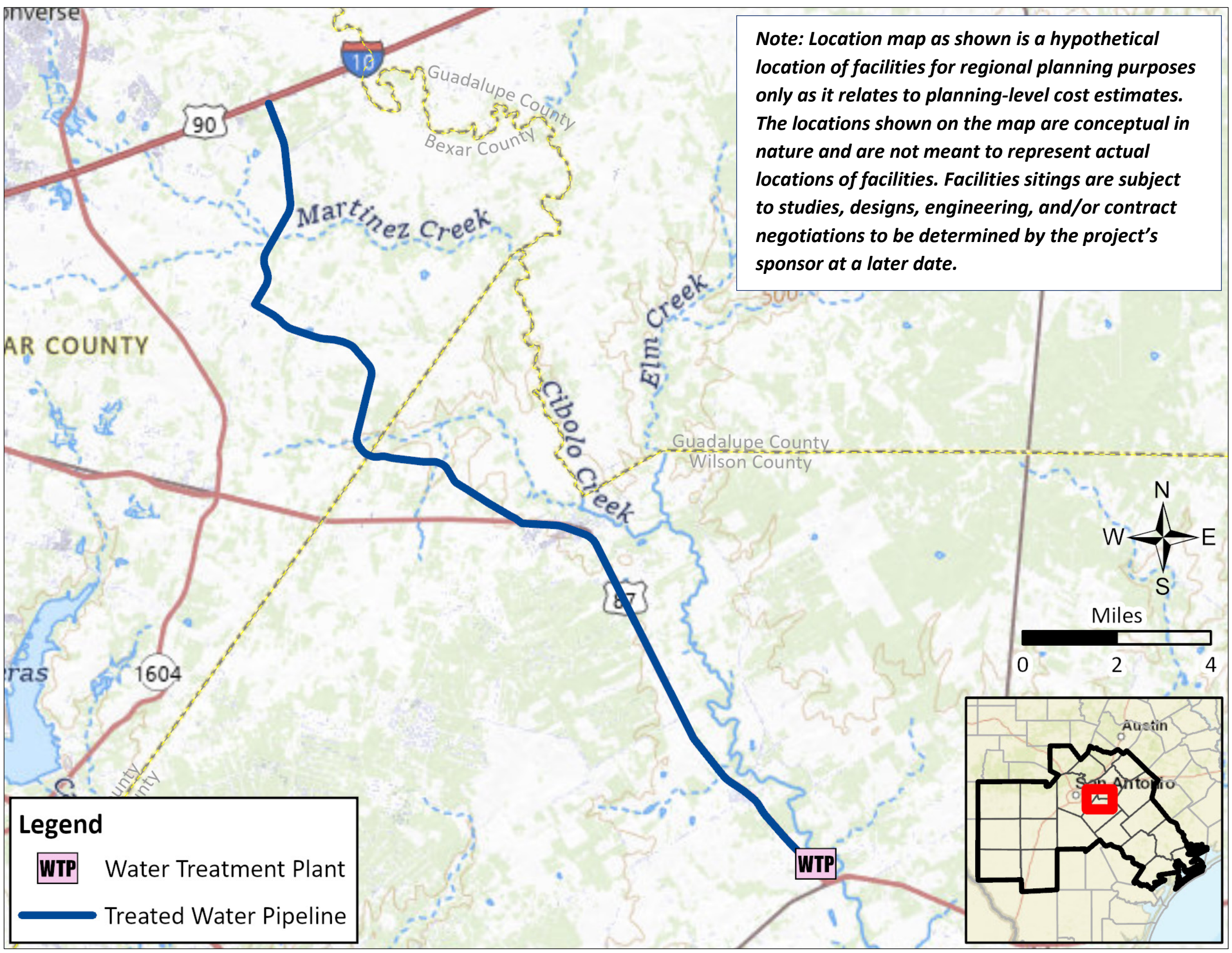

Figure 5.2.17-1 Approximate Location for the CRWA Siesta Project

5.2.17.2 Available Yield

This WMS has a firm yield of 5,042 acft/yr and is planned for full completion by 2060. Table 5.2.17-1 provides a summary of the available yield for the CRWA Siesta Project.

Table 5.2.17-1 Available Yield for the CRWA Siesta Project (acft/yr)

WMS	2030	2040	2050	2060	2070	2080
CRWA Siesta Project	0	0	0	5,042	5,042	5,042

CRWA has acquired two water rights on Cibolo Creek – Certificate of Adjudication (CA) #19-1155 for 42 acft/yr (formerly held by the Siesta Cattle Company) and CA #19-1151 for 86 acft/yr (formerly held by Raymond D. Hegwer et ux). CRWA has entered into agreements to lease water from two water rights holders on Cibolo Creek – CA #19-1152 for 35 acft/yr and CA #19-1157 for 117 acft/yr (for a total of 152 acft/yr). CRWA will be seeking to amend these water rights so that a common diversion point can be utilized at the Siesta Cattle Company site and to increase total authorized diversions at that point to 5,042 acft/yr, which is the firm yield for this WMS.

The Guadalupe-San Antonio River Basin (GSA) WAM was used to quantify water available for diversion under the existing water rights CRWA has either already acquired/leased or is seeking to acquire/lease. Hydrologic simulations and calculations were performed subject to the Hydrologic Assumptions for approval by TWDB for regional planning.

The GSA WAM was also used to quantify the water available under a proposed amendment to the Siesta water right (CA #19-1155), thereby increasing authorized diversion by 4,762 acft/yr. The proposed amendment to CA #19-1155 was modeled as a new appropriation subject to TCEQ Environmental Flow Standards.

The volumetric and monthly reliability of the water diverted for the CRWA Siesta Project under the various water rights acquisitions, leases, and amendments is shown in Table 5.2.17-2. In addition, Figure 5.2.17-2 shows the makeup water necessary from the San Antonio River Authority and/or CCMA WWTPs on Martinez Creek to obtain a firm yield of 5,042 acft/yr. The long-term average (1934 to 1989) diversion from Cibolo Creek under the various water rights is 1,564 acft/yr. The corresponding long-term average makeup water requirement is 3,478 acft/yr. This WMS project is planned for implementation in the 2060 decade.

Table 5.2.17-2 Volumetric and Monthly Reliability for the CRWA Siesta Project

Water Right	Maximum Authorized Diversion (acft/yr)	Average Annual Diversion (acft/yr)	Volumetric Reliability	Monthly Reliability
CA #19-1155_1	42	41.5	98.86%	99.11%
CA #19-1151_1	86	85	98.86%	99.11%
CA #19-1152_1	35	32.9	94.16%	95.24%
CA #19-1157_2	117	109.2	93.35%	94.49%
CA #19-1155_2*	4,762	1,295.8	27.21%	16.37%
*New surface water amendment/permit to be obtained by CRWA.				

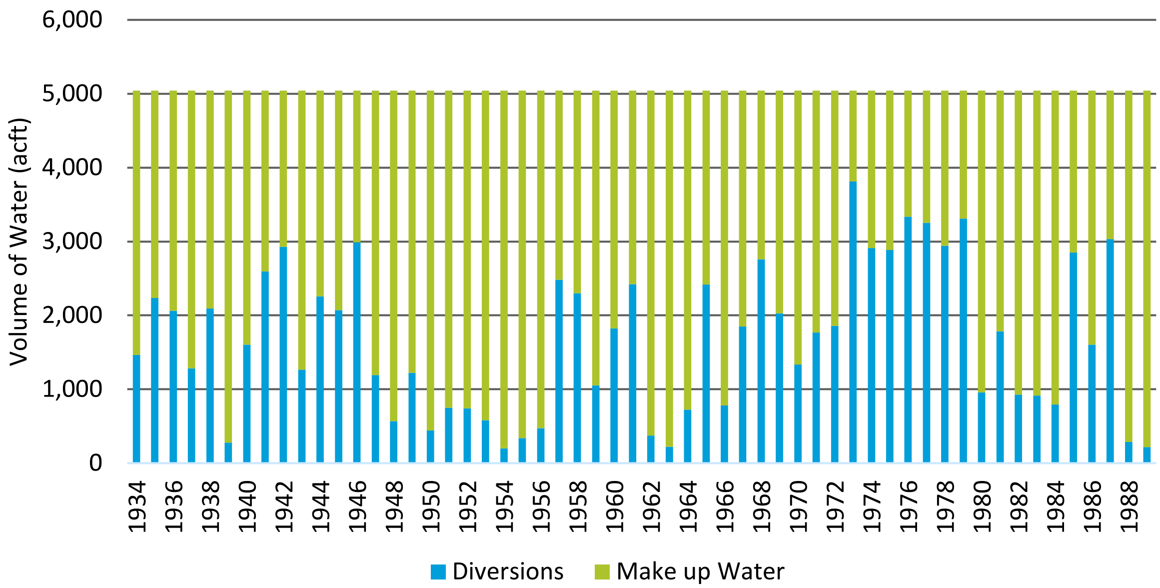

Figure 5.2.17-2 Annual Surface Water Diversion and Makeup Water for the CRWA Siesta Project

5.2.17.3 Environmental Factors

The project was evaluated to determine its potential impacts on environmental factors. Table 5.2.17-3 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.17-3 Summary of Potential Project Effects on Environmental Factors for the CRWA Siesta Project

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	35
Potential Species Impact Score	5
Potential Habitat Impact Score	1
Potential Stream Construction Impact Score	3
Potential Stream Flow / Water Quality Impact Score	3
Potential Cultural Resources Impact Score	95

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project area occurs in the Post Oak Savanna and Blackland Prairie ecoregions, and crosses a variety of vegetation types, mostly open fields, pastures, and riparian zones along streams. As mapped by TPWD [1], dominant vegetation types in the project area are post oak savanna grassland, disturbance/tame grassland, floodplain herbaceous vegetation, mesquite shrubland, and urban. The linear components of the project cross riparian vegetation zones along streams, mapped by TPWD as

[1] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/

floodplain and riparian herbaceous vegetation, floodplain and riparian hardwood forest, and floodplain live oak forest.

Based on TPWD vegetation mapping, the project may have the potential to impact 35 acres of agricultural resources, including 2 acres mapped as row crops, and 33 acres of disturbance or tame grassland which may include pasture areas used for grazing or hay production.

The water treatment plant, storage tank, and pump station would result in conversion of land use from riparian woodland along Cibolo Creek to small areas of industrial use. Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing, woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Pipeline easements may continue to be used for agricultural purposes.

Aquatic Resources

The project pipeline alignment crosses several mapped streams and their associated floodplains, including the Martinez Creek, Dry Hollow Creek, and several unnamed tributaries of Cibolo Creek. The NWI mapping displays 2.1 acres of freshwater pond/riverine wetlands in the project area.

The project alignment crosses Segment 1902A of Martinez Creek twice. This segment has been designated as an impaired stream segment in the Texas Integrated Report of 303(d) listed water bodies [2] This list identifies the water bodies or segments in Texas that do not meet assigned water quality standards. The southern half of the project pipeline alignment generally follows, but does not cross, Cibolo Creek. However, TCEQ Segment 1902, Lower Cibolo Creek, is the water source for this project. This stream segment has also been designated as an impaired stream segment in the Texas Integrated Report of 303(d) listed water bodies. The project area does not contain ecologically significant stream segments as designated by TPWD.

The project will require an on-site delineation of streams, ponds, and wetlands. Stream crossings for pipeline construction would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58 – Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including if permanent impacts would be to over 0.1 acre of waters of the United States. The USACE permit requires that no change in preconstruction contours of waters of the United States would occur. Utility crossings under stream (e.g., through horizontal directional drilling) would not require a USACE permit.

[2] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened, endangered, and candidate species and species of concern that may occur in Bexar and Wilson Counties [3, 4, 5]. The federally endangered whooping crane (*Grus americana*) has low potential to occur during migration. Suitable habitat may occur for the monarch butterfly, which is a candidate for federal listing as a threatened or endangered species.

Suitable habitat may occur for several state-listed threatened species, including white-faced ibis (*Plegadis chihi*), wood stork (*Mycteria americana*), Texas horned lizard (*Phrynosoma cornutum*), and Texas tortoise (*Gopherus berlandieri*). Potentially suitable habitat may occur for numerous state wildlife, plant, and insect species designated by TPWD as SGCN. These species do not have formal protected status but are being monitored by TPWD. Migratory birds may occur in the project area, particularly in riparian zones and wetland areas.

Site-specific field surveys would be required to determine the quality of habitat for federal and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be required to obtain their recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may occur in the project area during spring or fall migration. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15. Preconstruction surveys for active bird nests are recommended.

Cultural Considerations

Vicinity cemeteries are very general areas where a cemetery location was reported at one time, but the exact location is unknown or could not be confirmed. If project impacts are to occur near the vicinity cemetery location, further work (e.g., pedestrian survey and/or metal detecting) or construction monitoring might be needed to ensure human burials are not present in the project alignment. In the State of Texas, all human burials are protected by law [6], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project alignment and the remains are determined to be Native American, they will be handled in accordance with procedures established through coordination with the THC, and work in the affected area could only resume according to THC authorization.

For linear portions of the project (i.e., project alignments), a background literature review was performed for the alignment and a 300-foot radius around the project alignment. The background literature review determined that 10 cultural resources are located within or immediately adjacent (i.e.,

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[3] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Bexar County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[4] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Wilson County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[5] U.S. Fish and Wildlife Service. 2024. Information for Planning and Consultation Resource List. https://ipac.ecosphere.fws.gov/location/index

[6] As per the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

within 300 feet) to the approximate 282-acre project alignment (Table 5.2.17-4) [7]. These cultural resources include one archaeological site (41WN58), two NRHP-eligible properties (i.e., Annunciation of the Blessed Virgin Mary Roman Catholic Church, and Saint Hedwig Commercial Building), two cemeteries (i.e., Annunciation of the Blessed Virgin Mary Roman Catholic Cemetery [BX-C037], and Immanuel Lutheran Cemetery [WN-C002]), one vicinity cemetery (Carpenter Family [BX-C192]), and four Official Texas Historical Markers (OTHMSs) (i.e., Applewhite Homestead [Marker No. 13773], Immanuel Lutheran Cemetery [Marker No. 13555], Saint Hedwig [Marker No. 18445], and Suttles Pottery [Marker No. 13047]). Note that there are cultural resources with multiple resource types. Archaeological site 41WN58 remains undetermined for listing on the NRHP. Both cemeteries are designated as a Historic Texas Cemetery. Additionally, the historical map review identified 23 potential historic-age structures that intersect with or are immediately adjacent (i.e., within 300 feet) to the project alignment[8].

A probability model was used to assess the overall potential of buried prehistoric archaeological deposits in the project alignment, which included low, medium, and high potential zones. The model indicated that 26.4% of the project alignment had a high likelihood of containing significant unidentified archaeological resources, 50.3% had a moderate likelihood, and 23.3% had a low likelihood. Areas with higher archaeological probability were considered to have been located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project alignment that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project alignment. Next, the cultural resources within the project alignment were evaluated according to its NRHP eligibility and SAL designation. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts and properties or archaeological sites, SALs, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, Recorded Texas Historical Landmarks, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. For cultural resources with multiple resource types, the values of each resource type were calculated and used to determine the overall assessment score. The points for all cultural resources within the project alignment were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for this project equaled 95.

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, one archaeological site, two NRHP-eligible historic properties, two cemeteries, one vicinity cemetery, four historical markers, and 23 potential historic-age structures are located within the project alignment; the probability model indicates a moderate to high likelihood of buried deposits; and the project assessment score is 95. Based on these results, a cultural resources assessment for the final design plan is likely necessary, as well as a buffer zone of at least 100 feet between the cemeteries and the proposed development.

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[7] Texas Historical Commission (THC). 2024. *Texas Archeological and Historical Sites Atlas.* Available at: https://atlas.thc.texas.gov/. Accessed October 2024.

[8] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed October 2024.

Table 5.2.17-4 Cultural Resources Results for the CRWA Siesta Project

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
41WN58	Archaeological site	Prehistoric	Undetermined	Adjacent
Saint Hedwig Commercial Building	Historic property / OTHM	Historic	Eligible	Intersect
Annunciation of the Blessed Virgin Mary Roman Catholic Church	Historic property / Cemetery	Historic	Eligible	Adjacent
Immanuel Lutheran Cemetery	Cemetery / OTHM	Historic	Undetermined	Intersect
Carpenter Family	Vicinity Cemetery	Historic	Undetermined	Intersect
Applewhite Homestead	Historical Marker	Historic	Undetermined	Intersect
Suttles Pottery	Historical Marker	Historic	Undetermined	Adjacent
None (N=23)	Buildings / Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**95**

5.2.17.4 Engineering and Costing

Preliminary engineering and costing analyses have been performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. These costs include all facilities required for water diversion, conveyance, and treatment.

Cost estimates were calculated for capital costs, annual debt service, operation and maintenance, power, land acquisition, and environmental mitigation for season and peak day demands. These costs are summarized in Table 5.2.17-5 for the CRWA Siesta Project. Facilities for the CRWA Siesta Project include a raw water intake and pump station and a water treatment plant at the Siesta Cattle Company site as well as a 23-mile, 20-inch treated water transmission pipeline to the existing FM 1518 elevated tank, part of the existing CRWA Mid-Cities Pipeline. The new water treatment plant would include conventional treatment.

Facilities have been sized with a 1.5 peaking factor to meet peak month demands. For costing purposes, it is assumed that the entire project yield would be delivered to the Farm-to-Market Road (FM) 1518 elevated storage tank (EST).

Table 5.2.17-5 Cost Estimate Summary for the CRWA Siesta Project

Item	Estimated Costs
CAPITAL COST	
Intake Pump Stations (6.8 MGD)	$28,764,000
Transmission Pipeline (20 in. dia., 23.3 miles)	$53,020,000
Transmission Pump Station(s) & Storage Tank(s)	$9,537,000
Water Treatment Plant (6.8 MGD)	$53,885,000
Integration, Relocations, Backup Generator & Other	$354,000
TOTAL COST OF FACILITIES	**$145,560,000**
Planning (3%)	$4,367,000
Design (7%)	$10,189,000
Construction Engineering (1%)	$1,456,000
Legal Assistance (2%)	$2,911,000
Fiscal Services (2%)	$2,911,000
Pipeline Contingency (15%)	$7,953,000
All Other Facilities Contingency (20%)	$18,508,000
Environmental & Archaeology Studies and Mitigation	$781,000
Land Acquisition and Surveying (296 acres)	$1,980,000
Interest During Construction (3.5% for 1 year with a 0.5% ROI)	$6,379,000
TOTAL COST OF PROJECT	**$202,995,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$14,258,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$4549,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$919,000
Water Treatment Plant	$3,999,000
Pumping Energy Costs (5,813,397 kW-hr @ 0.09 $/kW-hr)	$523,000
Purchase of Water (152 acft/yr @ 75 $/acft)	$11,000
TOTAL ANNUAL COST	**$20,259,000**
Available Project Yield (acft/yr)	5,042
Annual Cost of Water ($ per acft)*	$4,018
Annual Cost of Water After Debt Service ($ per acft)*	$1,190
Annual Cost of Water ($ per 1,000 gallons)*	$12.33
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$3.65
*Based on a peaking factor of 1.5.	

5.2.17.5 Implementation Considerations

Implementation of the CRWA Siesta Project WMS includes the following considerations:

- Purchase or lease agreements with water rights holders on Cibolo Creek;
- Permit amendments for each of the water rights to be purchased or leased to allow diversion from a common point at the Siesta Cattle Company site;
- Permit amendment for the Siesta water right (CA #19-1155) to authorize increased diversions;
- Agreement between CRWA and the San Antonio River Authority, the City of Marion, Green Valley SUD, and/or CCMA for the purchase and use of treated effluent from the San Antonio River Authority WWTPs on Martinez Creek; and
- Application to the TCEQ to obtain an authorization for the bed and banks transfer of treated effluent from the discharge points along Martinez Creek to the Siesta Cattle Company site.

5.2.18 CRWA Wells Ranch (Phase 3) Project

The SCTRWPG identified the CRWA Wells Ranch (Phase 3) Project as a potentially feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.18.1 Description of Water Management Strategy

CRWA is planning to expand their existing Wells Ranch Project to develop a new well field in Gonzales County. The project is designed to supply 14,500 acft/yr of treated water by the 2030 decade; however, the available yield varies because of MAG limitations. The project includes six new wells in the Carrizo Aquifer wells. Raw water from the wells would be delivered to the CRWA Wells Ranch WTP, which will require expansion for treatment and disinfection before the water is delivered to the CRWA distribution system. The proposed wells are to be constructed in a new well field in Gonzales County, southeast of the existing Wells Ranch WTP off HWY 80 (Figure 5.2.18-1). The project is expected to be implemented in the 2030 decade.

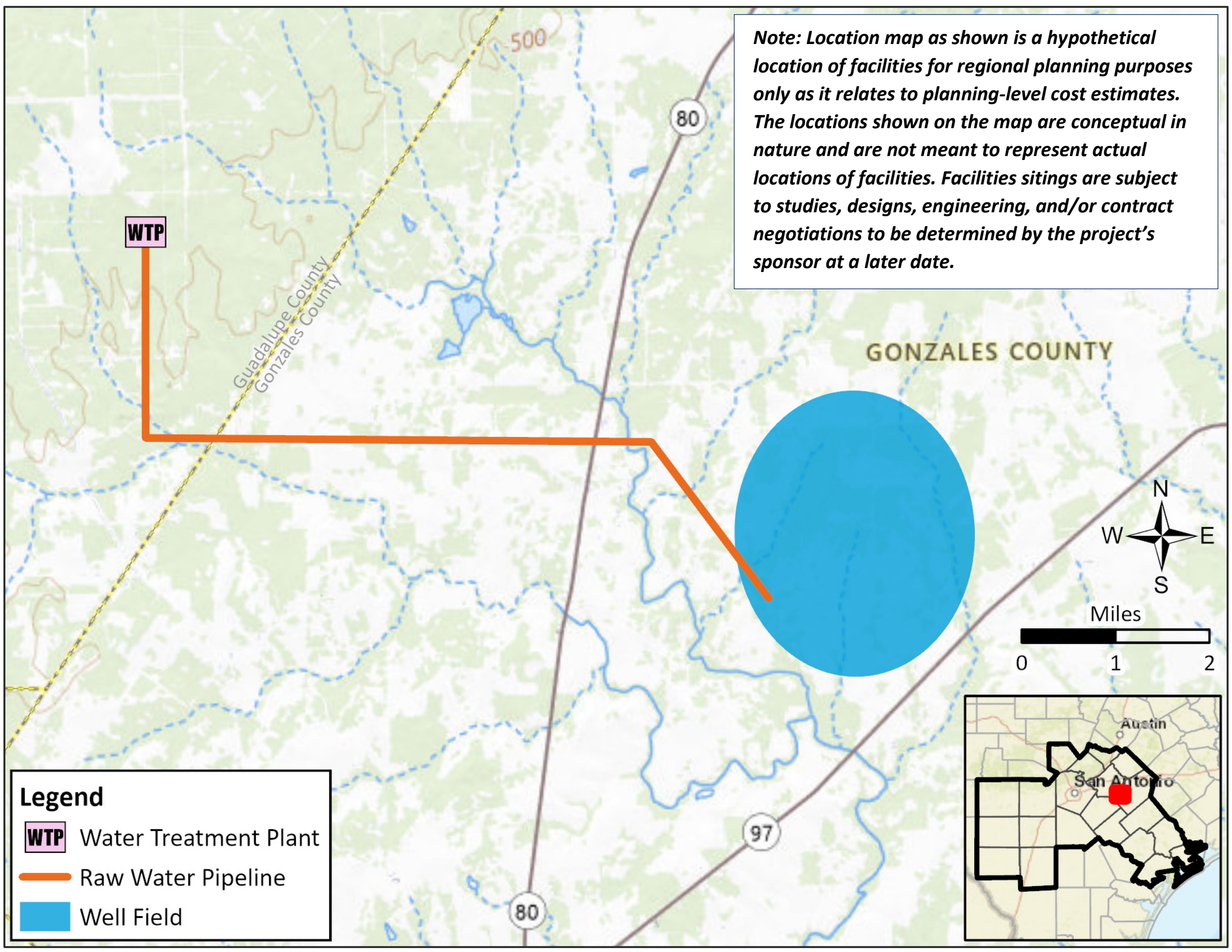

Figure 5.2.18-1 Approximate Location of the CRWA Wells Ranch (Phase 3) Project

5.2.18.2 Available Yield

This WMS is planned for full completion by 2030 and has an available yield that varies by decade because of MAG limitations. Table 5.2.18-1 provides a summary of the yield as envisioned by the sponsor (Envisioned Yield) and the yield available considering MAG constraints (MAG-Constrained Yield) for the CRWA Wells Ranch (Phase 3) Project WMS. The MAG-Constrained Yield is the available yield included in DB27.

Table 5.2.18-1 Envisioned and MAG-Constrained Yields for the CRWA Wells Ranch (Phase 3) Project (acft/yr)

Yield Type	2030	2040	2050	2060	2070	2080
Envisioned Yield	14,500	14,500	14,500	14,500	14,500	14,500
MAG-Constrained Yield	8,395	6,941	7,629	7,159	7,198	7,010

The Gonzales County UWCD regulates groundwater production, well spacing, and other requirements in the Carrizo-Wilcox Aquifer in Gonzales County. In 2021, GMA-13 established DFCs for the Carrizo-Wilcox Aquifer [1]. On the basis of the approved DFCs, the TWDB determined that the MAG estimate for the Carrizo-Wilcox Aquifer is 96,161 acft/yr for Gonzales County in 2080 [2].

Production and/or drilling permits for these wells may be required in accordance with specific GCD rules. For most aquifers in the region, GCDs have adopted DFCs. In some GCDs, full use of all groundwater supplies (permitted, grandfathered and exempt) may result in non-achievement of the DFCs for an aquifer. To ensure consistency with the DFCs, TWDB requires that groundwater availability for each aquifer be limited for planning purposes to the MAG for the discrete geographic-aquifer unit (i.e., aquifer/county/basin unit). In some instances, the sum of existing supplies and future supplies (as groundwater-based WMSs) are greater than the MAG or groundwater availability for a discrete geographic-aquifer unit. This has resulted, for regional water planning purposes only, in adjustments to available yields shown in this plan, and a lack of firm water available for future projects in this plan for some areas for certain time periods. This should not be construed as recommending or requiring that GCDs make these adjustments or deny future permit applications. As described in Guiding Principle V (refer to Appendix 5A), this is not intended to influence or interfere with the regulatory decisions made by the governing boards of permitting entities. The SCTRWPG recognizes and supports the ability of permit holders to exercise their rights to groundwater use in accordance with their permits and it recognizes and supports a GCD's discretion to issue permits and grandfather historical users for amounts in excess of the MAG. The SCTRWPG may not modify groundwater permits that GCDs have already issued or limit future permits that GCDs may issue. If MAG estimates are modified during or after this planning cycle, the SCTRWPG may amend this plan to adjust WMS supply volumes that are affected by the modified MAG estimate(s).

[1] Texas Water Development Board, Groundwater Management Area 13 – Desired Future Conditions. https://www.twdb.texas.gov/groundwater/dfc/docs/summary/GMA13_DFC_2021.pdf

[2] Wade, S.C. 2022. GAM Run 21-018 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers in GMA-13: TWDB. https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR21-018_MAG.pdf

The CRWA Wells Ranch (Phase 3) Project wells are to be designed to each produce approximately 1,550 gpm. Wells in the Carrizo Aquifer are expected to have a depth ranging from 400 to 600 feet.

The Carrizo-Wilcox Aquifer is one of four major aquifers in the South Central Texas Water Planning Region. Overall, the water quality of the Carrizo-Wilcox Aquifer is suitable for use as a water supply, as this area is low in TDS concentrations, but often has high concentrations of iron and manganese.

5.2.18.3 Environmental Factors

The project was evaluated to determine its potential impacts on environmental factors. Table 5.2.18-2 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.18-2 Summary of Potential Project Effects on Environmental Factors for the CRWA Wells Ranch (Phase 3) Project

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	28
Potential Species Impact Score	5
Potential Habitat Impact Score	1
Potential Stream Construction Impact Score	2
Potential Stream Flow / Water Quality Impact Score	1
Potential Cultural Resources Impact Score	57

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project area occurs in the Post Oak Savannah ecoregion. As mapped by TPWD [3], the project area crosses a mix of grassland, shrubland, and wooded areas. The predominant vegetation communities are post oak motte and woodland, and savannah grassland. The project area also includes some mesquite shrubland, and the proposed pipelines cross several riparian vegetation zones mapped by TPWD as riparian deciduous hardwood forest, riparian deciduous shrubland, and riparian herbaceous vegetation.

Based on TPWD vegetation mapping, the project does not affect agricultural resources mapped as row crops or tame grassland that may be used for pasture. The project impact area does contain 28 acres mapped as sandyland grassland that may include pasture areas used for grazing or hay production

The proposed well pads would result in conversion of land use from undeveloped vegetation or pasture (mostly open fields) to small areas of industrial use. Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing, woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species that are beneficial to native wildlife. Revegetation

[3] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/

plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each WMS to determine the best course of action regarding revegetation.

Aquatic Resources

The project area contains several mapped intermittent streams and their associated floodplains, including Tidwell Creek, East Fork Ecleto Creek, Ecleto Creek, multiple crossings of Sandies Creek, and several unnamed tributaries. The NWI mapping shows 63 acres of freshwater ponds and riverine wetlands in the project area.

Segment 1803B of Sandies Creek and Segment 1901F of Ecleto Creek in the project area has been designated as an impaired stream segment in the Texas Integrated Report of 303(d) listed water bodies [4]. This list identifies the water bodies or segments in Texas that do not meet assigned water quality standards. The project area does not contain ecologically significant stream segments as designated by TPWD.

The project will require an on-site delineation of streams, ponds, and wetlands. Well field facilities can typically be sited to avoid impacts to waters of the United States, including wetlands. Stream crossing for pipeline construction would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including if there would be permanent impacts to more than 0.1 acre of waters of the United States. The USACE permit requires that there will be no change in preconstruction contours of waters of the United States. Utility crossings under streams (e.g., through horizontal directional drilling) would not require a USACE permit.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened, endangered, and candidate species and species of concern that have potential to occur in Guadalupe County [5, 6]. Suitable habitat may occur for the proposed federally endangered tricolored bat (*Perimyotis subflavus*) and the monarch butterfly, which is a candidate for federal listing as a threatened or endangered species. The federally endangered whooping crane *(Grus americana)* has low potential to occur during migration.

Suitable habitat may occur for the state-listed threatened species: white-faced ibis (*Plegadis chihi*), Texas horned lizard (*Phrynosoma cornutum*), and Texas tortoise (*Gopherus berlandieri*).

There is potential for suitable habitat for numerous wildlife species designated by TPWD as SGCN, including American bumblebee (*Bombus pensylvanicus*), Strecker's chorus frog (*Pseudacris streckeri*), Woodhouse's toad (*Anaxyrus woodhousii*), western burrowing owl (*Athene cunicularia hypugaea*), eastern spotted skunk (*Spilogale putorius*), and plains spotted skunk (*Spilogale putorius interrupta*). In addition, SGCN bat species may utilize structures and could therefore occur in developed areas. The

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[4] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir.

[5] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Guadalupe County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[6] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Guadalupe County. https://ipac.ecosphere.fws.gov/.

SGCN list also includes numerous plant species. SGCN species do not have formal protected status but are being monitored by TPWD.

Site-specific field surveys would be required to determine the quality of habitat for federally and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be required to obtain their recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may nest in the project area. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15.

5.2.18.4 Cultural Considerations

For linear portions of the project (i.e., project alignment), a background literature review was performed for the alignment a 300-foot radius around the project alignment. For the area portion of the project (i.e., project area), a background literature review was performed of the area portion only. The background literature review determined that no previously recorded cultural resources intersect the approximate 4,027-acre project area and alignment or are immediately adjacent (i.e., within 300 feet) to the project's pipeline alignment [7, 8]. The historical map review identified 46 potential historic-age structures that intersect with the project area and alignment (Table 5.2.18-3) [9].

Table 5.2.18-3 Cultural Resources Results for the CRWA Wells Ranch (Phase 3) Project

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
None (N=46)	Buildings / Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**57.0**

A probability model was used to assess the overall potential of buried prehistoric archaeological deposits in the project area and alignment, which included low, medium, and high potential zones. The model indicated that the entirety of the project area and alignment had a low likelihood of containing significant unidentified archaeological resources. No areas were identified by the model as having a high or moderate probability. Areas with higher archaeological probability would have been located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project area and alignment that considered the probability model of archaeological potential information, as well as the presence of previously

[7] Texas Historical Commission (THC). 2024. *Texas Archeological and Historical Sites Atlas.* Available at: https://atlas.thc.texas.gov/. Accessed July 2024.
[8] Texas Department of Transportation (TxDOT). 2024. Aggregator. Available at: https://atlas.thc.texas.gov/Map. Accessed July 2024.
[9] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed September 2024.

recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area and alignment. Next, the cultural resources within the project area and alignment were evaluated according to its NRHP eligibility and SAL designation. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts and properties or archaeological sites, SALs, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, Recorded Texas Historical Landmarks, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. The points for all cultural resources within the project area and alignment were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for this project equaled 57.

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, 46 potential historic-age structures are located within the project area and alignment; the probability model indicates a low likelihood of buried deposits; and the project assessment score is 57. Based on these results, a cultural resource assessment for the final design plan is likely necessary; however, cultural resource investigations may be required depending on whether regulatory triggers are present.

5.2.18.5 Engineering and Costing

Preliminary engineering and costing analyses were performed using the 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Tool, which includes standard costing procedures and methods for calculating unit costs. The engineering and costing analysis for the CRWA Wells Ranch (Phase 3) Project includes all facilities required for a new brackish groundwater well field, a new desalination WTP, disposal of brine concentrate via deep well injection, and conveyance of potable water to existing integration pipelines that currently deliver water recovered from the existing local projects.

A cost estimate summary for CRWA Wells Ranch (Phase 3) Project is provided in Table 5.2.18-4. Infrastructure was sized to deliver the sponsor's Envisioned Yield, but because the project is MAG-limited, the annual unit costs were calculated using the MAG-Constrained Yield in the first decade of implementation. All cost estimates consider infrastructure and capacities necessary to deliver the sponsor's Envisioned Yield, despite the lack of groundwater availability.

Table 5.2.18-4 Cost Estimate Summary for the CRWA Wells Ranch (Phase 3) Project

Item	Estimated Costs
Pump Stations (13.6 MGD)	$10,697,000
Transmission Pipeline (30 in. dia., 9.7 miles)	$32,965,000
Well Fields (Wells, Pumps, and Piping)	$19,858,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,784,000
Water Treatment Plant (12.9 MGD)	$34,355,000
Integration, Relocations, Backup Generator & Other	$417,000
TOTAL COST OF FACILITIES	**$100,076,000**

Item	Estimated Costs
Planning (3%)	$3,002,000
Design (7%)	$7,005,000
Construction Engineering (1%)	$1,001,000
Legal Assistance (2%)	$2,002,000
Fiscal Services (2%)	$2,002,000
Pipeline Contingency (15%)	$4,945,000
All Other Facilities Contingency (20%)	$13,422,000
Environmental & Archaeology Studies and Mitigation	$486,000
Land Acquisition and Surveying (196 acres)	$829,000
Interest During Construction (3.5% for 1 year with a 0.5% ROI)	$4,367,000
TOTAL COST OF PROJECT	**$139,137,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$9,760,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$550,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$267,000
Water Treatment Plant	$2,405,000
Pumping Energy Costs (7,343,523 kW-hr @ 0.09 $/kW-hr)	$661,000
TOTAL ANNUAL COST	**$13,643,000**
Available Project Yield (acft/yr)	8,395
Annual Cost of Water ($ per acft)*	$1,625
Annual Cost of Water After Debt Service ($ per acft)*	$463
Annual Cost of Water ($ per 1,000 gallons)*	$4.99
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$1.42
* Based on a peaking factor of 1.0.	

5.2.18.6 Implementation Considerations

Information presented in this WMS was provided by CRWA and previous reports and represents the current plan, which is based on the sponsor's current understanding of the system. Implementation of the CRWA Wells Ranch (Phase 3) Project includes the following considerations:

- Verification of available groundwater quantity and well productivity;

- Verification of water quality for concentrations of dissolved constituents, such as TDS, chloride, sulfate, iron, manganese, and hydrogen sulfide;
- Verification of the potential for deep well injection of concentrate;
- Potential for differing water qualities/chemical constituents in the water;
- Iron and manganese content in the water;
- Class I disposal well permit through the TCEQ for deep well injection of desalination concentrate;
- Regulations by TCEQ;
- Regulations by and securing permits from the Gonzales County UWCD; and
- Experience in operating and maintaining a desalination WTP.

Additional considerations may include the following:

- Impacts on the following:
  - Endangered and threatened species;
  - Water levels in the aquifer, including potential dewatering of the current artesian part of the aquifer;
  - Baseflow in streams; and
  - Wetlands.
- Competition with others in the area for groundwater in the Carrizo Aquifer, including the following:
  - Private water purveyors;
  - Public water purveyors in the area; and/or
  - Future oil and gas drilling operations.

5.2.19 CVLGC Carrizo Project

The SCTRWPG identified the CVLGC Carrizo Project WMS as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.19.1 Description of Water Management Strategy

The CVLGC comprises the cities of Schertz and Cibolo. CVLGC is considering a Carrizo-Wilcox Aquifer well field project in Wilson County. The general location of the planned well field is north of US Highway (Hwy) 87 and east of Stockdale (Figure 5.2.19.1). Land use and groundwater availability were taken into consideration for selection of the well field.

The project is designed to supply 11,802 acft/yr of treated water to the partnering entities by the 2030 decade; however, the available yield varies because of MAG limitations. The project includes a 12 MGD expansion of the existing brackish desalination WTP. Treatment would include iron and manganese removal and reverse osmosis.

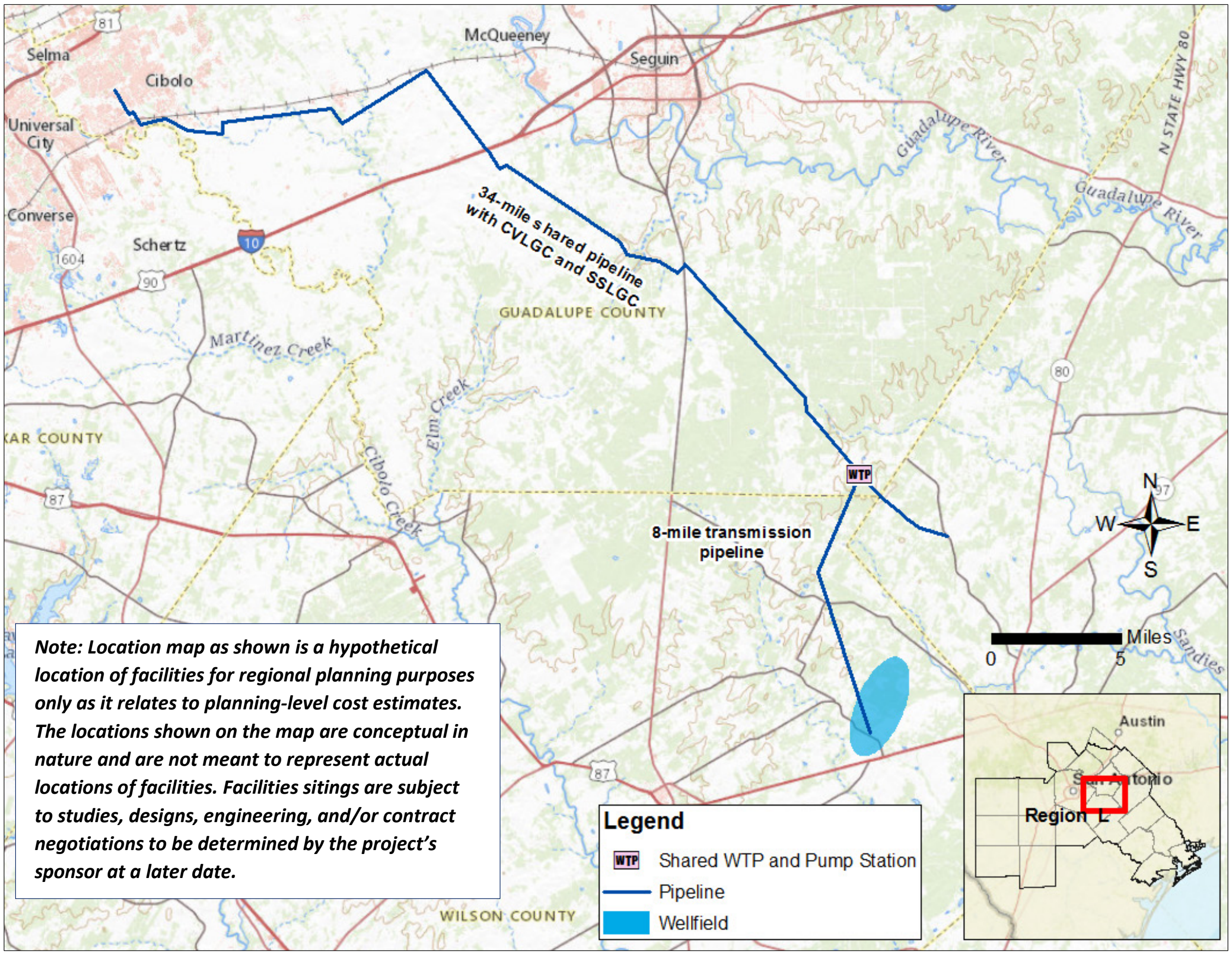

Figure 5.2.19.1 Approximate Location for the CVLGC Carrizo Project

5.2.19.2 Available Yield

This WMS is planned for implementation by 2030 and has an available yield that varies by decade because of MAG limitations. Table 5.2.19-1 provides a summary of the yield as envisioned by the sponsor (Envisioned Yield) and the yield available considering MAG constraints (MAG-Constrained Yield) for the CVLGC Carrizo Project. The MAG-Constrained Yield is the available yield included in DB27.

Table 5.2.19-1 Envisioned and MAG-Constrained Yields for the CVLGC Carrizo Project (acft/yr)

Yield Type	2030	2040	2050	2060	2070	2080
Envisioned Yield	11,802	11,802	11,802	11,802	11,802	11,802
MAG-Constrained Yield	194	1,032	2,860	7,854	9,816	9,760

The Evergreen UWCD regulates groundwater production, well spacing, and other requirements in the Carrizo-Wilcox Aquifer in Wilson County. In 2021, GMA 13 established DFCs for the Carrizo-Wilcox Aquifer [1]. On the basis of the approved DFCs, the TWDB determined that the MAG estimate for the Carrizo-Wilcox Aquifer in Wilson County is 125,670 acft/yr in 2080 [2].

Production and/or drilling permits for these wells may be required in accordance with specific GCD rules. For most aquifers in the region, GCDs have adopted DFCs. In some GCDs, full use of all groundwater supplies (permitted, grandfathered and exempt) may result in non-achievement of the DFCs for an aquifer. To ensure consistency with the DFCs, TWDB requires that groundwater availability for each aquifer be limited for planning purposes to the MAG for the discrete geographic-aquifer unit (i.e., aquifer/county/basin unit). In some instances, the sum of existing supplies and future supplies (as groundwater-based WMSs) are greater than the MAG or groundwater availability for a discrete geographic-aquifer unit. This has resulted, for regional water planning purposes only, in adjustments to available yields shown in this plan, and a lack of firm water available for future projects in this plan for some areas for certain time periods. This should not be construed as recommending or requiring that GCDs make these adjustments or deny future permit applications. As described in Guiding Principle V (refer to Appendix 5A), this is not intended to influence or interfere with the regulatory decisions made by the governing boards of permitting entities. The SCTRWPG recognizes and supports the ability of permit holders to exercise their rights to groundwater use in accordance with their permits and it recognizes and supports a GCD’s discretion to issue permits and grandfather historical users for amounts in excess of the MAG. The SCTRWPG may not modify groundwater permits that GCDs have already issued or limit future permits that GCDs may issue. If MAG estimates are modified during or after this planning cycle, the SCTRWPG may amend this plan to adjust WMS supply volumes that are affected by the modified MAG estimate(s).

[1] Texas Water Development Board, Groundwater Management Area 13 – Desired Future Conditions. https://www.twdb.texas.gov/groundwater/dfc/docs/summary/GMA13_DFC_2021.pdf

[2] Wade, S.C. 2022. GAM Run 21-018 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers in GMA-13: TWDB. https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR21-018_MAG.pdf

The planned well field is in the confined part of the Carrizo-Wilcox Aquifer and is located approximately 7 miles downdip of the outcrop. Based on available hydrogeologic information, wells in this area would be capable of producing more than 2,000 gpm and would range in depth from 1,000 to 1,500 feet deep. CVLGC has also increased the area by acquiring one 2.5-acre well site. The target aquifer is the Carrizo Sand instead of the Wilcox Group for water quality and depth considerations. Groundwater quality in the area generally has a TDS concentration of less than 300 mg/L. However, the water typically has elevated concentrations of iron and manganese that requires treatment prior to public consumption.

5.2.19.3 Environmental Factors

The project was evaluated to determine its potential impacts on environmental factors. Table 5.2.19-2 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.19-2 Summary of Potential Project Effects on Environmental Factors for the CVLGC Carrizo Project

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	976
Potential Species Impact Score	10
Potential Habitat Impact Score	2
Potential Stream Construction Impact Score	5
Potential Stream Flow / Water Quality Impact Score	2
Potential Cultural Resources Impact Score	104.5

Environmental Considerations

Vegetation, Land Use, Agricultural Resources

The project area is located in the Blackland Prairie and Post Oak Savannah ecoregions, and crosses a variety of vegetation types, primarily open fields and pastures. As mapped by TPWD [3], dominant vegetation communities in the area are savanna grassland, disturbance, or tame grassland, post oak motte and woodland, and mesquite shrubland. The linear components of the project cross riparian vegetation zones along streams, mapped by TPWD as floodplain hardwood forest, floodplain live oak forest, floodplain herbaceous vegetation, and floodplain deciduous shrubland.

Based on TPWD vegetation mapping, the project may have the potential to impact 976 acres of agricultural resources, including 65 acres mapped as row crops and 911 acres mapped as tame/disturbance grassland which may include pasture areas used for grazing or hay production.

Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing and woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed.

[3] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/

Revegetation of easements and other disturbed areas provides the opportunity to plant native species that are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each water management strategy to determine the best course of action regarding revegetation. Pipeline easements may continue to be used for agricultural purposes. The proposed well field site would result in conversion of land use from undeveloped vegetation and agricultural areas (mostly open fields and shrubland) to small areas of industrial use.

Aquatic Resources

The proposed pipeline would cross Campbell Branch, Clear Fork Creek, Cottonwood Creek, Elm Creek, Konde Branch, Krams Creek, Sandies Creek, Tally Branch, Deadman Creek, and Santa Clara Creek. The NWI mapping identifies 29.9 acres of freshwater wetlands in the overall project area.

The project pipeline crosses Segment 1803B of Sandies Creek, which is listed as impaired in the Texas Integrated Report of 303(d) listed water bodies [4]. This list identifies the water bodies or segments in Texas that do not meet assigned water quality standards. The well field project area does not contain listed impaired water bodies. The project area does not contain ecologically significant stream segments as designated by TPWD.

The project will require an on-site delineation of streams, ponds, and wetlands. Well field facilities can typically be sited to avoid impacts to waters of the United States, including wetlands. Stream crossings for pipeline construction would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including cases where there would be permanent impacts to more than 0.1 acre of Waters of the United States. The USACE permit requires that there will be no change in preconstruction contours of waters of the United States. Utility crossings under streams (e.g., through horizontal directional drilling) would not require a USACE permit.

[4] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that have potential to occur in Gonzales, Guadalupe, and Wilson Counties [5, 6, 7, 8, 9, 10]. Suitable habitat may occur for the federally endangered whooping crane (*Grus americana*), false spike (*Fusconaia mitchelli*), Guadalupe fatmucket (*Lampsilis bracteata*), Guadalupe orb (*Cyclonaias necki*), candidate monarch butterfly (*Danaus plexippus*), and proposed endangered tricolored bat (*Perimyotis subflavus*). However, the whooping crane only has a low likelihood to occur during migration and the streams crossed by the pipelines have a low potential to provide suitable habitat for endangered freshwater mussels.

Suitable habitat may occur for state-listed threatened species, including the white-faced ibis (*Plegadis chihi*), woodstork (*Mycteria americana*), swallow-tailed kite (*Elanoides forficatus*), Texas horned lizard (*Phrynosoma cornutum*), and Texas tortoise (*Gopherus berlandieri*).

There is potential for suitable habitat for numerous wildlife species designated by TPWD as SGCN, including American bumblebee (*Bombus pensylvanicus*), Strecker's chorus frog (*Pseudacris streckeri*), Woodhouse's toad (*Anaxyrus woodhousii*), eastern spotted skunk (*Spilogale putorius*), plains spotted skunk (*Spilogale interrupta*), and Elmendorf's onion (*Allium elmendorfii*). In addition, SGCN bat species may utilize structures and could, therefore, occur in developed areas. The SGCN list also includes numerous other plant species, including many for which detailed habitat requirements have not been developed by TPWD. SGCN species do not have formal protected status but are being monitored by TPWD.

Site-specific field surveys would be required to determine the quality of habitat for federally and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be required to obtain its recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may nest in the project area. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or to avoid vegetation clearing during the general bird nesting season from March 15 to September 15. Although it is no longer on the federal endangered species list, the bald eagle is protected by the federal Bald and Golden Eagle Protection Act,

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[5] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Gonzales County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[6] Texas Parks and Wildlife Department (TPWD). 2019. Annotated County Lists of Rare Species – Guadalupe County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[7] Texas Parks and Wildlife Department (TPWD). 2019. Annotated County Lists of Rare Species – Wilson County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[8] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Gonzales County. https://ipac.ecosphere.fws.gov/location/index

[9] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Guadalupe County. https://ipac.ecosphere.fws.gov/location/index

[10] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Wilson County. https://ipac.ecosphere.fws.gov/location/index

which prohibits impacts to the eagles unless permitted by USFWS. Preconstruction surveys for active bird nests and presence of eagles are recommended.

Cultural Considerations

For linear portions of the project (i.e., project alignment), a background literature review was performed for the alignment and a 300-foot radius around the project alignment. For the area portion of the project (i.e., project area), a background literature review was conducted of the area portion only. The background literature review identified nine cultural resources that intersect with the approximate 3,412-acre project area and alignment or are immediately adjacent (i.e., within 300 feet) to the project's pipeline alignment (Table 5.2.19-3) [11, 12]. The project area and alignment contain three archaeological sites (i.e., 41GU131, 41GU169, and 41WN63), and one vicinity cemetery (i.e., Barnett Family Cemetery). Cultural resources located immediately adjacent to the project's pipeline alignment include four archaeological sites (i.e., 41GU19, 41GU192, 41GU194, and 41GU195), and one historical marker (i.e., Cibolo). Out of the total seven archaeological sites within the project area and alignment as well as immediately adjacent to the project's pipeline alignment, two are ineligible for listing on the NRHP (i.e., 41GU19, and 41GU131), and five remain undetermined (i.e., 41GU169, 41GU192, 41GU194, 41GU195, and 41WN63) for listing on the NRHP. Additionally, the historical map review identified 65 potential historic-age structures that intersect with the project area and alignment [13].

Vicinity cemeteries are very general areas where a cemetery location was reported at one time, but the exact location is unknown or could not be confirmed. If project impacts are to occur near the vicinity cemetery location, further work (e.g., pedestrian survey and/or metal detecting) or construction monitoring might be needed to ensure human burials are not present in the project area and alignment. In the State of Texas, all human burials are protected by law [14], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project area and alignment and the remains are determined to be Native American, they will be handled in accordance with procedures established through coordination with the THC, and work in the affected area could only resume according to THC authorization.

A probability model was used to assess the overall archaeological site potential, which included low, medium, and high potential zones. The model indicated that 11% of the project area and alignment had a high likelihood of containing significant unidentified archaeological resources, 21% had a moderate likelihood, and 68% had a low likelihood. Areas with greater archaeological probability are located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

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[11] Texas Historical Commission (THC). 2024. *Texas Archeological and Historical Sites Atlas.* Available at: https://atlas.thc.texas.gov/. Accessed July 2024.

[12] Texas Department of Transportation (TxDOT). 2024. TxDOT Historic Resources Aggregator, TxDOT Environmental Affairs Division. Austin, Texas Available at: https://txdot.maps.arcgis.com/apps/webappviewer/index.html?id=e13ba0aa78bf4548a8e98758177a8dd5. Accessed July 2024.

[13] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed September 2024.

[14] According to the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

A cultural assessment score was developed for the project area and alignment that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area and alignment. Next, the cultural resources within the project area and alignment were evaluated according to its NRHP eligibility. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts, properties or archaeological sites, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. The points for all cultural resources within the project area and alignment were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for the project equaled 104.5.

Table 5.2.19-3 Cultural Resources Results for the CVLGC Carrizo Project

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Archaeological Site (41GU19)	Lithic scatter	Prehistoric	Ineligible (THC 5/10/2007)	Adjacent
Archaeological Site (41GU131)	Lithic Scatter	Prehistoric	Ineligible within ROW (THC 7/5/2011)	Intersect
Archaeological Site (41GU169)	Farmstead	Historic	Undetermined	Intersect
Archaeological Site (41GU192)	Lithic Scatter/Open Camp	Prehistoric	Undetermined	Adjacent
Archaeological Site (41GU194)	Lithic Scatter/Open Camp	Prehistoric	Undetermined	Adjacent
Archaeological Site (41GU195)	Lithic Scatter/Open Camp	Prehistoric	Undetermined	Adjacent
Archaeological Site (41WN63)	Lithic Scatter	Prehistoric	Undetermined	Intersect
Barnett Family Cemetery (WN-C149)	Vicinity Cemetery	Historic	Undetermined	Intersect
Cibolo	Historical Marker	Historic	Undetermined	Adjacent
None (N=65)	Buildings/Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**104.5**

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, the project area and alignment contain three archaeological sites, one cemetery, and

65 potential historic-age structures; in addition, four archaeological sites and one historical marker are located immediately adjacent to the project's pipeline alignment. The probability model for the project indicates a low to moderate likelihood of buried deposits; and the project assessment score is 104.5. Based on these results, a cultural resources assessment for the final design plan is likely necessary, as well as a buffer zone of at least 100 feet between the cemetery and the proposed development.

5.2.19.4 Engineering and Costing

Preliminary engineering and costing analyses were performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required for a new brackish groundwater well field, expanded brackish desalination water treatment, brine concentrate storage, concentrate disposal via deep well injection, and conveyance of potable water to customers via shared pipelines and pump stations.

A cost estimate summary for the CVLGC Carrizo Project is provided in Table 5.2.19-4. Infrastructure was sized to deliver the sponsor's Envisioned Yield, but because the project is MAG-limited, the annual unit costs were calculated using the MAG-Constrained Yield in the first decade of implementation. All cost estimates consider infrastructure and capacities necessary to deliver the sponsor's Envisioned Yield, despite the lack of groundwater availability.

A final delivery point has not been selected at this time. For purposes of estimating costs, the delivery point is assumed to be near the City of Cibolo. As shown on Figure 5.2.19.1, this project will share a planned SSLGC pipeline and pump station to deliver the water from the current SSLGC water treatment .

Table 5.2.19-4 Cost Estimate Summary for the CVLGC Carrizo Project

Item	Estimated Costs
Pump Stations (13.2 MGD)	$21,394,000
Transmission Pipelines (30-36 in. dia., 41.9 miles)	$105,268,000
Transmission Pump Station(s) & Storage Tank(s)	$5,407,000
Well Fields (Wells, Pumps, and Piping)	$22,292,000
Water Treatment Plant Expansion (12 MGD)	$32,575,000
Integration, Relocations, Backup Generator & Other	$1,096,000
TOTAL COST OF FACILITIES	**$188,032,000**
Planning (3%)	$5,499,000
Design (7%)	$12,830,000
Construction Engineering (1%)	$1,833,000
Legal Assistance (2%)	$3,666,000
Fiscal Services (2%)	$3,666,000
Pipeline Contingency (15%)	$15,078,000
All Other Facilities Contingency (20%)	$16,553,000
Environmental & Archaeology Studies and Mitigation	$1,924,000
Land Acquisition and Surveying (611 acres)	$5,183,000
Interest During Construction (3.5% for 1 year with a 0.5% ROI)	$8,228,000
TOTAL COST OF PROJECT	**$262,492,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$18,392,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,239,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$670,000
Water Treatment Plant	$2,280,000
Pumping Energy Costs (18,462,048 kW-hr @ 0.09 $/kW-hr)	$1,662,000
Purchase of Water (11,802 acft/yr @ 8.15 $/acft)	$96,000
TOTAL ANNUAL COST	**$24,339,000**
Available Project Yield (acft/yr)	194
Annual Cost of Water ($ per acft)*	$125,459
Annual Cost of Water After Debt Service ($ per acft)*	$30,655
Annual Cost of Water ($ per 1,000 gallons)*	$384.96
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$94.06
*Based on a peaking factor of 1.25.	

5.2.19.5 Implementation Considerations

Implementation of the CVLGC Carrizo Project could create conflicts with other water supply plans as they will be competing for limited groundwater supplies within Wilson County and the Evergreen Underground WCD. Because the district's permitting process is independent of the regional planning process, potentially competing groundwater management strategies are not prioritized.

The development of groundwater in the Carrizo-Wilcox Aquifer in the SCTRWPA must address several issues, which may include the following:

- Evergreen UWCD permits:
  - Analyses of pumping impacts on groundwater levels;
  - Mitigation of impacts on existing well owners;
  - Drought and Water Conservation Plans; and
  - Needs assessment of the receiving water utilities.
- Impacts on:
  - Endangered and threatened species;
  - Baseflow in streams; and
  - Wetlands.
- Competition with others in the area for groundwater.

5.2.20 GBRA Lower Basin New Appropriation

The SCTRWPG identified the GBRA Lower Basin New Appropriation as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.20.1 Description of Water Management Strategy

The GBRA Lower Basin New Appropriation WMS includes a diversion of up to 189,484 acft/yr from the Guadalupe River in Calhoun County. The project would use either the existing gravity-flow diversion facilities located immediately upstream of GBRA's Saltwater Barrier and Diversion Dam or new diversion facilities in order to divert water at a rate 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 (Figure 5.2.20-1). The diversion and storage will serve municipal and industrial water users in GBRA's 10-county statutory district.

Implementation of this WMS will help to meet projected demands for current and future GBRA customers over the next 50 years and beyond. As discussed in the Available Yield section below, water availability modeling indicates a proposed 50,000 acft OCR would have an estimated firm yield of 26,500 acft/yr. This WMS is planned for implementation in the 2040 decade.

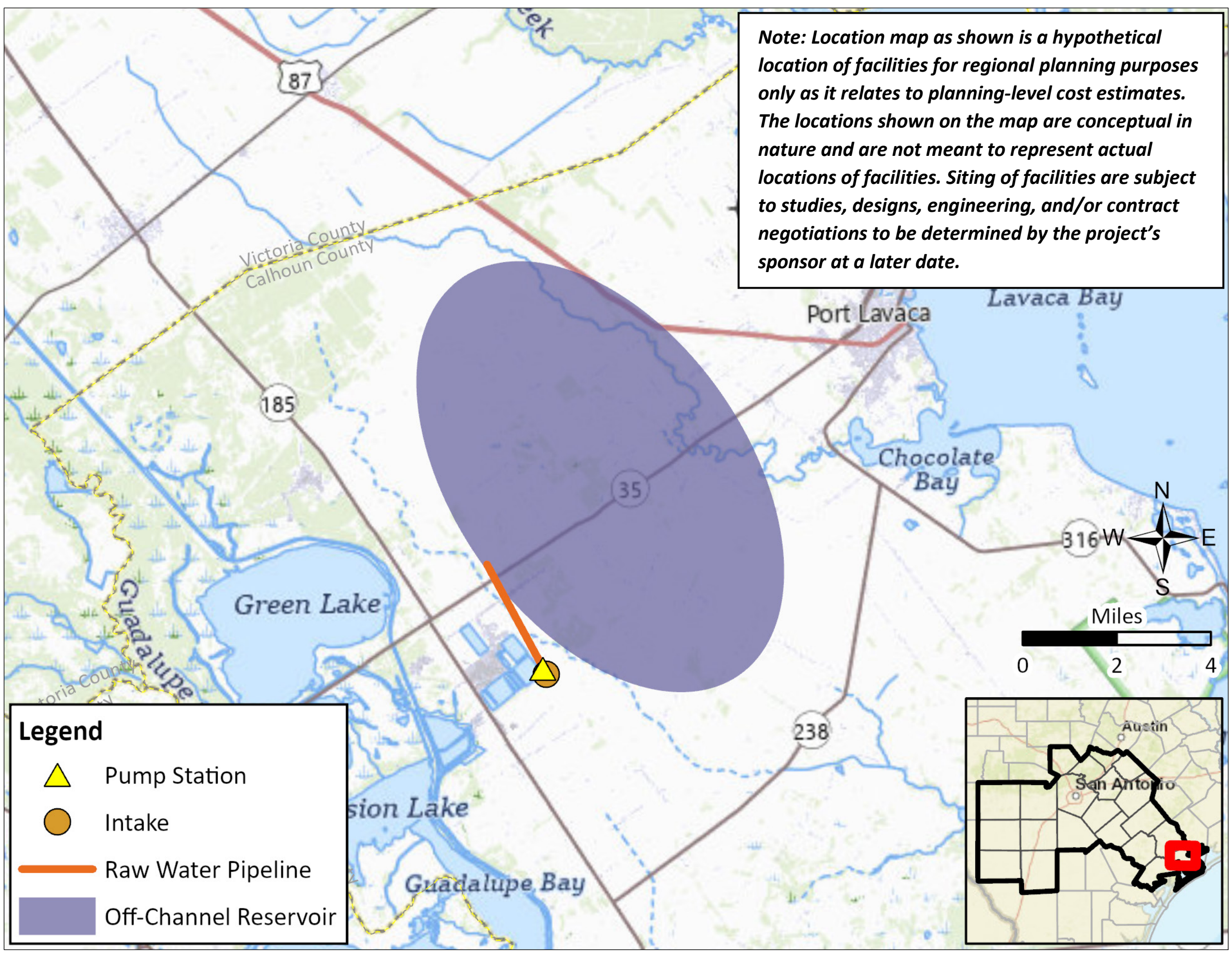

Figure 5.2.20-1 Approximate Location for the GBRA Lower Basin New Appropriation WMS

5.2.20.2 Available Yield

This WMS has a firm yield of 26,500 acft/yr and is planned for completion by 2040. Table 5.2.20-1 provides a summary of the available yield for the GBRA Lower Basin New Appropriation WMS. The following sections provide additional information regarding estimation of available yield for this WMS.

Table 5.2.20-1 Available Yield for the GBRA Lower Basin New Appropriation WMS (acft/yr)

WMS	2030	2040	2050	2060	2070	2080
GBRA Lower Basin New Appropriation	0	26,500	26,500	26,500	26,500	26,500

Water Availability Modeling

The GBRA Lower Basin New Appropriation WMS was evaluated using the TCEQ GSA WAM Run 3, which does not include effluent return flows. This WMS is subject to full application of environmental flow standards adopted pursuant to TWC §11.1471. The GSA WAM is a monthly time-step model; however, a series of spreadsheet models, including the FRAT, were used to quantify water availability for a new water right subject to daily flow variations, senior water rights, instantaneous instream flow restrictions, and an instantaneous maximum diversion rate. General technical assumptions used for the applications of the GSA WAM include the following:

- Surface water rights were modeled at full consumptive amounts per certificates of adjudication and permits with no treated effluent discharges (TCEQ WAM Run 3).
- Edwards Aquifer withdrawals, critical period management, and resulting springflows consistent with the approved Habitat Conservation Plan (Phase I) were developed through the Edwards Aquifer Recovery Implementation Program.
- All senior Guadalupe River hydropower water rights were subordinated to Canyon Reservoir.
- For firm water supply modeling purposes, the total run-of-river supply of water available under the GBRA/Dow Water Rights at any time is assumed to be allocated first to satisfy projected demands for firm water at that time among all present and future GBRA customers and then, to the extent additional run-of-river water is available, to storage in the proposed OCR.
- For firm water supply modeling purposes, projected demands for firm water by all present and future GBRA customers are assumed to be in accordance with current GBRA planning.

Specifically, the GSA WAM was used to determine the regulated flow and unappropriated flow for the San Antonio and Guadalupe Rivers, separately, just upstream of the confluence of the two rivers. For each river, the regulated and unappropriated flows were disaggregated to daily values, and the daily senior water rights passage volume was determined. Results were imported into separate FRAT models, and the appropriate instream flow standard was incorporated. For the Guadalupe River, the environmental flow standard associated with the Guadalupe River at Victoria was used, adjusted for the additional incremental drainage area to the confluence. For the San Antonio River, the environmental flow standard associated with the San Antonio River at Goliad was used, adjusted for the additional incremental drainage area to the confluence. The FRAT models were then used to determine the amounts of water available to the GBRA Lower Basin New Appropriation WMS from each river. Finally, a daily spreadsheet model was used to estimate the amount of water used from each river in conjunction with daily reservoir operations and to calculate firm yield.

Modeling Results

Firm yield calculations were performed for an off-channel reservoir of 50,000 acft, assuming 2,000 acre surface area and 25-foot depth, which would enable a firm yield of 26,500 acft/yr.

With any new project in the Guadalupe-San Antonio River Basin, the project's impacts on freshwater inflows to the Guadalupe Estuary is a concern. Figure 5.2.20-2 and Figure 5.2.20-3 illustrate simulated freshwater inflows to the Guadalupe Estuary with and without implementation of this WMS. The data labeled as "With GBRA Lower Basin New Appropriation WMS" on Figure 5.2.20-2 and Figure 5.2.20-3 are from simulations including a 50,000 acft OCR and annual diversion of the firm yield as reported in Table 5.2.20-2.

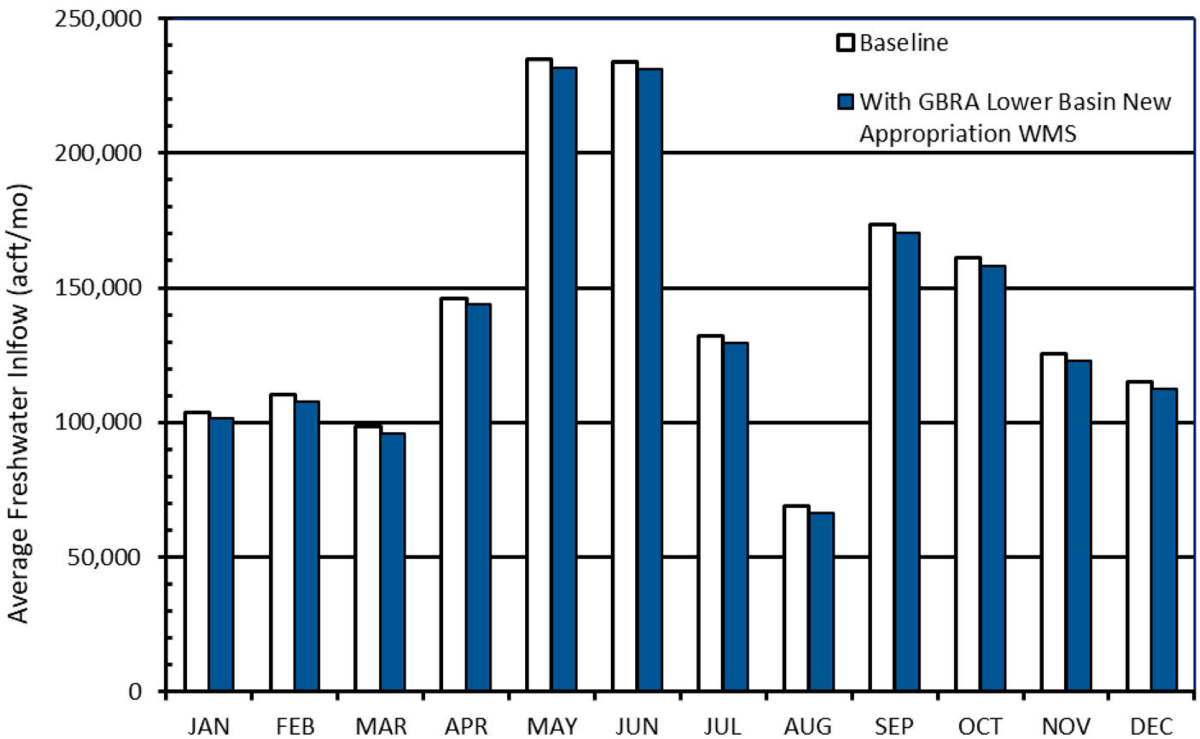

Figure 5.2.20-2 Monthly Average Freshwater Inflows

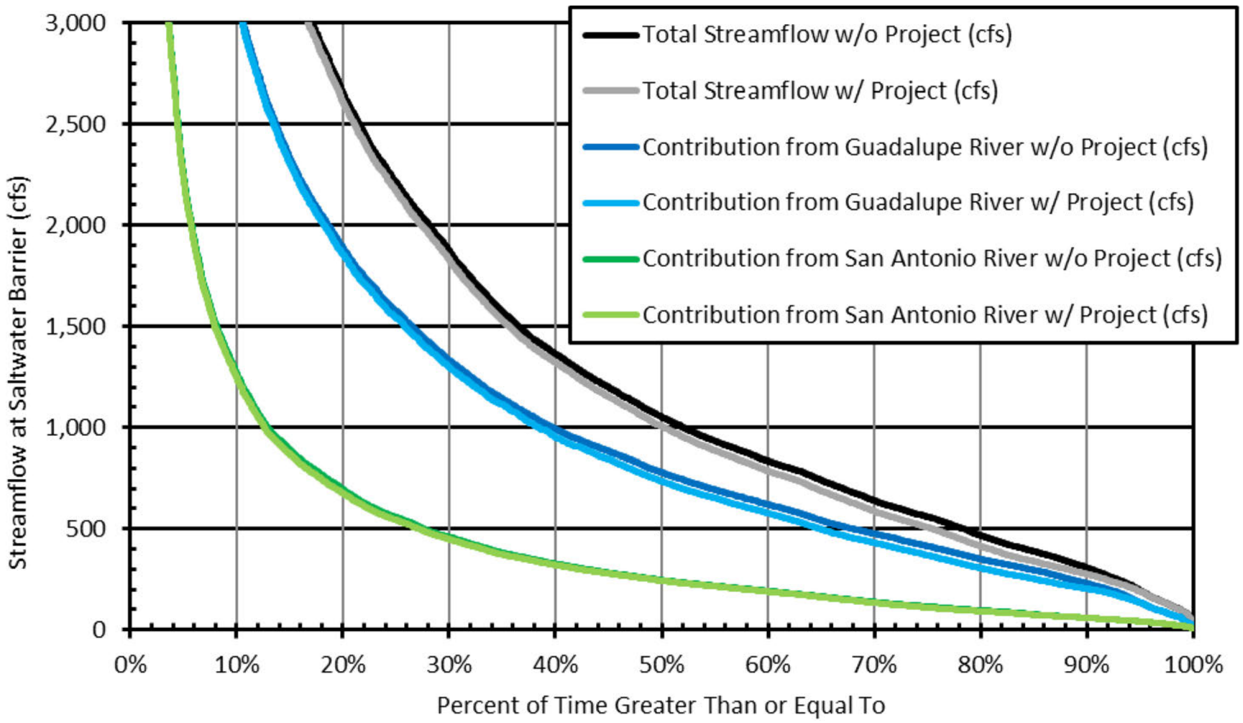

Figure 5.2.20-3 Freshwater Inflow Frequency

5.2.20.3 Environmental Factors

The GBRA Lower Basin New Appropriation WMS was evaluated to determine its potential impacts on environmental factors. Table 5.2.20-2 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.20-2 Summary of Potential Project Effects on Environmental Factors for the GBRA Lower Basin New Appropriation WMS

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	29,748
Potential Species Impact Score	13
Potential Habitat Impact Score	2
Potential Stream Construction Impact Score	3
Potential Stream Flow / Water Quality Impact Score	5
Potential Cultural Resources Impact Score	242

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project area is located in the Western Gulf Coastal Plain ecoregion, and occurs within a variety of vegetation types, mostly croplands, pastures, shrublands, and wetlands. A railway associated with a large chemical facility occurs within the project area. As mapped by TPWD[1], dominant vegetation types in the project area are row crops and coastal prairie, with small amounts of wooded area such as evergreen shrubland, live oak motte and woodland, and mesquite shrubland. The project also contains riparian vegetation zones, mapped by TPWD as riparian grassland, riparian evergreen and deciduous shrublands, riparian live oak/hardwood forest, riparian hardwood forest, and riparian herbaceous wetland.

Based on TPWD vegetation mapping, the project may have the potential to impact up to 29,748 acres of agricultural resources, including 19,635 acres mapped as row crops and 10,113 acres mapped as coastal prairie which may include pasture areas used for grazing or hay production.

Construction of project storage and mechanical facilities would result in conversion of native vegetation and/or croplands to industrial and reservoir use. Project pipeline easements would require the removal of woody vegetation and long-term maintenance (mowing, woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species that are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each WMS to determine the best course of action regarding revegetation.

Aquatic Resources

The project occurs between San Antonio Bay and Lavaca Bay/Matagorda Bay. As mapped by NHD, a network of irrigation ditches and East and West Coloma Creeks traverse the project area. These two creeks appear to be channelized and eventually flow into Matagorda Bay. NWI mapping shows 808 acres of emergent and forested/shrub wetlands and ponds, and riverine wetlands in the project area.

No water bodies are in the project area that are designated as impaired in the Texas Integrated Report of 303(d) listed water bodies[2]. This list identifies the water bodies or segments in Texas that do not meet assigned water quality standards. No ecologically significant stream segments designated by TPWD occur in the project area.

The project will require an on-site delineation of streams, ponds, and wetlands. Stream crossings for pipeline construction would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including if there would be permanent impacts to over 0.1 acre of waters of the United States. The USACE permit requires that no change in preconstruction contours of waters of the United States occur. Utility crossings under streams (e.g., through horizontal directional drilling) would not require a USACE permit.

[1] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/

[2] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d)*. https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened, endangered, and candidate species and species of concern that may occur in Calhoun and Refugio Counties [3, 4, 5]. Suitable foraging habitat for the federally endangered whooping crane (*Grus americana*) may occur in the project area. The only natural flock of whooping cranes winter mainly in and adjacent to ANWR along the central Texas coast in Aransas, Calhoun, and Refugio counties [6] (Canadian Wildlife Service and USFWS 2007). The project area occurs approximately 13 miles north-northwest of the ANWR. Furthermore, the project area occurs approximately 14 miles north of federally designated critical habitat for the whooping crane. Habitat for the federally threatened black rail (*Laterallus jamaicensis*) may occur within wetlands in the project area. The area may also contain suitable habitat for the proposed federally endangered tricolored bat (*Perimyotis subflavus*) and the monarch butterfly (*Danaus plexippus*), which is a candidate for federal listing as threatened or endangered.

Suitable habitat may occur for state listed threatened species including the black-spotted newt (*Notophthalmus meridionalis*), reddish egret (*Egretta rufescens*), swallow-tailed kite (*Elanoides forficatus*), white-faced ibis (*Plegadis chihi*), white-tailed hawk (*Buteo albicaudatus*), wood stork (*Mycteria americana*), bald eagle (*Haliaeetus leucocephalus*), and Texas horned lizard (*Phrynosoma cornutum*). The wood stork and bald eagle would only be expected to forage within the project area. Potentially suitable habitat may occur for numerous wildlife, plant, and insect species designated by TPWD as SGCN. These species do not have formal protected status but are being monitored by TPWD. Migratory birds may occur in the project area, particularly in riparian zones and wetland areas.

A site-specific assessment for the potential for whooping cranes to utilize the project area would be required. Additionally, site-specific field surveys would be required to determine the quality of habitat for other federally and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be required to obtain their recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may nest within the project area. The federal MBTA protects birds, nests, and eggs from impacts unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15. Preconstruction surveys for bald eagle nests are recommended.

Cultural Considerations

For linear portions of the project (i.e., project alignment), a background literature review was performed for the alignment and a 300-foot radius around the project alignment. For the well field portion of the project (i.e., project area), a background literature review was conducted of the area portion only. The

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[3] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Calhoun County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[4] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Refugio County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[5] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation (IPaC) Resource List – Calhoun County. https://ipac.ecosphere.fws.gov/location/index

[6] Canadian Wildlife Service and USFWS 2007. *International Recovery Plan for the Whooping Crane*. Ottawa: Recovery of Nationally Endangered Wildlife, and USFWS, Albuquerque, New Mexico.

background literature review identified 10 cultural resources that intersect with the approximate 32,258-acre project area (Table 5.2.20-3); the project alignment contained no previously recorded cultural resources. The cultural resources contained within the project area include four cemeteries (i.e., Branch-Clark Cemetery, Hatch Bend Cemetery, Colonial Gardens Cemetery, and Dr. Moses Johnson Cemetery), five Official Texas Historical Markers (OTHMSs), and one 1936 Texas Centennial Marker.[7,8] The 1936 Centennial Marker is eligible for the NRHP, and three OTHMs exist within the cemeteries. Additionally, the historical map review identified 196 potential historic-age structures that intersect with the project area and alignment or are immediately adjacent (i.e., within 300 feet) to the project's pipeline alignment [9].

Table 5.2.20-3 Cultural Resources Results for the GBRA Lower Basin New Appropriation WMS

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Branch-Clark Cemetery (CL-C005)	Cemetery / OTHM	Historic	Undetermined	Intersect
Colonial Gardens Cemetery (CL-C021)	Cemetery	Historic	Undetermined	Intersect
Dr. Moses Johnson Grave (CL-C025)	Cemetery / OTHM	Historic	Undetermined	Intersect
Hatch Bend Cemetery (CL-C022)	Cemetery / OTHM	Historic	Undetermined	Intersect
Cotton Gins of Calhoun County	OTHM	Historic	Undetermined	Intersect
Moses Johnson, M.D.	OTHM	Historic	Undetermined	Intersect
Hatch Sylvanus	1936 Texas Centennial Marker	Historic	Eligible	Intersect
None (N=196)	Buildings/ Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**241.8**

[7] Texas Historical Commission (THC). 2024. *Texas Archeological and Historical Sites Atlas.* Available at: https://atlas.thc.texas.gov/. Accessed September 2024.

[8] Texas Department of Transportation (TxDOT). 2024. TxDOT Historic Resources Aggregator, TxDOT Environmental Affairs Division. Austin, Texas Available at: https://txdot.maps.arcgis.com/apps/webappviewer/index.html?id=e13ba0aa78bf4548a8e98758177a8dd5. Accessed September 2024.

[9] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed September 2024.

In the State of Texas, all human remains and human burials are protected by law[10], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project area and alignment and the remains are determined to be Native American, they will be handled in accordance with procedures established through coordination with the THC, and work in the affected area could only resume in accordance with THC authorization.

A probability model was used to assess the overall potential of buried prehistoric archaeological deposits in the project area, which included low, medium, and high potential zones. The model indicated that 1.5% of the project are and alignment had a high likelihood of containing significant unidentified archaeological resources, 26.2% had a moderate likelihood, and 72.3% had a low likelihood. Areas with higher archaeological probability were considered to have been located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project area and alignment that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area and alignment. Next, the cultural resources within the project area were evaluated according to its NRHP eligibility. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts, properties or archaeological sites, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. The points for all cultural resources within the project area and alignment were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for this project equaled 241.8.

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, four cemetery, six historical markers, and 196 potential historic-age structures are located within the project area and alignment; the probability model indicates a low to moderate likelihood of buried deposits; and the project assessment score is 241.8. Based on these results, a cultural resources assessment for the final design plan is likely necessary, as well as a buffer zone of at least 100 feet between the cemeteries and the proposed development.

5.2.20.4 Engineering and Costing

Preliminary engineering and costing analyses have been performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required for the river diversion, reservoir storage, transmission, and integration. A cost estimate summary for the GBRA Lower Basin New Appropriation WMS is provided in Table 5.2.20-4.

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[10] According to the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

Table 5.2.20-4 Project Cost Estimate Summary for the GBRA Lower Basin New Appropriation WMS

Item	Estimated Costs
CAPITAL COST	
Dam and Reservoir (Conservation Pool 50,000 acft, 2,000 acres)	$38,149,000
Intake Pump Stations (99.6 MGD)	$55,652,000
Transmission Pipeline (78 in. dia., 2.7 miles)	$21,447,000
Integration, Relocations, Backup Generator & Other	$48,164,000
TOTAL COST OF FACILITIES	**$163,412,000**
Engineering:	
Planning (3%)	$4,902,000
Design (7%)	$11,439,000
Construction Engineering (1%)	$1,634,000
Legal Assistance (2%)	$3,268,000
Fiscal Services (2%)	$3,268,000
Pipeline Contingency (15%)	$3,217,000
All Other Facilities Contingency (20%)	$28,393,000
Environmental & Archaeology Studies and Mitigation	$11,105,000
Land Acquisition and Surveying (2,037 acres)	$11,343,000
Interest During Construction (3.5% for 1 year with a 0.5% ROI)	$7,842,000
TOTAL COST OF PROJECT	**$249,823,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$12,179,000
Reservoir Debt Service (3.5 percent, 40 years)	$3,559,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$696,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$1,391,000
Dam and Reservoir (1.5% of Cost of Facilities)	$572,000
Pumping Energy Costs (11,822,567 kW-hr @ 0.09 $/kW-hr)	$1,064,000
TOTAL ANNUAL COST	**$19,461,000**
Available Project Yield (acft/yr)	26,500
Annual Cost of Water ($ per acft)*	$734
Annual Cost of Water After Debt Service ($ per acft)*	$140
Annual Cost of Water ($ per 1,000 gallons)*	$2.25
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.43
* Based on a peaking factor of 1.	

5.2.20.5 Implementation Considerations

Implementation of the GBRA Lower Basin New Appropriation WMS includes the following considerations:

- Institutional arrangements may be needed to implement the project.
- It may be necessary to obtain the following:
  - TCEQ Diversion and Storage Permits (Application No. 12482, pending);
  - USACE Sections 10 and 404 Dredge and Fill Permits for the reservoir and pipelines;
  - TCEQ stormwater permit for construction activities;
  - GLO sand and gravel removal permits;
  - GLO easement for use of state-owned land; and
  - TPWD sand, gravel, and marl permit.
- Permitting may require the following studies:
  - Habitat mitigation plan;
  - Environmental studies; and
  - Cultural resource studies and mitigation.
- Acquisition of private land for construction of new facilities through either negotiations or condemnation; and
- Additional studies, investigations, and/or agency coordination will be necessary prior to full implementation, including but not limited to the following:
  - Design of infrastructure;
  - Local coordination with municipalities, county, or railroads for roadway, railroad, and utility crossings;
  - Environmental studies;
  - Potential stream/wetland mitigation plans;
  - Site-specific protected species habitat evaluations and presence/absence surveys; and
  - Cultural resources surveys.

5.2.21 GBRA WaterSECURE

The SCTRWPG identified the GBRA WaterSECURE WMS as a potentially feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.21.1 Description of Water Management Strategy

The GBRA WaterSECURE is a WMS that combines the following two WMSs that were included in the 2021 Regional Water Plan, with modifications to infrastructure and customers: GBRA Mid-Basin Project (Phase 2) and GBRA Lower Basin Storage Project. The WMS is designed to supply 125,000 acft/yr; however, the available yield varies because of MAG limitations.

Given the geographic extent of this WMS, the approximate project location is shown in two maps; one for the lower basin (Figure 5.2.21-1) and one for the mid-basin (Figure 5.2.21-2). The maps are conceptual, as the exact locations and configuration of infrastructure have not yet been finalized. The WMS would include the following:

- Diversion of surface water from the lower Guadalupe-San Antonio River Basin in Refugio County;
- Storage of raw water in a new lower basin OCR in Calhoun County;
- Conveyance of raw water northward from Calhoun County to Gonzales County, traversing through Victoria and DeWitt Counties, where the Yoakum Raw Water Booster Station is located;
- Diversion of surface water from the mid-Guadalupe River Basin in Gonzales County;
- Treatment at a new conventional WTP in Gonzales County of raw surface water from the lower and mid-basin diversions;
- Injection and storage of treated water in an ASR well field in the Carrizo-Wilcox Aquifer in Gonzales County;
- Withdrawal of brackish groundwater from a new well field in the Carrizo-Wilcox Aquifer in Gonzales County, which is co-located on the same footprint as the ASR well field;
- Treatment of brackish groundwater at a new brackish desalination WTP in Gonzales County; and
- Conveyance of treated water to the north and northwest for delivery to GBRA customers, with pipelines located in Caldwell, Hays, Guadalupe, Comal, and Kendall Counties.

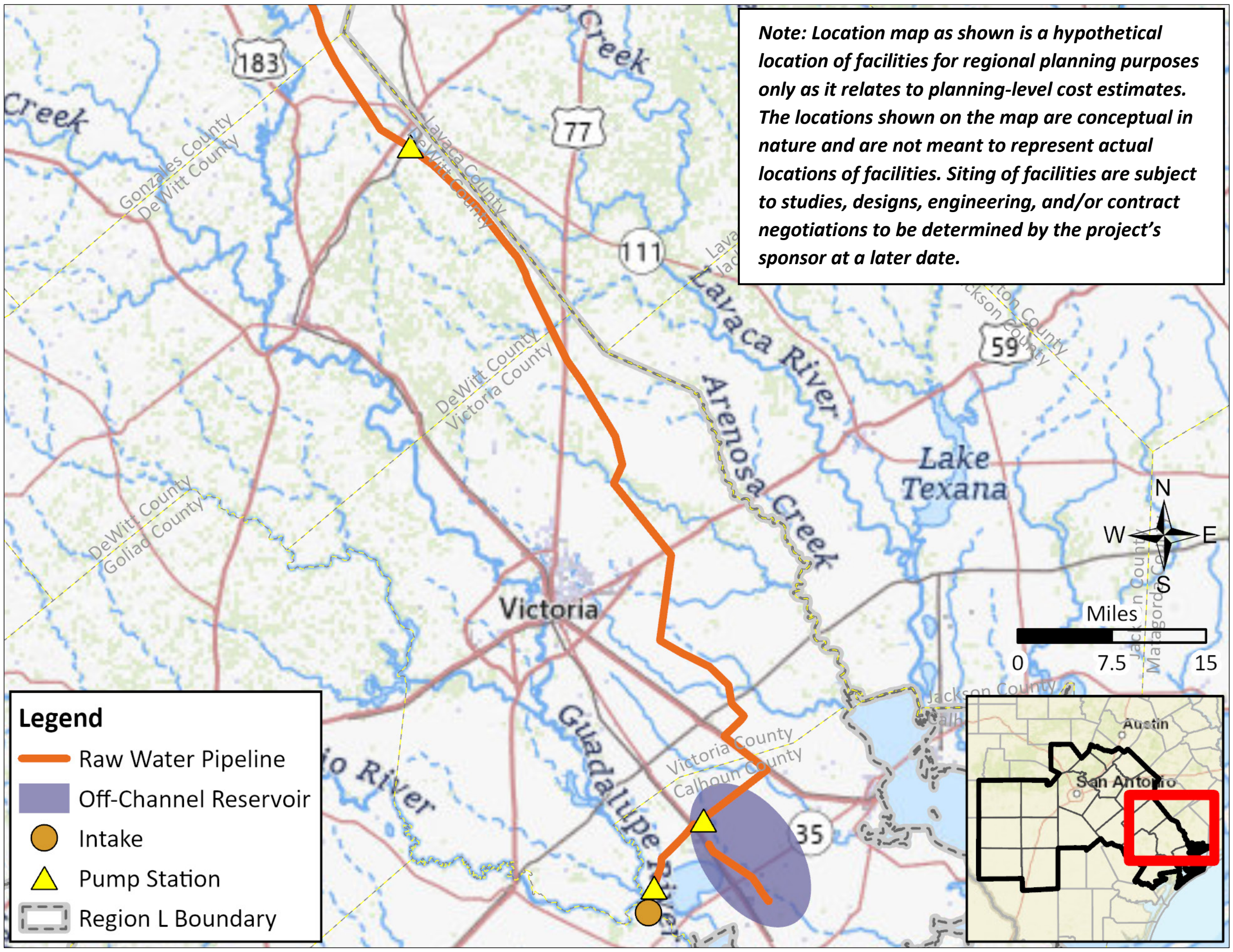

Figure 5.2.21-1 Approximate Location in the Lower Basin for the GBRA WaterSECURE WMS

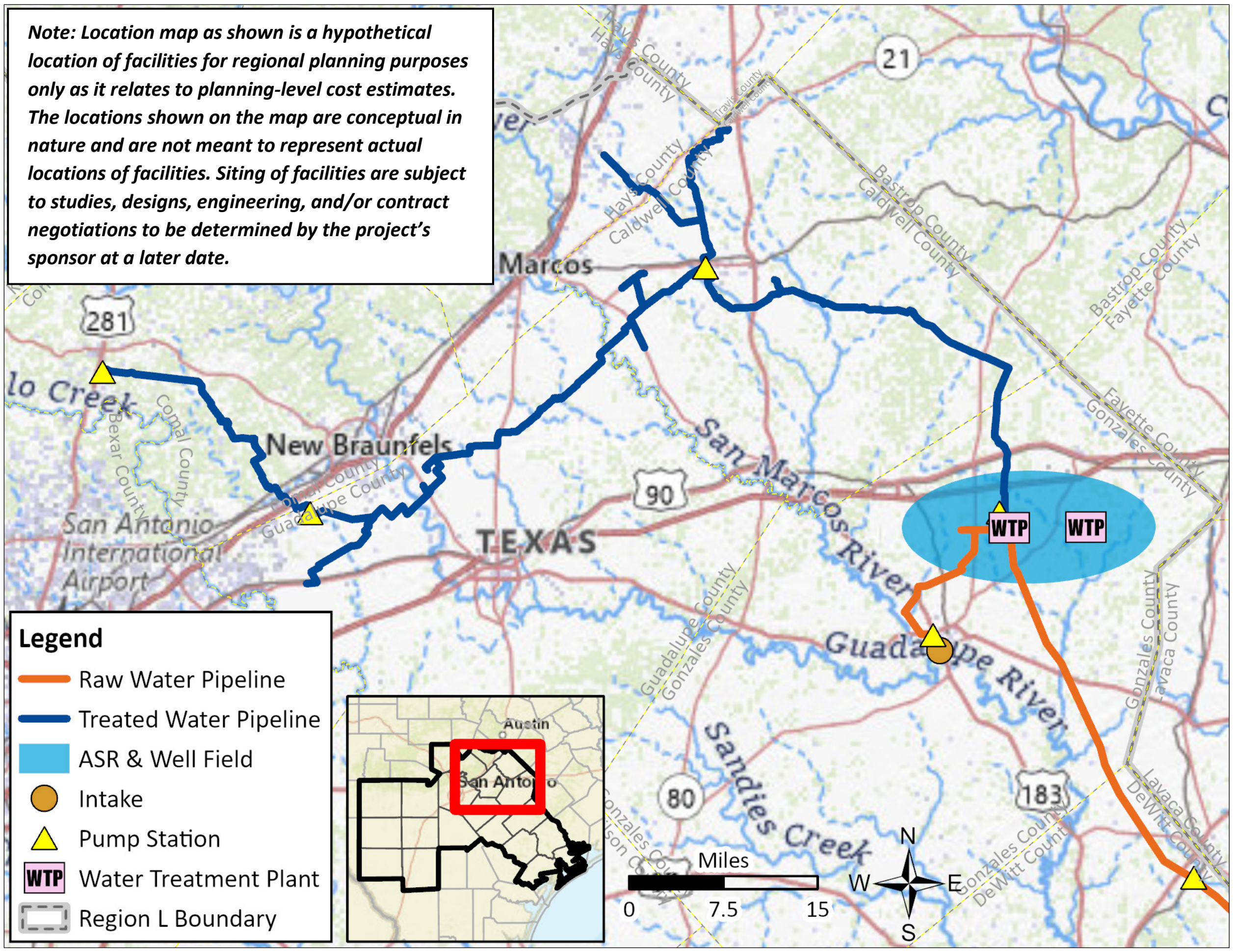

Figure 5.2.21-2 Approximate Location in the Mid-basin for the GBRA WaterSECURE WMS

A new conventional WTP (IH-10 South WTP) will be located northwest of Gonzales and will receive raw surface water from the Lower Basin OCR (approximately 95 miles away) and from the river diversion/intake point near Gonzales (5.3 miles). Additionally, a new desalination WTP will be located in Gonzales County, which will treat brackish groundwater from a new well field in the Carrizo-Wilcox Aquifer in Gonzales County, which is co-located on the same footprint as the ASR well field.

Treated water will generally be delivered to meet daily needs; however, when WTP capacity exceeds daily needs, additional raw water supplies will be treated and injected into the Carrizo-Wilcox Aquifer using new ASR wells. Potable water supplies will be conveyed to various delivery points throughout the proposed central, eastern, and western treated water systems. Customers will be responsible for construction of any facilities required to connect to the delivery locations. Additionally, some treated supply could be made available to customers along the transmission line.

The finished water pipeline throughout the proposed central, eastern, and western treated water systems will total approximately 150 miles in length. The transmission line is sized to deliver baseline supply with a 1.3 peaking factor. Two pump stations will be required to deliver supplies along the central treated water system transmission main before branching into the proposed eastern and western treated water systems. A HSPS will pump treated water from the clear well located at the new I-10 South WTP and will provide sufficient head to deliver supplies to the first booster pump station, the SH-142 Booster Station. The SH-142 Booster Station will boost pressures to convey supplies to the delivery points within the proposed eastern and western treated water systems. Two additional booster pump stations in the western treated water system are included in the WMS: the New Braunfels Booster Station and the Western Canyon Booster Station.

5.2.21.2 Available Yield

The GBRA WaterSECURE WMS is planned for implementation by 2040 and has an available yield that varies by decade because of MAG limitations. Table 5.2.21-1 provides a summary of the yield as envisioned by the sponsor (Envisioned Yield) and the yield available considering MAG constraints (MAG-Constrained Yield) for the GBRA WaterSECURE WMS. The MAG-Constrained Yield is the available yield included in DB27.

Table 5.2.21-1 Envisioned and MAG-Constrained Yields for the GBRA WaterSECURE WMS (acft/yr)

Yield Type	2030	2040	2050	2060	2070	2080
Envisioned Yield	0	125,000	125,000	125,000	125,000	125,000
MAG-Constrained Yield	0	120,289	125,000	125,000	125,000	122,707

The yield as envisioned by the sponsor (Envisioned Yield) is 125,000 acft/yr, consisting of 110,000 acft/yr for the surface water and ASR components and 15,000 acft/yr for the brackish groundwater component. However, the firm yield of brackish groundwater component varies by decade due to MAG limitations of the Carrizo-Wilcox Aquifer in Gonzales County and the Guadalupe Basin.

Subsequent sections provide additional information regarding the evaluation of the available yield for the GBRA WaterSECURE WMS.

Surface Water Modeling of the Lower Basin Diversion and OCR

For the surface water and ASR components, the firm yield is based on detailed WAM modeling provided by the project sponsor, which estimated a firm yield of 110,000 acft/yr. Additional WAM evaluations were performed for Regional Water Planning purposes, which estimated a higher annual yield than 110,000 acft/yr. However, the more conservative, lower estimate provided by the project sponsor was used as the firm yield for this WMS.

All surface water rights for the GBRA WaterSECURE WMS have been granted. In the lower basin, GBRA and Dow, individually and collectively, own surface water rights in the lower Guadalupe-San Antonio River Basin (the GBRA/Dow Water Rights) authorizing diversions from the run-of-river flow of the Guadalupe River totaling 172,501 acft/yr. Table 5.2.21-2 summarizes the GBRA/Dow Water Rights, including the certificate of adjudication number, priority date, annual diversion amount, authorized uses, and ownership.

Table 5.2.21-2 GBRA/Dow Water Rights in the Lower Guadalupe River Basin

Certificate of Adjudication	Priority Date	Authorized Uses	Ownership	Annual Diversion (acft/yr)
18-5173	2/3/1941	Irrigation/Industrial	GBRA/Dow	2,500
18-5174	6/15/1944	Irrigation/Industrial	GBRA/Dow	1,870
18-5175	2/13/1951	Irrigation/ Industrial/ Mining/ Livestock	GBRA/Dow	940
18-5176	6/21/1951	Irrigation/ Industrial/ Municipal	GBRA/Dow	9,944
18-5177	1/3/1944	Irrigation/ Industrial/ Municipal	Dow	10,000
	1/3/1944	Irrigation/ Industrial/ Municipal	GBRA/Dow	32,615
	1/26/1948	Irrigation/ Industrial	GBRA/Dow	8,632
18-5178	1/7/1952	Irrigation/ Industrial/ Municipal	GBRA/Dow	106,000
Total Annual Diversion	**All**	**All**	**All**	**172,501**

Water available for diversion under these rights for use by GBRA and Dow is governed by the complex interactions of natural, anthropogenic, and legal factors including rainfall, runoff, springflow, evaporation, aquifer recharge, diversions by other water right owners, reservoir operations, off-channel storage, terms and conditions of contracts between GBRA and Dow, terms and conditions of water rights, and the prior appropriation doctrine as enforced by the South Texas Watermaster of the TCEQ. Because the point of diversion for the GBRA/Dow Water Rights near Tivoli is below the confluence of the San Antonio and Guadalupe Rivers, and the water rights have senior priority dates to most upstream water rights in both the Guadalupe and San Antonio River Basins, the water rights are considered quite reliable but not firm.

To firm up the run-of-river supplies of water available under the GBRA/Dow Water Rights, an OCR near the GBRA Main Canal and Dow Seadrift Operations facilities is planned for implementation by 2040 decade. Although a final site has yet to be selected, the general location of the OCR is shown on Figure 5.2.21-1, just east of Green Lake. The OCR is assumed to be a traditional dam with a surface area of 2,462 acres and a maximum water depth of 25 feet, capable of impounding approximately 60,000 acft of water. A raw water pipeline would transport water diverted from the raw water intake in Refugio County and pump it to the OCR site. GBRA has obtained water rights permits for this project.

Initial water availability calculations were performed using TCEQ's GSA WAM Run 3. The GSA WAM is a monthly time-step computer model used to estimate regulated streamflow and water available for diversion under existing water rights on a priority basis subject to technical assumptions regarding natural, anthropogenic, and legal factors. General technical assumptions used for the applications of the GSA WAM include the following:

- Surface water rights were modeled at full consumptive amounts per certificates of adjudication and permits with no treated effluent discharges (TCEQ WAM Run 3).
- Edwards Aquifer withdrawals, critical period management, and resulting springflows consistent with the approved Habitat Conservation Plan (Phase I) were developed through the Edwards Aquifer Recovery Implementation Program.

- All senior Guadalupe River hydropower water rights were subordinated to Canyon Reservoir.
- For firm water supply modeling purposes, the total run-of-river supply of water available under the GBRA/Dow Water Rights at any time is assumed to be allocated first to satisfy projected demands for firm water at that time among all present and future GBRA customers and then, to the extent additional run-of-river water is available, to storage in the proposed OCR.
- For firm water supply modeling purposes, projected demands for firm water by all present and future GBRA customers are assumed to be in accordance with current GBRA planning.

Monthly regulated streamflow values from the GSA WAM were disaggregated to daily values using historical daily streamflow patterns to obtain estimates of firm water supply available under the GBRA/Dow Water Rights on a daily basis. The daily firm supply available from the GBRA/Dow Water Rights without the proposed OCR is approximately 8,870 acft/yr. This analysis is limited to a shorter historical period of record because of data availability and does not include on-site storage capacity that Dow or other end users may have, which could impact firm yield.

Firm water supplies available on a daily basis under the GBRA/Dow Water Rights can be enhanced with development and integration of off-channel storage. Analyses of the proposed OCR are based on the following:

- Assumed an OCR capacity of approximately 60,000 acft;
- Assumed an OCR surface area of 2,426 acres;
- Simplified OCR operations simulations assuming maximum and minimum water depths of approximately 25 feet and 3 feet, respectively;
- Assumed a maximum instantaneous diversion rate to the OCR of 250 cfs; and
- Applied historical net evaporation from the GSA WAM.

Under the above assumptions, firm surface water supply from the lower basin could be increased from 8,870 acft/yr to 117,800 acft/yr with the addition of the 60,000 acft OCR. Note that 50,000 acft/yr of the increased firm surface water supply of the lower basin component will remain in the lower basin. When the remaining lower basin supply is combined with the firm surface water supply of the mid-basin component of this project, the total firm surface water supply of the GBRA WaterSECURE WMS is approximately 110,000 acft/yr. Additionally, the firm supply would also be increased by increasing the rate of delivery of water into the OCR above the assumed maximum rate of 250 cfs.

Surface Water Modeling of the Mid-Basin Diversion and ASR Well Field

As described previously, all surface water rights for the GBRA WaterSECURE WMS have been granted. Estimates of surface water available for diversion under GBRA's Permit No. 12378 from the Guadalupe River at Gonzales were computed using the TCEQ WAM Run 3, which considers senior water rights and environmental flow requirements included in the Special Conditions of the permit. Surface water availability was estimated in accordance with GBRA's permit.

Models used to determine availability and yield include the GSA WAM and the FRAT. Major modeling assumptions in applications of the GSA WAM and FRAT include the following:

- Estimated water availability subject to full use of senior water rights for consumptive uses and environmental flow standards in 30 TAC §298, as adopted by TCEQ on August 30, 2012.

- Excluded treated effluent discharges throughout the river basin (similar to TCEQ Run 3), except when specifically addressed in a water right (e.g., INVISTA, Kate O'Connor Trust, etc.).
- Based the springflows from the Edwards Aquifer on aquifer management in accordance with full implementation of the EAHCP, as approved by the USFWS.
- Assumed maximum instantaneous Mid-Basin diversion rate of 135 cfs.
- Assumed maximum annual Mid-Basin diversion amount of 75,000 acft, in accordance with GBRA's permit No. 12378.
- Assumed maximum ASR storage of 193,800 acft.
- Assumed maximum ASR recharge rate of 35 MGD.
- Assumed maximum ASR recovery rate of 58 MGD.
- Assumed annual ASR storage loss rate of 10%.

Monthly regulated flows were then disaggregated to daily values using gaged or estimated daily streamflows for the Guadalupe River at Gonzales. Monthly amounts allocated to downstream senior water rights were then taken uniformly out of the base of the daily hydrograph so that the sum of daily pass-through amounts in each month equaled the total monthly amount allocated to downstream senior water rights.

Daily senior water right pass-throughs and daily regulated flows are incorporated into the FRAT model, along with environmental flow requirements included in the permit's Special Conditions. These environmental flow requirements for the mid-basin diversion on the Guadalupe River under Permit No. 12378 are based on the Environmental Flow Standards for the Guadalupe River at Gonzales in 30 TAC §298.380(c)(6). The standards consist of subsistence, base, and pulse flow requirements. Although the requirements in Permit No. 12378 contain subsistence and base flow requirements, the pulse flow requirements do not include the standards' small seasonal pulse for the spring season or the large seasonal pulses for winter, spring, and fall. Because the authorized diversion rate of Permit No. 12378 is less than 20% of the pulse trigger level requirement, it is exempt from the specific small and large seasonal pulses mentioned above according to 30 TAC §298.385(b).

The proposed ASR well field will be located approximately 20 miles northeast of the City of Gonzales and include approximately 24 wells for injection and recovery. It was assumed to include a design recharge rate of 35 MGD, which is incorporated into the respective conventional WTP capacity.

Challenges to reliability include natural groundwater flow away from the ASR site and the associated drift of the storage bubble, thus reducing available supplies. For the purposes of this WMS, the anticipated water loss associated with ASR recovery rates is assumed to be 10% of the storage volume each year. This water loss is associated with drift within the aquifer. To compensate for the anticipated water loss, GBRA plans to inject additional water into the stored volume within the aquifer.

Brackish Groundwater Well Field

The proposed brackish groundwater well field will be co-located on the same footprint as the new ASR well field, which is approximately 20 miles northeast of the City of Gonzales. The wells would withdraw brackish groundwater from the Carrizo-Wilcox Aquifer in Gonzales County.

The Gonzales County UWCD regulates groundwater production, well spacing, and other requirements in the Carrizo-Wilcox Aquifer in Gonzales County. In 2021, GMA 13 established DFCs for the Carrizo-Wilcox Aquifer [1]. On the basis of the approved DFCs, the TWDB determined that the MAG estimate for the Carrizo-Wilcox Aquifer in Gonzales County is 96,161 acft/yr in 2080 [2].

Production and/or drilling permits for these wells may be required in accordance with specific GCD rules. For most aquifers in the region, GCDs have adopted DFCs. In some GCDs, full use of all groundwater supplies (permitted, grandfathered and exempt) may result in non-achievement of the DFCs for an aquifer. To ensure consistency with the DFCs, TWDB requires that groundwater availability for each aquifer be limited for planning purposes to the MAG for the discrete geographic-aquifer unit (i.e., aquifer/county/basin unit). In some instances, the sum of existing supplies and future supplies (as groundwater-based WMSs) are greater than the MAG or groundwater availability for a discrete geographic-aquifer unit. This has resulted, for regional water planning purposes only, in adjustments to available yields shown in this plan, and a lack of firm water available for future projects in this plan for some areas for certain time periods. This should not be construed as recommending or requiring that GCDs make these adjustments or deny future permit applications. As described in Guiding Principle V (refer to Appendix 5A), this is not intended to influence or interfere with the regulatory decisions made by the governing boards of permitting entities. The SCTRWPG recognizes and supports the ability of permit holders to exercise their rights to groundwater use in accordance with their permits and it recognizes and supports a GCD's discretion to issue permits and grandfather historical users for amounts in excess of the MAG. The SCTRWPG may not modify groundwater permits that GCDs have already issued or limit future permits that GCDs may issue. If MAG estimates are modified during or after this planning cycle, the SCTRWPG may amend this plan to adjust WMS supply volumes that are affected by the modified MAG estimate(s).

For planning purposes, infrastructure for the brackish groundwater component of the GBRA WaterSECURE WMS is sized to deliver the Envisioned Yield, which is 15,000 acft/yr. The lack of available data and the fractured and heterogenous nature of the aquifer system in this area are such that it is difficult to accurately predict well characteristics. Additional studies, test hole drilling, and characterization studies are recommended prior to well design to determine site-specific aquifer properties, well water quality. Based on available data, the project is anticipated to include 12 wells, each with an estimated pumping capacity of 1,000 gpm. For planning purposes, the brackish groundwater wells are assumed to have a depth of approximately 1,600 feet.

The anticipated TDS concentration is 1,500 mg/L, which would require a brackish desalination WTP. For planning purposes, the estimated RO efficiency is assumed to be 80%. Brackish concentrate will be disposed via deep well injection. It is anticipated that there would be five concentrate injection wells, which includes one contingency well.

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[1] Texas Water Development Board, Groundwater Management Area 13 – Desired Future Conditions. https://www.twdb.texas.gov/groundwater/dfc/docs/summary/GMA13_DFC_2021.pdf

[2] Wade, S.C. 2022. GAM Run 21-018 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers in GMA-13: TWDB. https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR21-018_MAG.pdf

5.2.21.3 Environmental Factors

The GBRA WaterSECURE WMS was evaluated to determine its potential impacts on environmental factors. Table 5.2.21-3 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.21-3 Summary of Potential Project Effects on Environmental Factors for the GBRA WaterSECURE WMS

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	36,551
Potential Species Impact Score	21
Potential Habitat Impact Score	2
Potential Stream Construction Impact Score	6
Potential Stream Flow / Water Quality Impact Score	5
Potential Cultural Resources Impact Score	1,233

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project area is located in the Balcones Canyonlands, Blackland Prairie, Southern Post Oak Savanna, Southern Blackland/Fayette Prairie, Northern Humid Gulf Coastal Prairie, and Mid-Coast Barrier Islands and Coastal Marshes ecoregions, and crosses a variety of vegetation types, mostly open fields, pastures, and riparian zones along streams. A large chemical plant and associated water basins and railway lie within the project area. As mapped by TPWD [3], dominant vegetation types in the project area include savanna grassland, mesquite shrubland, floodplain herbaceous vegetation, post oak motte and woodland, croplands, pastures, shrublands, wetlands, coastal prairie, row crops, open water, and invasive evergreen shrubland. The linear components of the project cross riparian vegetation zones along streams, mapped by TPWD as floodplain and riparian herbaceous vegetation, floodplain and riparian hardwood forest, floodplain and riparian deciduous shrubland, floodplain live oak forest, riparian grassland, riparian evergreen and deciduous shrublands, riparian live oak forest, and hardwood forest; with the transmission pipeline alignment also crossing significant areas of central Texas floodplain hardwood forest and floodplain herbaceous vegetation communities.

Based on TPWD vegetation mapping, the project may have the potential to impact up to 36,551 acres of agricultural resources, including 19,508 acres mapped as row crops, 5,519 acres mapped as tame/disturbance grassland, and 11,524 acres mapped as coastal prairie which may include pasture areas used for grazing or hay production.

Construction of well fields would result in conversion of woody and herbaceous vegetation and agricultural uses to industrial land use for facilities. Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing and woody vegetation clearing) to maintain

[3] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/.

easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species that are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each WMS to determine the best course of action regarding revegetation. Pipeline easements may continue to be used for agricultural purposes.

Aquatic Resources

The mid-basin linear components from Comal/Hays to Gonzales Counties cross several NHD mapped streams and their associated floodplains, including the San Marcos River, Plum Creek, and Sandy Fork, and includes a raw water intake in the Guadalupe River. The project pipeline crosses Segment 1804A of Geronimo Creek, a tributary of the Guadalupe River. This stream segment has been designated as impaired in the Texas Integrated Report of 303(d) listed water bodies [4]. This list identifies the water bodies or segments in Texas that do not meet assigned water quality standards. The project pipeline crosses the headwaters of Geronimo Creek, an ecologically significant stream segment designated by TPWD.

The transmission pipeline from the lower basin to the mid-basin areas extends from DeWitt to Refugio Counties located between San Antonio Bay and Matagorda Bay, with the transmission pipeline extending generally to the northwest to Gonzales. A network of irrigation ditches and East and West Coloma creeks traverse the approximate OCR area. These two creeks appear to be channelized and eventually flow into Matagorda Bay. The lower basin pipeline alignment crosses numerous mapped streams and their associated floodplains, including the Guadalupe River. Operational water basins associated with a chemical plant occur on the western side of the project region.

Linear components of the project cross several stream segments that have been designated as impaired in the Texas Integrated Report of 303(d) listed water bodies. The impaired water bodies in the pipeline alignments include the Lower San Marcos River (Segment 1808), Guadalupe River below San Antonio River (Segment 1802), Arenosa Creek (Segment 2453C), Peach Creek (Segment 1803C), Sandy Fork (Segment 1803G), Denton Creek (Segment 1803F), Dry Comal Creek (Segment 1811A), Plum Creek (Segment 1810), Garcitas Creek above tidal (Segment 2453E), Guadalupe River below Comal River (Segment 1804), Victoria Barge Canal (Segment 1701), and Alligator Creek (Segment 1804C). NWI mapping shows 617 acres of freshwater emergent wetlands, 36 acres of freshwater forested/shrub wetlands, 657 acres of freshwater ponds, 1,818 acres of lakes, and 1,118 acres of riverine wetlands in the project area. During planning and design of the project, GBRA intends to seek alternatives to avoid impacts to aquatic resources wherever possible.

The project pipeline crosses three water bodies that have been designated as ecologically significant stream segments by TPWD. Garcitas Creek, from its confluence with Lavaca Bay in Victoria/Jackson/Calhoun County upstream to FM 1315 in Victoria County, was designated because of the presence of estuarine wetlands, high water quality/high aesthetic value, and occurrence of rare Texas palmetto palm (*Sabal mexicana*) and diamondback terrapin (*Malaclemys terrapin*). The Guadalupe River, from US 183

[4] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir.

in Gonzales County upstream to Lake Gonzales Dam in Gonzales County (Segments 1803 and 1804), was designated due to known populations of the Guadalupe orb freshwater mussel (*Cyclonaias necki*). Another segment of the Guadalupe River, from its confluence with Guadalupe Bay in Calhoun/Refugio County upstream to FM 447 in northwest Victoria County (Segment 1801 and part of Segment 1803), was designated due to the presence of extensive freshwater and estuarine wetland habitat, including the 7,410-acre Guadalupe Delta Wildlife Management Area. This river segment also contains extensive marshland that provides habitat for the federally endangered whooping crane (*Grus americana*).

The project will require an on-site delineation of streams, ponds, and wetlands. Stream crossings for pipeline construction would result in temporary stream impacts that may require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including if there would be permanent impacts to over 0.1 acre of waters of the U.S. The USACE permit requires that there will be no change in pre-construction contours of waters of the U.S. Utility crossings under streams (e.g., through horizontal directional drilling) would not require a USACE permit. Although the proposed project includes an OCR, streams or wetlands impacted by reservoir development would require appropriate USACE permitting depending on impacts. During planning and design of the project, GBRA intends to seek alternatives to avoid impacts to aquatic resources wherever possible.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that may occur in Caldwell, Calhoun, Comal, DeWitt, Gonzales, Guadalupe, Hays, and Victoria Counties [5, 6, 7, 8, 9, 10, 11, 12]. Suitable habitat for the federally listed endangered golden-cheeked warbler (*Setophaga chrysoparia*), whooping crane (*Grus americana*), northern aplomado falcon (*Falco femoralis septentrionalis*), Attwater's greater prairie-chicken (*Tympanuchus cupido attwateri*), Houston toad (*Bufo houstonensis*), false spike (*Fusconaia mitchelli*), Guadalupe fatmucket (*Lampsilis bergmanni*), Guadalupe orb (*Cyclonaias necki*), and bracted twistflower (*Streptanthus bracteatus*), federally listed threatened eastern black rail (*Laterallus jamaicensis* ssp. *jamaicensis*), rufa red knot (*Calidris canutus rufa*), and

[5] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Caldwell County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[6] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Calhoun County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[7] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Comal County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[8] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – DeWitt County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[9] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Gonzales County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[10] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Guadalupe County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[11] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Hays County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[12] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Victoria County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

piping plover (*Charadrius melodus*), the federally proposed tricolored bat (*Perimyotis subflavus*), and the candidate monarch butterfly (*Danaus plexippus*) may occur within the project area.

Habitat for the federally listed endangered golden-cheeked warbler, northern aplomado falcon, the federally proposed listed tricolored bat, and monarch butterfly may occur in the open grasslands and woodlands of the project area. The only natural flock of whooping cranes winters mainly in and adjacent to Aransas National Wildlife Refuge (ANWR) along the central Texas coast in Aransas, Calhoun, and Refugio Counties[13]. The project area occurs approximately 12 miles north of the ANWR. Furthermore, the project area occurs approximately 8.5 miles north of federally designated critical habitat for the whooping crane. Therefore, the federally endangered whooping crane may occur in or fly over the project area. Habitat for the federally threatened eastern black rail, rufa red knot, and piping plover may occur within wetlands in the project area. Suitable habitat for the federally listed endangered Attwater's greater prairie-chicken may occur in the open coastal grasslands of the project area. Suitable habitat for the federally endangered false spike, Guadalupe fatmucket, and Guadalupe orb may occur in the project streams and canal crossings where they contain suitable flow conditions. Proposed critical habitat for the Guadalupe fatmucket and Guadalupe orb occurs within the Guadalupe River at the pipeline alignment. Suitable habitat for the bracted twistflower may occur within the project footprint in Comal County. Based on updated karst invertebrate zones issued by the USFWS in August 2024[14], habitat for federally endangered karst invertebrates may occur along the westernmost end of the transmission pipeline in the mid-basin area. The project will require on-site habitat assessments to determine if suitable habitat is present within the project impact areas.

Suitable habitat may occur for several state-listed threatened species, including the wood stork (*Mycteria americana*), Texas horned lizard (*Phrynosoma cornutum*), Texas tortoise (*Gopherus berlandieri*), and Cagle's map turtle (*Graptemys caglei*). The wood stork would only be expected to forage within the project area. Potentially suitable habitat may occur for numerous state wildlife, plant, and insect species designated by TPWD as SGCN. These species do not have formal protected status but are being monitored by TPWD. Migratory birds may occur in the project area, particularly in riparian zones and wetland areas.

Streams in the project area may contain suitable habitat for federal endangered/state threatened freshwater mussel species. Suitable habitat may occur in perennial rivers/streams and perennial pools of intermittent streams. If any such habitat would be affected by construction, presence/absence surveys and relocation of native mussel species would be required. Handling and relocation of mussels and other aquatic species must be conducted by TPWD-permitted personnel and in accordance with an approved Aquatic Resources Relocation Plan. Furthermore, any species impacts would require USFWS consultation.

Site-specific field surveys would be required to determine the quality of habitat for state-listed species. Coordination with TPWD may be required to mitigate species impacts. If TWDB funding/financing will be

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[13] Canadian Wildlife Service and U.S. Fish and Wildlife Service (USFWS). 2007. International Recovery Plan for the Whooping Crane. Ottawa: Recovery of Nationally Endangered Wildlife, and USFWS, Albuquerque, New Mexico.
[14] United States Fish and Wildlife Service (USFWS). Section 10(a)(1)(A) Scientific Permit Requirements for Conducting Presence/Absence Surveys and Habitat Assessments for Listed Karst Invertebrates in Central Texas. U.S. Fish and Wildlife Service, Austin Ecological Services Field Office, 1505 Ferguson Lane, Austin, Texas. August 12, 2024.

used for the project, formal coordination with TPWD will likely be required to obtain its recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may occur and nest in the project area. The federal MBTA protects birds, nests, and eggs from impacts unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15. Preconstruction surveys for active bird nests are recommended.

Cultural Considerations

For the linear portions of the project (i.e., project alignment), a background literature review was performed for the alignment and a 300-foot radius around the project alignment. For the well fields and OCR portions of the project (i.e., project area), a background literature review of the portion identified 82 cultural resources within the approximate 15,952-acre project area and alignment or immediately adjacent (i.e., within 300 feet) to the project's pipeline alignment (Table 5.2.21-4) [15, 16]. These cultural resources include 52 archaeological sites, two NRHP-listed historic districts, one NRHP-eligible historic property, 13 cemeteries, five vicinity cemeteries, seven Official Texas Historical Markers (OTHMSs), and two historic trails. Note that there are cultural resources with multiple resource types. Out of the archaeological sites, three are NRHP-eligible, six are ineligible for NRHP-listing, and 43 remain undetermined for listing on the NRHP. Two of the cemeteries, Jewish Cemetery and Saturn, are designated as Historic Texas Cemeteries. Additionally, the historical map review identified 975 potential historic-age structures that intersect with the project area and alignment or are immediately adjacent (i.e., within 300 feet) to the project's pipeline alignment [17].

Vicinity cemeteries are general areas where a cemetery location was reported at one time, but the exact location is unknown or could not be confirmed. If project impacts are to occur near the vicinity cemetery location, further work (e.g., pedestrian survey and/or metal detecting) or construction monitoring might be needed to ensure human burials are not present in the project area and alignment. In the State of Texas, all human burials are protected by law [18], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project area and alignment and the remains are determined to be Native American, they will be managed in accordance with procedures established through coordination with the THC, and work in the affected area can only resume per THC authorization.

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[15] Texas Historical Commission (THC). 2024. *Texas Archeological and Historical Sites Atlas.* Available at: https://atlas.thc.texas.gov/. Accessed October 2024.
[16] Texas Department of Transportation (TxDOT). 2024. TxDOT Historic Resources Aggregator, TxDOT Environmental Affairs Division. Austin, Texas Available at: https://txdot.maps.arcgis.com/apps/webappviewer/index.html?id=e13ba0aa78bf4548a8e98758177a8dd5. Accessed October 2024.
[17] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed October 2024.
[18] As per the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

A probability model was used to assess the overall potential of buried prehistoric archaeological deposits in the project area and alignment, which included low, medium, and high potential zones. The model indicated that 14.2% of the project area and alignment had a high likelihood of containing significant unidentified archaeological resources, 22.6% had a moderate likelihood, and 63.2% had a low likelihood. Areas with higher archaeological probability were considered to have been located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project area and alignment that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area and alignment. Next, the cultural resources within the project area and alignment were evaluated according to its NRHP eligibility and SAL designation. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts and properties or archaeological sites, SALs, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 points. In addition, Recorded Texas Historical Landmarks, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. For cultural resources with multiple resource types, the values of each resource type were calculated and used to determine the overall assessment score. The points for all cultural resources within the project area and alignment were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for this project equaled 1,233.

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, 52 archaeological sites, two NRHP-listed historic districts, one NRHP-eligible historic property, 13 cemeteries, five vicinity cemeteries, seven OTHMs, two historic trails, and 975 potential historic-age structures are located within the project area and alignment; the probability model indicates that one-third of the project area has a moderate to high likelihood of buried deposits; and the project assessment score is 1,233. Based on these results, a cultural resources assessment for the final design plan is recommended, as well as a buffer zone of at least 100 feet between the cemeteries and the proposed project infrastructure.

Table 5.2.21-4 Cultural Resources Results for the GBRA WaterSECURE WMS

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
41CL1	Archaeological site	Multicomponent	Ineligible	Intersect
41CL10	Archaeological site	Prehistoric	Undetermined	Intersect
41CL59	Archaeological site	Prehistoric	Eligible	Intersect
41CL70	Archaeological site	Multicomponent	Undetermined	Intersect
41CL77	Archaeological site	Multicomponent	Eligible	Intersect
41CL78	Archaeological site	Multicomponent	Eligible	Intersect
41CL79	Archaeological site	Multicomponent	Undetermined	Intersect

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
41CL89	Archaeological site	No data	Undetermined	Intersect
41CL96	Archaeological site	Historic	Undetermined	Intersect
41CM140	Archaeological site	Prehistoric	Ineligible	Intersect
41CM141	Archaeological site	Prehistoric	Ineligible	Intersect
41CM399	Archaeological site	Prehistoric	Undetermined	Intersect
41CW35	Archaeological site	Historic	Undetermined	Adjacent
41CW117	Archaeological site	Prehistoric	Ineligible	Intersect
41CW118	Archaeological site	Prehistoric	Undetermined	Intersect
41CW119	Archaeological site	Prehistoric	Undetermined	Intersect
41CW185	Archaeological site	Historic	Undetermined	Intersect
41CW186	Archaeological site	Historic	Undetermined	Intersect
41CW187	Archaeological site	Multicomponent	Undetermined	Intersect
41CW188	Archaeological site	Historic	Undetermined	Intersect
41CW189	Archaeological site	Prehistoric	Undetermined	Intersect
41CW190	Archaeological site	Prehistoric	Undetermined	Intersect
41CW194	Archaeological site	Prehistoric	Undetermined	Intersect
41CW195	Archaeological site	Prehistoric	Undetermined	Intersect
41CW196	Archaeological site	Prehistoric	Undetermined	Intersect
41CW197	Archaeological site	Prehistoric	Undetermined	Adjacent
41CW198	Archaeological site	Historic	Undetermined	Intersect
41CW199	Archaeological site	Historic	Undetermined	Intersect
41CW200	Archaeological site	Prehistoric	Undetermined	Intersect
41CW201	Archaeological site	Multicomponent	Undetermined	Intersect
41CW202	Archaeological site	Historic	Undetermined	Intersect
41CW203	Archaeological site	Historic	Undetermined	Intersect
41CW204	Archaeological site	Historic	Undetermined	Intersect
41CW239	Archaeological site	Prehistoric	Undetermined	Intersect
41GU45	Archaeological site	Historic	Undetermined	Adjacent
41GU190	Archaeological site	Historic	Undetermined	Adjacent
41GU212	Archaeological site	Historic	Undetermined	Intersect
41GU214	Archaeological site	Historic	Undetermined	Intersect
41GU215	Archaeological site	Historic	Undetermined	Intersect
41GU216	Archaeological site	Prehistoric	Undetermined	Intersect
41GU217	Archaeological site	Historic	Undetermined	Intersect
41GU218	Archaeological site	Multicomponent	Undetermined	Intersect
41GU220	Archaeological site	Prehistoric	Undetermined	Intersect
41GZ106	Archaeological site	Prehistoric	Undetermined	Intersect

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
41GZ120	Archaeological site	Prehistoric	Undetermined	Intersect
41GZ191	Archaeological site	Historic	Undetermined	Adjacent
41GZ210	Archaeological site	Prehistoric	Ineligible	Intersect
41GZ229	Archaeological site	Prehistoric	Undetermined	Intersect
41GZ259	Archaeological site	Prehistoric	Undetermined	Intersect
41GZ230	Archaeological site	Historic	Undetermined	Intersect
41HY535	Archaeological site	Historic	Ineligible	Intersect
41HY593	Archaeological site	Prehistoric	Undetermined	Intersect
Cuero I	Archaeological District	Multicomponent	Listed	Intersect
Gonzalez Commercial	Historic District	Historic	Listed	Adjacent
Altwein Farm	Historic Property / OTHM	Historic	Eligible	Adjacent
Baldridge	Cemetery	Historic	Undetermined	Intersect
Bodemann	Cemetery	Historic	Undetermined	Intersect
Center Union	Cemetery	Historic	Undetermined	Intersect
Haschke	Cemetery	Historic	Undetermined	Intersect
Hebron	Cemetery	Historic	Undetermined	Intersect
Helmke	Cemetery	Historic	Undetermined	Adjacent
Hillert CM-C040	Cemetery	Historic	Undetermined	Adjacent
Jewish Cemetery	Cemetery / OTHM	Historic	Undetermined	Intersect
Long Mott	Cemetery	Historic	Undetermined	Intersect
McKinney #2	Cemetery	Historic	Undetermined	Adjacent
Mt. Eden-Hickston	Cemetery	Historic	Undetermined	Intersect
Saturn	Cemetery / OTHM	Historic	Undetermined	Intersect
Unknown (West of Ohiendorf)	Cemetery	Historic	Undetermined	Adjacent
Bohr	Vicinity Cemetery	Historic	Undetermined	Intersect
DeCloudt Graves	Vicinity Cemetery	Historic	Undetermined	Intersect
Matthias Haug (Hagg)	Vicinity Cemetery	Historic	Undetermined	Intersect
Parr	Vicinity Cemetery	Historic	Undetermined	Intersect
Weston Family	Vicinity Cemetery	Historic	Undetermined	Adjacent
Cotton Gins of Calhoun County	OTHM	Historic	Undetermined	Intersect
Green Lake	OTHM	Historic	Undetermined	Intersect
Sam Houston Oak	OTHM	Historic	Undetermined	Intersect

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Site of Dietz Community	OTHM	Historic	Undetermined	Adjacent
El Camino Real de Los Tejas	Historic trail	Historic	Listed (segments)	Intersect
Chisholm Trail	Historic trail	Historic	Listed (segments)	Intersect
None (N=975)	Buildings / Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**1.233**

5.2.21.4 Engineering and Costing

Preliminary engineering and costing analyses were performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required for surface water diversions, storage in an OCR, raw water conveyance, conventional water treatment, ASR system for recharge and recovery, brackish groundwater, brackish desalination water treatment, and potable water delivery to customers via pipelines and pump stations. The project sponsor provided several costs used in the costing analysis.

A cost estimate summary for the GBRA WaterSECURE WMS is provided in Table 5.2.21-5. Infrastructure was sized to deliver the sponsor's Envisioned Yield, but because the project is MAG-limited, the annual unit costs were calculated using the MAG-Constrained Yield in the first decade of implementation. All cost estimates consider infrastructure and capacities necessary to deliver the sponsor's Envisioned Yield, despite the lack of groundwater availability.

Table 5.2.21-5 Cost Estimate Summary for the GBRA WaterSECURE WMS

Item	Estimated Costs
Lower Basin Off-Channel Reservoir (Conservation Pool 60,000 acft, 2,562 acres)	$155,000,000
Intake Pump Stations (210 MGD)	$499,487,000
Transmission Pipelines (14-96 in. dia., 258.2 miles)	$1,859,840,000
Transmission Pump Stations & Storage Tank	$382,500,000
Well Fields (Wells, Pumps, and Piping) – ASR and Brackish GW	$183,677,000
Two Water Treatment Plants (140 MGD and 13.5 MGD)	$697,714,000
TOTAL COST OF FACILITIES	**$3,778,218,000**
- Planning (7%)	$264,475,000
- Design (7%)	$264,475,000
- Construction Engineering (7%)	$264,475,000
Legal Assistance (2%)	$75,564,000
Fiscal Services (2%)	$75,564,000

Item	Estimated Costs
Pipeline Contingency (20%)	$371,968,000
All Other Facilities Contingency (30%)	$575,513,000
Environmental & Archaeology Studies and Mitigation	$9,312,000
Land Acquisition and Surveying (6,176 acres)	$222,282,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$191,811,000
TOTAL COST OF PROJECT	**$6,093,657,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$411,292,000
Reservoir Debt Service (3.5%, 40 years)	$11,623,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$20,435,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$22,050,000
Dam and Reservoir (1.5% of Cost of Facilities)	$2,325,000
Water Treatment Plants	$58,388,000
Pumping Energy Costs (771,781,284 kW-hr @ 0.09 $/kW-hr)	$69,460,000
TOTAL ANNUAL COST	**$595,573,000**
Available Project Yield (acft/yr)	120,289
Annual Cost of Water ($ per acft)*	$4,951
Annual Cost of Water After Debt Service ($ per acft)*	$1,435
Annual Cost of Water ($ per 1,000 gallons)*	$15.19
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$4.40
* Based on a Peaking Factor of 1.3.	
One or more cost elements have been calculated externally	

5.2.21.5 Implementation Considerations

Implementation of the GBRA WaterSECURE WMS includes the following considerations:

- It may be necessary to obtain the following permits or authorizations:
  - USACE Sections 10 and 404 dredge and fill permits;
  - TCEQ Underground Injection Control Permit for deep well disposal of desalination concentrate;
  - TCEQ Class V injection well permit for ASR wells. Key requirements for permits to construct and operate a Class V injection well are mechanical integrity of the well,

pollution control, demonstration of recoverability in the permitting process, and periodic reports.

- TCEQ stormwater permit for construction activities;
- GLO sand and gravel removal permits;
- GLO easement for use of state-owned land; and
- TPWD sand, gravel, and marl permits.

- Acquisition of private land for construction of facilities through either negotiations or condemnation.
- Additional studies, investigations, and/or agency coordination will be necessary prior to full project implementation, including but not limited to the following:
  - ASR well testing and monitoring;
  - ASR cycle testing;
  - Design of infrastructure;
  - Local coordination with municipalities, county, or railroads for roadway, railroad, and utility crossings;
  - Environmental studies;
  - Potential stream/wetland mitigation plans;
  - Site-specific protected species habitat evaluations and presence/absence surveys; and
  - Cultural resources surveys.

In addition, GBRA is currently developing a regional Habitat Conservation Plan (HCP) to cover implementation of projects in the entirety of the Guadalupe River Basin. Once approved, the HCP will provide incidental take coverage for federally listed threatened and endangered species that are covered under the HCP, which are anticipated to include eastern black rail, whooping crane, Guadalupe darter, false spike, Guadalupe orb, and Guadalupe fatmucket. Protected species not covered by the HCP would require individual consultation with the USFWS if they may be adversely affected by proposed project activities.

5.2.22 Medina County Regional ASR Project

The SCTRWPG identified the Medina County Regional ASR Project as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.22.1 Description of Water Management Strategy

Medina County is experiencing rapid population growth, like other counties located along the IH35 corridor. Located west of San Antonio, Medina County grew by nearly 30% between the 2000 and 2020 Census to a population of 50,748. Population projections (see Chapter 2) show continued rapid growth with an expected population of 79,204 in 2040 and 92,564 in 2080.

Historically, WUGs in Medina County have relied primarily on groundwater from the Trinity Aquifer and Edwards Aquifer, and to a lesser extent on surface water from Medina Lake. These supplies are limited, however. The Edwards Aquifer is subject to EAA critical period management plan that requires reductions of permitted production by 44% during Stage 5, and Medina Lake has zero firm yield during a repeat of the drought of record.

To accommodate this growth and to increase drought resilience, several WUGs within Medina County are considering implementation of a regional ASR project. For purposes of this WMS evaluation, the project sponsors are Yancey WSC and East Medina County SUD, which will sell water to various customers within Medina County. For purposes of this section 5.2.22, the term “project participants” will refer to the project sponsors and customers listed in Section 5.2.22.2 Available Yield.

The ASR project will be implemented to accomplish the following:

- Provide a long-term supply during a repeat of the drought of record;
- Develop a shared resource that leverages economies of scale;
- Provide an opportunity to increase utilization of existing Edwards Aquifer permits, postponing or reducing acquisition of new water supplies;
- Meet seasonal demands when restrictions are imposed;
- Meet demands at the ends of the distribution system;
- Provide an emergency supply;
- Minimize construction of new facilities;
- Provide for efficient use of existing distribution systems; and
- Minimize environmental impacts.

Like any ASR project, the purpose is to store water during times of plenty and to recover the water during times of shortage. Excess treated Edwards Aquifer water or treated Medina Lake surface water from project participants will be injected into the ASR system. The Medina County Regional ASR Project was designed to consider both the short-term and long-term timeframes. For the short-term or annual cycle, water is stored during winter and spring and recovered during the summer. For the long-term or multi-year cycle, water is stored over several years or even decades to provide emergency supply during a major drought.

The project will be implemented in two phases, with Phase 1 in 2040 and Phase 2 in 2080. The source of water for recharge will be Edwards Aquifer water or Medina Lake surface water, treated to meet drinking water standards at existing production wells operated by project participants and conveyed to the ASR well field via existing pipelines, supplemented as necessary with new pipelines. The project will utilize new and existing infrastructure. New infrastructure includes a new conventional WTP, transmission pipelines, pump stations, and ASR wells, well pumps, and well piping. The proposed ASR well field will be located in northeast Medina County, near Medina Lake's Diversion Lake. The ASR wells will inject water that will be stored within the saline portion of the Trinity Aquifer (Figure 5.2.22-1).

Many of the project participants already have interconnections with each other. However, with the additional water from the ASR system, new or additional pipeline capacities will be necessary for the interconnections. Therefore, booster pump stations and approximately 21 miles of additional pipelines are included in this WMS. Although Phase 1 is expected to be online and providing water by the 2040 decade, interconnection infrastructure may be needed prior to 2040.

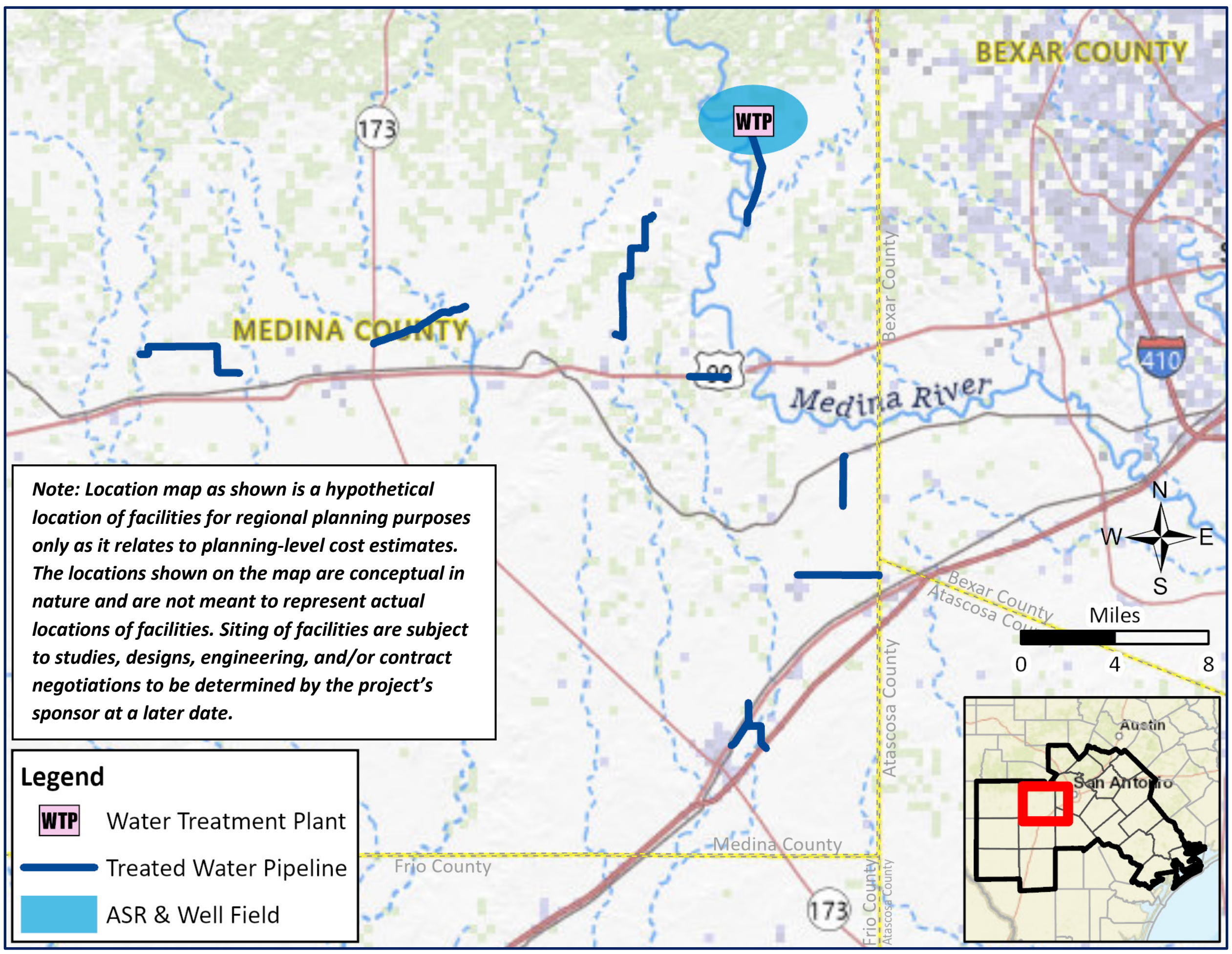

Figure 5.2.22-1 Approximate Location of the Medina County Regional ASR Project

5.2.22.2 Available Yield

This WMS has multiple phases, with Phase 1 having a firm yield of 6,250 acft/yr with implementation by 2030, and Phase 2 having a firm yield of 12,500 acft/yr with implementation by 2080. Table 5.2.22-1 provides a summary of the available yield for the Medina County Regional ASR Project WMS. Delivery volumes for project participants are summarized in Table 5.2.22-2.

Table 5.2.22-1 Available Yield for the Medina County Regional ASR Project (acft/yr)

WMS	2030	2040	2050	2060	2070	2080
Medina County Regional ASR Project	0	6,250	6,250	6,250	6,250	12,500

Table 5.2.22-2 Delivery Points and Annual Volumes for the Medina County Regional ASR Project (acft/yr)

Delivery Point	2030	2040	2050	2060	2070	2080
Benton City WSC	0	1,767	1,767	1,767	1,767	3,534
Castroville	0	268	268	268	268	536
Devine	0	439	439	439	439	878
East Medina County SUD*	0	870	870	870	870	1,740
Hondo	0	915	915	915	915	1,830
La Coste	0	123	123	123	123	246
Lytle	0	403	403	403	403	806
Natalia	0	151	151	151	151	302
West Medina WSC	0	121	121	121	121	242
Yancey WSC*	0	1,193	1,193	1,193	1,193	2,386
Total	**0**	**6,250**	**6,250**	**6,250**	**6,250**	**12,500**

* For Regional Water Planning purposes, Yancey WSC and East Medina County SUD are the WMS sponsors and the other WUGs are considered customers.

The majority of project participants currently obtain Edwards Aquifer water, permitted through EAA. For Phase 1, the source water will include solely Edwards Aquifer water; Phase 2 may include a combination of Edwards Aquifer and other sources, such as surface water from Medina Lake. When project participants have excess treated water, it will be conveyed to the ASR well field for injection via the proposed ASR wells. Injected water will be stored in the saline portion of the Trinity Aquifer. When demands exceed supplies, water will be recovered from the ASR wells for treatment on-site and distribution into project participants' distribution systems. A new 18 MGD conventional WTP is proposed for Phase 1 and will be sited at the ASR well field. Phase 2 will include an 18 MGD WTP expansion, yielding a total WTP capacity of 36 MGD.

Each of the wells is anticipated to have a depth of 3,100 feet with a peak recovery capacity of approximately 1,350 gpm and a recharge capacity of about 1,000 gpm. The loss of ASR water is assumed to be zero for the purpose of this WMS modeling, but further study is recommended. Phase 1 of the project is expected to consist of 10 wells, with nine ASR wells for recharge and recovery and one monitoring well. Phase 2 will include an additional nine ASR wells, bringing the total project's ASR well field to 19 wells. The number of wells may change in the future, depending on site-specific recharge and recovery rates or other factors. The target storage volume is 63,700 acft, which includes approximately 60,000 acft of stored water and 3,700 acft of buffer zone volume that will remain within the aquifer.

5.2.22.3 Environmental Factors

The Medina County Regional ASR Project was evaluated to determine its potential impacts on environmental factors. Table 5.2.22-3 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.22-3 Summary of Potential Project Effects on Environmental Factors for the Medina County Regional ASR Project

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	3,284
Potential Species Impact Score	5
Potential Habitat Impact Score	2
Potential Stream Construction Impact Score	2
Potential Stream Flow / Water Quality Impact Score	2
Potential Cultural Resources Impact Score	144

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project area occurs in the Southern Plains and Texas Blackland Prairie ecoregions and is comprised of eight project sites in Medina County. The area contains a mixture of herbaceous and woody vegetation, mostly paralleling existing roads. As mapped by TPWD [1], dominant vegetation types in the project vicinity are row crops, barren, disturbance/tame grassland, urban, riparian forest/herbaceous, and various types of Edwards Plateau, Native Invasive, Post Oak Savanna, and South Texas shrublands and woodlands. Areas mapped as urban, barren, and row crops are not likely to contain significant amounts of native vegetation.

Based on TPWD vegetation mapping in the general project area, the project may have the potential to impact 3,284 acres of agricultural resources, including 1,078 acres mapped as row crops and 2,206 acres mapped as tame, disturbance, and savanna grasslands which may include pasture areas used for grazing or hay production.

Aquatic Resources

According to the NHD, the project area crosses segments of 22 streams/rivers. These include the Medina River, Chacon Creek, Deep Creek, East Prong Fort Ewell Creek, Hondo Creek, Mesquite Creek, San Francisco Perez Creek, Second Creek, Verde Creek, West Branch Live Oak Creek, West Prong

[1] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/.

Atascosa River, and West Prong Fort Ewell Creek. The NWI mapping shows small areas (62.3 acres) mapped as wetlands or ponds. The Texas Integrated Report of 303(d) listed water bodies [2] identifies the water bodies or segments in Texas that do not meet assigned water quality standards. The Medina River below Medina Diversion Lake, Chacon Creek, and Hondo Creek are classified as an impaired stream segment. The project area does not contain ecologically significant stream segments as designated by TPWD.

The project will require an on-site delineation of streams, ponds, and wetlands. Well facilities can typically be sited to avoid impacts to waters of the United States, including wetlands. Stream crossings for pipeline construction will result in temporary stream impacts that may require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including if there will be permanent impacts to over 0.1 acre of waters of the United States. The USACE permit requires that there will be no change in pre-construction contours of waters of the United States. Utility crossings under streams (e.g., through horizontal directional drilling) will not require a USACE permit. Although the proposed project is an off-channel reservoir, streams/wetlands affected by reservoir development, if applicable, will require appropriate USACE permitting depending on impacts.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that may occur in Medina County [3, 4]. Suitable habitat may occur for the federally listed endangered golden-cheeked Warbler (*Setophaga chrysoparia*) in the Edwards Plateau Woodlands of the project area. Suitable subterranean habitat within the Edwards Aquifer may occur for the Peck's cave amphipod (*Stygobromus pecki*) throughout the project area. Suitable habitat may occur for the federally endangered black lace cactus (*Echinocereus reichenbachii var albertii*) in the open grasslands and savannas of central and southeast Medina County. Suitable habitat may occur for the federal candidate for listing monarch butterfly (*Danaus plexippus*) in the grasslands, savannas, woodlands, forests, and riparian areas of the project area.

Because of the existing agricultural development in the project area, suitable habitat is not expected to occur for most state-listed species; however, there is potential suitable habitat for species that utilize open, sparsely vegetated areas, and wooded areas such as the state-threatened Texas horned lizard (*Phrynosoma cornutum*) and Texas tortoise (*Gopherus berlandieri*). There is low to moderate potential for suitable habitat for numerous wildlife and plant species designated by TPWD as SGCN. In addition, several bat SGCN species may utilize structures and could, therefore, occur in developed areas. SGCN species do not have formal protected status but are being monitored by TPWD.

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[2] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir.

[3] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Medina County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[4] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List. https://ipac.ecosphere.fws.gov/location/index.

Site-specific field surveys will be required to determine the quality of habitat and potential for impacts to federal and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be required to obtain its recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat is present, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may occur and nest in the project area. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or to avoid vegetation clearing during the general bird nesting season from March 15 to September 15. Although it is no longer on the federal endangered species list, the bald eagle is protected by the federal Bald and Golden Eagle Protection Act, which prohibits impacts to the eagles unless permitted by USFWS. Preconstruction surveys for active bird nests and presence of eagles are recommended.

Cultural Considerations

For the linear portion of the project (i.e., project alignment), a background literature review was performed for the alignment in addition to a 300-foot radius around the project alignment. A background literature review was also performed for the well field area (i.e., project area). The background literature review identified two cultural resources within the approximate 5,611-acre project area and alignment, as shown in Table 5.2.22-4 [5]. These cultural resources include one vicinity cemetery (Seekatz Family [ME-C056]) and one historic trail (El Camino Real de Los Tejas). Additionally, the historical map review identified 94 potential historic-age structures that intersect with the project area and alignment or are immediately adjacent (i.e., within 300 feet) to the project's pipeline alignment [6].

Vicinity cemeteries are very general areas where a cemetery location was reported at one time, but the exact location is unknown or could not be confirmed. If project impacts are to occur near the vicinity cemetery location, further work (e.g., pedestrian survey and/or metal detecting) or construction monitoring might be needed to ensure human burials are not present in the project area and alignment. In the State of Texas, all human burials are protected by law [7], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project area and alignment and the remains are determined to be Native American, they will be handled in accordance with procedures established through coordination with the THC, and work in the affected area could only resume per THC authorization.

A probability model was used to assess the overall potential of buried prehistoric archaeological deposits in the project area and alignment, which included low, medium, and high potential zones. The model indicated that 22.4% of the project area and alignment had a high likelihood of containing

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[5] Texas Historical Commission (THC). 2024. *Texas Archeological and Historical Sites Atlas.* Available at: https://atlas.thc.texas.gov/. Accessed October 2024.

[6] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed October 2024.

[7] As per the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

significant unidentified archaeological resources, 61.7% had a moderate likelihood, and 15.9% had a low likelihood. Areas with higher archaeological probability were considered to have been located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project area and alignment that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area and alignment. Next, the cultural resources within the project area and alignment were evaluated according to its NRHP eligibility and SAL designation. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts and properties or archaeological sites, SALs, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 points. In addition, Recorded Texas Historical Landmarks, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. For cultural resources with multiple resource types, the values of each resource type were calculated and used to determine the overall assessment score. The points for all cultural resources within the project area and alignment were tabulated and added to the mean score for a total cultural assessment score (See Table 5.2.22-4). Based on this methodology, the overall calculated cultural resources assessment score for this project equaled 144.

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, one vicinity cemetery, one historic trail, and 94 potential historic-age structures are located within the project area and alignment; the probability model indicates a moderate to high likelihood of buried deposits; and the project assessment score is 144. Based on these results, cultural resources assessment for the final design plan is likely necessary.

Table 5.2.22-4 Cultural Resources Results Factors for the Medina County Regional ASR Project

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Seekatz Family	Vicinity Cemetery	Historic	Undetermined	Intersect
El Camino Real de Los Tejas	Historic trail	Historic	Listed (segments)	Intersect
None (N=94)	Buildings / Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**144**

5.2.22.4 Engineering and Costing

Preliminary engineering and costing analyses have been performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required for water recharge, recovery, collection, treatment, and conveyance. Water treatment will require a conventional WTP to treat recovered water from the ASR system. Costs for interconnection booster pump stations were provided by project sponsors.

A cost estimate summary for Phase 1 (expected implementation in 2040) is provided in Table 5.2.22-6 and for Phase 2 (expected implementation in 2080) is provided in Table 5.2.22-7. A total project cost estimate summary for the Medina County Regional ASR Project is provided in Table 5.2.22-5.

Table 5.2.22-5 Cost Estimate Summary for the Medina County Regional ASR Project – Phase 1

Item	Estimated Costs
Pump Stations (20.1 MGD)	$6,219,000
Transmission Pipeline (42 in. dia., 25.2 miles)	$53,217,000
Well Fields (Wells, Pumps, and Piping)	$57,954,000
New Water Treatment Plant (18 MGD)	$103,721,000
TOTAL COST OF FACILITIES	**$221,111,000**
- Planning (3%)	$6,382,000
- Design (7%)	$14,892,000
- Construction Engineering (1%)	$2,127,000
Legal Assistance (2%)	$4,255,000
Fiscal Services (2%)	$4,255,000
Pipeline Contingency (15%)	$6,726,000
All Other Facilities Contingency (20%)	$33,579,000
Environmental & Archaeology Studies and Mitigation	$1,092,000
Land Acquisition and Surveying (62 acres)	$454,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$9,584,000
TOTAL COST OF PROJECT	**$304,457,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$21,422,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,028,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$155,000
Water Treatment Plant	$7,261,000
Pumping Energy Costs (7,550,757 kW-hr @ 0.09 $/kW-hr)	$680,000
TOTAL ANNUAL COST	**$30,546,000**
Available Project Yield (acft/yr)	6,250
Annual Cost of Water ($ per acft)*	$4,887
Annual Cost of Water After Debt Service ($ per acft)*	$1,460
Annual Cost of Water ($ per 1,000 gallons)*	$15.00
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$4.48
*Based on a Peaking Factor of 1.0	
One or more cost elements have been calculated externally	

Table 5.2.22-6 Cost Estimate Summary for the Medina County Regional ASR Project – Phase 2

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$54,475,000
Water Treatment Plant Expansion (18 MGD)	$43,858,000
TOTAL COST OF FACILITIES	**$98,333,000**
- Planning (3%)	$2,950,000
- Design (7%)	$6,883,000
- Construction Engineering (1%)	$983,000
Legal Assistance (2%)	$1,967,000
Fiscal Services (2%)	$1,967,000
All Other Facilities Contingency (20%)	$19,667,000
Environmental & Archaeology Studies and Mitigation	$311,000
Land Acquisition and Surveying (33 acres)	$238,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$4,333,000
TOTAL COST OF PROJECT	**$137,632,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$9,684,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$545,000
Water Treatment Plant	$3,070,000
Pumping Energy Costs (85,605 kW-hr @ 0.09 $/kW-hr)	$8,000
TOTAL ANNUAL COST	**$13,307,000**
Available Project Yield (acft/yr)	6,250
Annual Cost of Water ($ per acft)*	$2,129
Annual Cost of Water After Debt Service ($ per acft)*	$580
Annual Cost of Water ($ per 1,000 gallons)*	$6.53
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$1.78
*Based on a Peaking Factor of 1.0	
One or more cost elements have been calculated externally	

Table 5.2.22-7 Total Project Cost Estimate Summary for the Medina County Regional ASR Project – Phases 1 and 2

Item	Estimated Costs
Pump Stations (20.1 MGD)	$6,219,000
Transmission Pipeline (42 in. dia., 25.2 miles)	$53,217,000
Well Fields (Wells, Pumps, and Piping)	$112,429,000
Water Treatment Plants (New 18 MGD and Expansion 18 MGD)	$147,580,000
TOTAL COST OF FACILITIES	**$319,445,000**
- Planning (3%)	$9,332,000
- Design (7%)	$21,775,000
- Construction Engineering (1%)	$3,111,000
Legal Assistance (2%)	$6,221,000
Fiscal Services (2%)	$6,221,000
Pipeline Contingency (15%)	$6,726,000
All Other Facilities Contingency (20%)	$53,246,000
Environmental & Archaeology Studies and Mitigation	$1,402,000
Land Acquisition and Surveying (95 acres)	$692,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$13,916,000
TOTAL COST OF PROJECT	**$442,087,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$31,106,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,573,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$155,000
Water Treatment Plant	$10,331,000
Pumping Energy Costs (15,255,604 kW-hr @ 0.09 $/kW-hr)	$1,373,000
TOTAL ANNUAL COST	**$44,538,000**
Available Project Yield (acft/yr)	12,500
Annual Cost of Water ($ per acft)*	$3,563
Annual Cost of Water After Debt Service ($ per acft)*	$1,074
Annual Cost of Water ($ per 1,000 gallons)*	$10.93
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$3.30
*Based on a Peaking Factor of 1.0	
One or more cost elements have been calculated externally	

5.2.22.5 Implementation Considerations

Implementation of the Medina County Regional ASR Project includes the following considerations:

- TCEQ:
  - USACE Sections 10 and 404 dredge and fill permits;
  - TCEQ Class V injection well permit for ASR wells. Key requirements for permits to construct and operate a Class V injection well are mechanical integrity of the well, pollution control, demonstration of recoverability in the permitting process, and periodic reports.
- EAA:
  - An authorization from or interlocal agreement with EAA may be necessary.
  - EAA construction permits for each individual ASR well must comply with EAA specifications. Coordination with EAA is recommended, as additional requirements may be required.
- It may be necessary to obtain the following permits or authorizations for the project:
  - USACE Sections 10 and 404 dredge and fill permits;
  - TCEQ stormwater permit for construction activities;
  - GLO sand and gravel removal permits;
  - GLO easement for use of state-owned land; and
  - TPWD sand, gravel, and marl permit.
- Acquisition of private land for construction of new facilities through either negotiations or condemnation.
- Additional studies, investigations, and/or agency coordination will be necessary prior to full implementation, including but not limited to the following:
  - Feasibility studies;
  - ASR well testing and monitoring;
  - ASR cycle testing;
  - Design of infrastructure;
  - Local coordination with municipalities, county, or railroads for roadway, railroad, and utility crossings;
  - Environmental studies;
  - Potential stream/wetland mitigation plans;
  - Site-specific protected species habitat evaluations and presence/absence surveys; and
  - Cultural resources surveys.

5.2.23 NBU ASR Project

The SCTRWPG identified the NBU ASR Project WMS as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.23.1 Description of Water Management Strategy

To firm up its existing water supply, NBU plans to develop an ASR project (utilizing dual-purpose wells) to its water system [1]. The NBU ASR Project WMS is designed to accomplish the following:

- Provide a long-term supply during DOR;
- Provide an opportunity to increase utilization of existing permits, which postpones acquisition of new water supplies;
- Defer construction of a second WTP;
- Meet seasonal demands when restrictions are imposed;
- Meet demands at the ends of the distribution system;
- Provide an emergency supply;
- Minimize construction of new facilities;
- Provide for efficient use of existing distribution system; and
- Minimize environmental impacts.

Like any ASR project, the purpose is to store water during times of plenty and to recover the water during times of shortage. The NBU ASR Project was designed to consider both the short-term and long-term timeframes. For the short-term or annual cycle, water is stored during winter and spring and recovered during the summer. For the long-term or multi-year cycle, water is stored over several years or even decades to provide emergency supply during a major drought.

The proposed ASR wells are located on property owned by NBU and the City of New Braunfels (City), near the New Braunfels Regional Airport in Guadalupe County. The ASR wells are located in the saline portion of the Edwards Aquifer (Figure 5.2.23-1). The ASR project is currently in the demonstration phase. One ASR well has been completed to the upper saline zone of the Edwards Aquifer. This first well is planned to be drilled to the lower saline zone in the near future. Findings from the first two rounds of cycle testing suggest that injecting water into both the upper and lower saline zones will ensure the delivery of a higher quantity of fresh water.

[1] New Braunfels Utilities, June 2018, 2018 Water Resources Plan, Executive Summary.

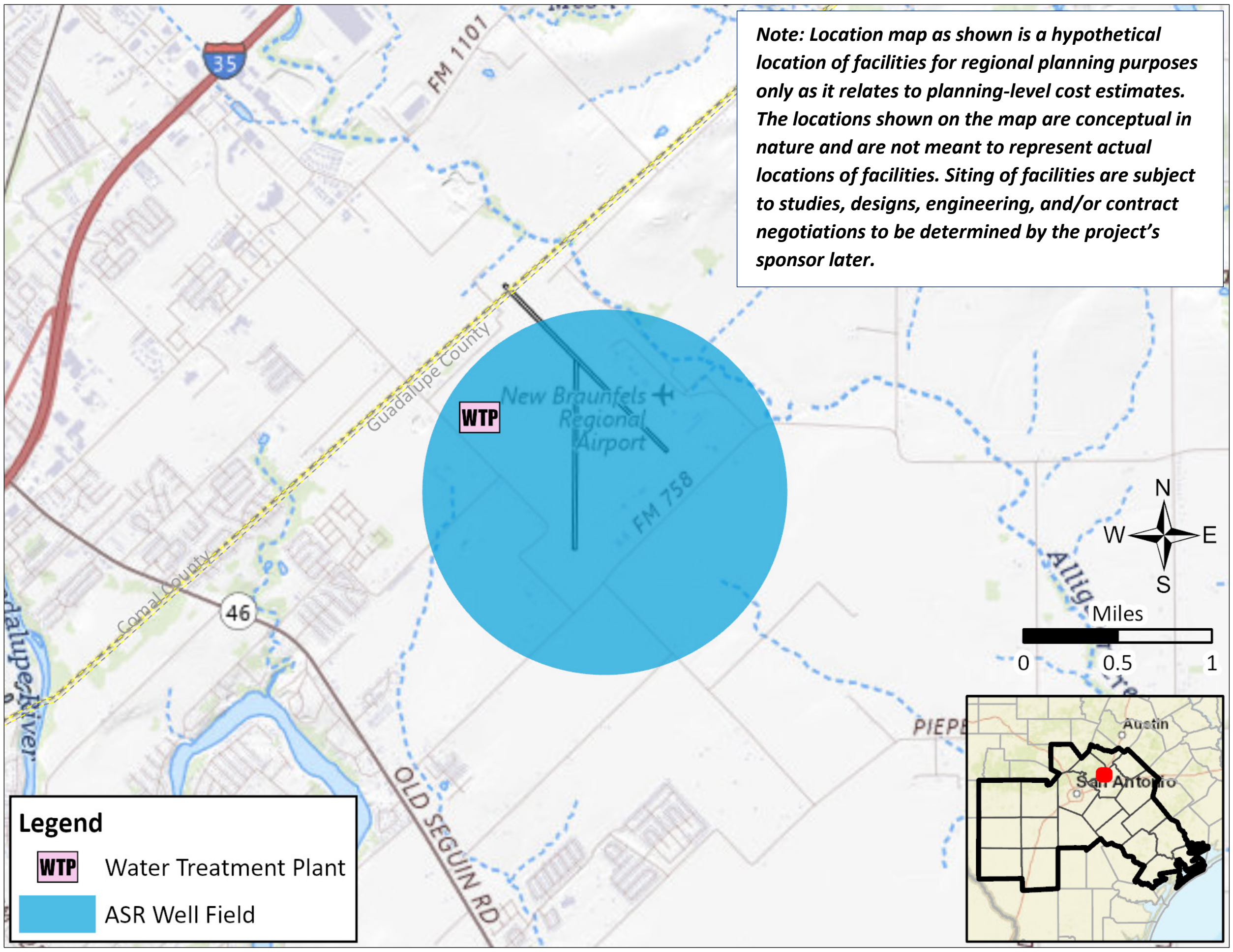

Figure 5.2.23-1 Approximate Location of the NBU ASR Project

5.2.23.2 Available Yield

This WMS has a firm yield of 7,000 acft/yr and is planned for full completion by 2030. Table 5.2.23-1 provides a summary of the available yield for the NBU ASR Project WMS.

Table 5.2.23-1 Available Yield for the NBU ASR Project (acft/yr)

WMS	2030	2040	2050	2060	2070	2080
NBU ASR Project	7,000	7,000	7,000	7,000	7,000	7,000

NBU obtains water from multiple sources, including surface water from the Guadalupe River, stored water contracts from Canyon Reservoir, and groundwater from the Edwards Aquifer. When NBU has excess treated water in its distribution system, that water will be injected via the proposed ASR wells for storage in the saline portion of the Edwards Aquifer. NBU will be able to recover the stored water for on-site re-disinfection treatment and distribution into its system.

The project will consist of up to nine ASR wells for recharge and recovery. Each of the wells is anticipated to have a recovery capacity of about 694 gpm and a recharge capacity of about 347 gpm. The loss of ASR water is assumed to be zero for the purpose of this WMS modeling, but further study is recommended.

The project will increase NBU's firm supply incrementally by 7,000 acft/yr. The stored water volume of water within the aquifer will be 7,000 acft with an additional 7,000 acft buffer zone volume that would remain in the aquifer, resulting in a target storage volume of 14,000 acft.

The NBU ASR Project is designed to work in conjunction with the NBU Surface Water Treatment Plant expansion, included in the Facilities Expansion WMS (refer to Section 5.2.8), which is designed to provide increased capacity to treat water for storage in the ASR project.

5.2.23.3 Environmental Factors

The NBU ASR Project was evaluated to determine its potential impacts on environmental factors. Table 5.2.23-2 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.23-2 Summary of Potential Project Effects on Environmental Factors for the NBU ASR Project

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	1,714
Potential Species Impact Score	2
Potential Habitat Impact Score	2
Potential Stream Construction Impact Score	0
Potential Stream Flow / Water Quality Impact Score	1
Potential Cultural Resources Impact Score	132

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project area occurs in the Blackland Prairie ecoregion and is generally situated in and near the New Braunfels Regional Airport. The area appears to contain little woody vegetation. As mapped by TPWD [2], dominant vegetation types in the project vicinity are row crops, disturbance/tame grassland, and urban, with small areas mapped as floodplain herbaceous vegetation and mesquite shrubland. Areas mapped as industrial (airport) and row crops are not likely to contain significant amounts of native vegetation.

Based on TPWD vegetation mapping in the general project area, the project may have the potential to impact 1,714 acres of agricultural resources, including 1,045 acres mapped as row crops and 669 acres mapped as tame/disturbance grassland which may include pasture areas used for grazing or hay production.

[2] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/.

Aquatic Resources

According to the NHD, Alligator Creek, an intermittent stream with associated floodplain, runs along the northeastern edge of the project area. The NWI mapping shows small areas (less than 10 acres) mapped as wetlands or ponds. The Texas Integrated Report of 303(d) listed water bodies [3] identifies the water bodies or segments in Texas that do not meet assigned water quality standards. Alligator Creek is not classified as an impaired stream segment. Geronimo Creek, which occurs just downgradient to the southwest of the project area, is listed as impaired. The project area does not contain ecologically significant stream segments as designated by TPWD; however, Geronimo Creek just downgradient is designated as an ecologically significant stream.

The project will require an on-site delineation of streams, ponds, and wetlands. Well facilities can typically be sited to avoid impacts to waters of the United States, including wetlands.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened, endangered, and candidate species and species of concern that may occur in Guadalupe County [4, 5]. Suitable habitat does not occur for any of the federally listed threatened or endangered species. However, the habitat for the monarch butterfly (*Danaus plexippus*), which is a candidate species for listing as federally threatened or endangered, is suitable.

Because of the existing agricultural and industrial development in the project area, suitable habitat is not expected to occur for most state-listed species; however, habitat for species that utilize open, sparsely vegetated areas, such as the state-threatened Texas horned lizard (*Phrynosoma cornutum*) is potentially suitable.

The potential for suitable habitat for several wildlife species designated by TPWD as SGCN is low to moderate: Strecker's chorus frog (*Pseudacris streckeri*), Woodhouse's toad (*Anaxyrus woodhousii*), eastern spotted skunk (*Spilogale putorius*), plains spotted skunk (*Spilogale interrupta*), western spotted skunk (*Spilogale gracilis*), and eastern box turtle (*Terrepene carolina*). In addition, several bat SGCN species may utilize structures and could, therefore, occur in developed areas. The likelihood of occurrence of the SGCN plant species low spurge (*Euphobia peplidion*) and parks jointweed (*Polygonella parksii*) is low. SGCN species do not have formal protected status but are being monitored by TPWD.

Site-specific field surveys would be required to determine the quality of habitat and potential for impacts to state-listed species and confirm lack of suitable habitat for federally threatened and endangered species. Coordination with TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD would likely be required to obtain its recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat is present, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

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[3] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d)*. https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir.

[4] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Guadalupe County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[5] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Guadalupe County. https://ipac.ecosphere.fws.gov/location/index .

Migratory birds may nest in the project area. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or to avoid vegetation clearing during the general bird nesting season from March 15 to September 15.

Cultural Considerations

The background literature review identified two cultural resources that intersect with the approximate 1,882-acre project area, as shown in Table 5.2.23-3. The cultural resources consist of two historic-age archaeological sites (i.e., 41GU45 and 41GU236) that are located in the northwestern and southeastern portions of the project area [6]. One of these sites is ineligible (i.e., 41GU236) for listing on the NRHP, and the other remains undetermined (i.e., 41GU45) for listing on the NRHP. Additionally, the historical map review identified 85 potential historic-age structures that intersect with the project area [7].

A probability model was used to assess the overall archaeological site potential, which included low, medium, and high potential zones. The model indicated that 14% of the project area had a high likelihood of containing significant unidentified archaeological resources and 86% had a moderate likelihood. No areas were identified by the model as having a low probability. Areas with greater archaeological probability are located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project area that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area. Next, the cultural resources within the project area were evaluated according to its NRHP eligibility. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts, properties or archaeological sites, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. The points for all cultural resources within the project area were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for the project equaled 132.

Table 5.2.23-3 Cultural Resources Results for the NBU ASR Project

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Archaeological Site (41GU45)	Trash Scatter	Historic	Undetermined (THC 6/24/1998)	Intersect
Archaeological Site (41GU236)	Farmstead	Historic	Ineligible (THC 5/26/2023)	Intersect
None (N=85)	Buildings/Structures	Historic	–	Intersect

[6] Texas Historical Commission (THC). 2024. *Texas Archeological and Historical Sites Atlas.* Available at: https://atlas.thc.texas.gov/. Accessed July 2024.
[7] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed September 2024.

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Assessment Score Total	**All**	**All**	**All**	**132**

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, two archaeological sites and 85 potential historic-age structures are located within the project area; the probability model indicates a moderate to high likelihood of buried deposits; and the project assessment score is 132. Based on these results, a cultural resources assessment for the final design plan is likely necessary.

5.2.23.4 Engineering and Costing

Preliminary engineering and costing analyses were performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required for water recharge, recovery, collection, and treatment. Water treatment will require standard disinfection to treat recovered water from the ASR system. A cost estimate summary for the NBU ASR Project is provided in Table 5.2.23-4.

Table 5.2.23-4 Cost Estimate Summary for the NBU ASR Project

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$22,416,000
Water Treatment Plant (6.3 MGD)	$446,000
Integration, Relocations, Backup Generator & Other	$3,042,000
TOTAL COST OF FACILITIES	**$25,904,000**
Planning (3%)	$777,000
Design (7%)	$1,813,000
Construction Engineering (1%)	$259,000
Legal Assistance (2%)	$518,000
Fiscal Services (2%)	$518,000
All Other Facilities Contingency (20%)	$5,181,000
Environmental & Archaeology Studies and Mitigation	$463,000
Land Acquisition and Surveying (63 acres)	$36,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,153,000
TOTAL COST OF PROJECT	**$36,622,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$2,577,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$255,000
Water Treatment Plant	$268,000
Pumping Energy Costs (13,524,835 kW-hr @ 0.09 $/kW-hr)	$1,217,000
TOTAL ANNUAL COST	**$4,317,000**
Available Project Yield (acft/yr)	7,000
Annual Cost of Water ($ per acft)*	$617
Annual Cost of Water After Debt Service ($ per acft)*	$249
Annual Cost of Water ($ per 1,000 gallons)*	$1.89
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.76
*Based on a Peaking Factor of 1.0	

5.2.23.5 Implementation Considerations

Implementation of the NBU ASR Project includes the following considerations:

- TCEQ:
  - An ASR well is authorized as a Class V injection well. Key requirements for permits to construct and operate a Class V injection well are mechanical integrity of the well, pollution control, demonstration of recoverability in the permitting process, and periodic reports.
  - Under recent legislation related to the Edwards Aquifer (Balcones Fault Zone), the source water for injection into an ASR well in NBU’s proposed project area can be blended water directly from NBU’s distribution system.
  - The run-of-the-river permits will not need to be amended for injection and recovery operations.
- EAA:
  - NBU has an interlocal contract with EAA that provides the authorizations needed to implement the ASR project in measured phases.
  - NBU’s contractor(s) will obtain construction permits for each individual ASR well based on the final design of the well, which must meet EAA’s standard requirements.
- It may be necessary to obtain the following permits or authorizations for the project:
  - USACE Sections 10 and 404 dredge and fill permits;
  - TCEQ stormwater permit for construction activities;
  - GLO sand and gravel removal permits;
  - GLO easement for use of state-owned land; and
  - TPWD sand, gravel, and marl permit.
- Additional studies, investigations, and/or agency coordination will be necessary prior to full implementation, including but not limited to the following:
  - Feasibility studies;
  - ASR well testing and monitoring;
  - ASR cycle testing;
  - Design of infrastructure;
  - Local coordination with municipalities, county, or railroads for roadway, railroad, and utility crossings;
  - Environmental studies;
  - Potential stream/wetland mitigation plans;
  - Site-specific protected species habitat evaluations and presence/absence surveys; and
  - Cultural resources surveys.

5.2.24 NBU Trinity Well Field Expansion

The SCTRWPG identified the NBU Trinity Well Field Expansion WMS as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.24.1 Description of Water Management Strategy

In 2023, NBU began construction to expand the existing Trinity well field. The proposed site of the Trinity well field is on the northwest side of the City of New Braunfels (City). More specifically, it is in the vicinity of Loop 377 and Oak Run Parkway and on property owned by NBU. A well field consisting of four wells is already on this site and is set to be expanded upon. The project includes drilling three additional groundwater wells, installing conveyance piping to the water treatment plant, expanding the existing treatment facility (membranes), store additional capacity in an additional ground storage tank, and distribute additional flows with an expanded pump station (Figure 5.2.24-1).

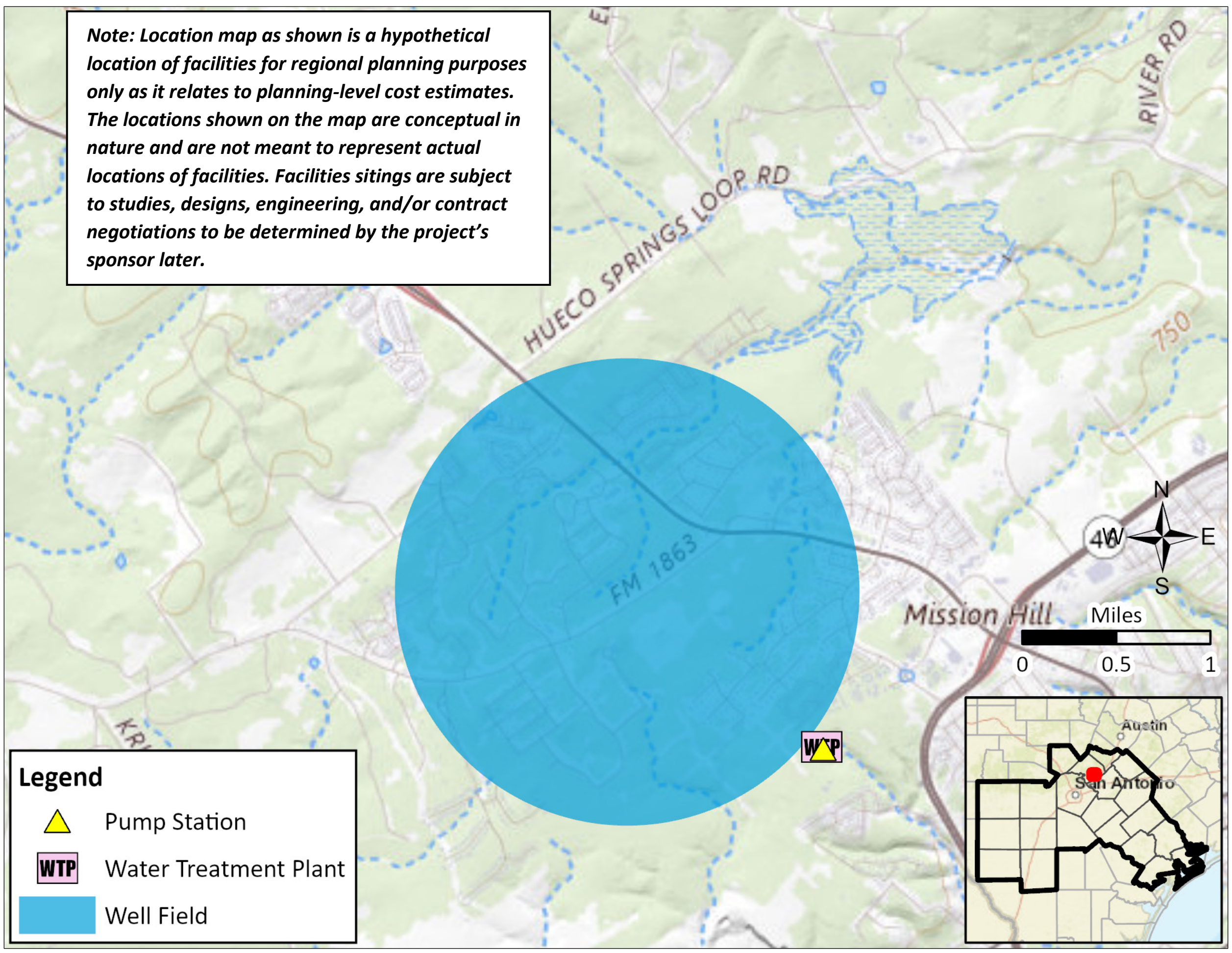

Figure 5.2.24-1 Approximate Location for the NBU Trinity Well Field Expansion WMS

Currently, four wells have been drilled. Wells 20, 21, and 22 are anticipated to produce 1.2 MGD, 1.2 MGD, and 1.4 MGD, respectively. Well 23 was found to be a low producing well and is anticipated to be plugged in 2024. Final production rates will be confirmed once the wells are commissioned, permitted, and placed into service in late 2025.

The adjacent water treatment facility expansion includes expanded treatment equipment, additional ground storage tank, and expanded pump station. Facility construction is anticipated to be completed and permitted by Summer 2025. Flows from the facility storage will add resilience and provide potable water to additional customers.

5.2.24.2 Available Yield

This WMS is planned for implementation in the 2030 decade and has a yield of 3,900 acft/yr. Table 5.2.24-1 provides a summary of the yield requested by the WMS sponsor and the available yield for the NBU Trinity Well Field Expansion WMS.

Table 5.2.24-1 Available Yield for the NBU Trinity Well Field Expansion WMS (acft/yr)

WMS	2030	2040	2050	2060	2070	2080
NBU Trinity Well Field Expansion WMS	3,900	3,900	3,900	3,900	3,900	3,900

The project will expand the well field from four wells to seven wells, and increase the supply of the Trinity well field from 3,900 acft/yr to 7,800 acft/yr. For purposes of this WMS, it is assumed that three wells are feasible and that each well has a peak capacity of 1.2 mgd, a depth of 620 feet.

An assessment of groundwater availability consists of calculating a water balance of the Trinity Aquifer in Comal County between the supply, as determined from the MAG, and the estimated demands from current users. The MAG for the Trinity Aquifer in Comal County is 43,088 acft/yr for 2030 [1, 2]. This strategy is located within the boundaries of the Comal Trinity GCD; but because this is a new GCD, they have not implemented any type of permitting system at this time. This strategy is planned for implementation beginning in the 2030 decade (Table 5.2.24-1).

5.2.24.3 Environmental Factors

The project was evaluated to determine its potential impacts on environmental factors. Table 5.2.24-2 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent sections.

[1] 2021. Modeled Available Groundwater for Relevant Aquifers by County in Groundwater Management Area 10: Texas Water Development Board. https://www.twdb.texas.gov/groundwater/dfc/docs/summary/GMA10_MAGsbyCounty_2021.pdf?d=14134.199999988079.

[2] 2021. Modeled Available Groundwater for Relevant Aquifers by County in Groundwater Management Area 9: Texas Water Development Board. https://www.twdb.texas.gov/groundwater/dfc/docs/summary/GMA9_MAGsbyCounty_2021.pdf.

Table 5.2.24-2 Summary of Potential Project Effects on Environmental Factors for the NBU Trinity Well Field Expansion WMS

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	0
Potential Species Impact Score	7
Potential Habitat Impact Score	2
Potential Stream Construction Impact Score	0
Potential Stream Flow / Water Quality Impact Score	1
Potential Cultural Resources Impact Score	218.5

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project area occurs in the Balcones Canyonlands Level IV ecoregion and most of the project vicinity contains residential and commercial development. As mapped by TPWD [3], the dominant vegetation types in the project vicinity are Ashe juniper motte and woodland, urban, deciduous oak/evergreen motte and woodland, savanna grassland, deciduous woodland, and Ashe juniper/live oak shrubland. Since the existing project land use is a well field, the project area likely does not contain significant amounts of native vegetation, although fields and woody vegetation occur nearby.

Based on TPWD vegetation mapping, the project is unlikely to affect agricultural resources as the project area does not contain mapped row crops or tame/disturbance grassland that may include pasture areas used for grazing or hay production.

Aquatic Resources

According to NHD, no streams are mapped in the project area. The NWI mapping shows areas in the project vicinity, approximately 16 acres, mapped as ponds/potential wetlands. The Texas Integrated Report of 303(d)-listed water bodies [4] identifies the water bodies or segments in Texas that do not meet assigned water quality standards. Streams within the project area are not listed as impaired. The project area does not contain ecologically significant stream segments as designated by TPWD.

The project has a low likelihood of affecting ponds or wetlands. Well facilities can typically be sited to avoid impacts to waters of the United States, including wetlands.

The project area occurs in the Edwards Aquifer Recharge Zone. Project activities will need to comply with TCEQ Edwards Aquifer Protection Program regulations, and the project area may require a geologic assessment.

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[3] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/

[4] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that may occur in Comal County. Suitable habitat may occur for the federally endangered golden-cheeked warbler (*Setophaga chrysoparia*), federally proposed endangered tricolored bat (*Perimyotis subflavus*), and candidate monarch butterfly (*Danaus plexippus*) [5]. Federally endangered karst invertebrates are not known to occur in Comal County; however, a portion of the project area occurs in karst Zone 3a. Zone 3a is defined as areas suitable for troglobitic species but which have a low probability of containing listed karst species because the habitat is occupied by other troglobitic species. Thus, the likelihood of occurrence of endangered karst invertebrates in the project area is low.

Because of the existing development in and around the project area, suitable habitat is not expected to occur for most state-listed species; however, the habitat in the project vicinity for species that utilize open fields and shrublands such as the state-threatened Texas horned lizard (*Phrynosoma cornutum*) and Texas tortoise (*Gopherus berlandieri*) is potentially suitable [6].

The potential for suitable habitat in the project vicinity for several wildlife species designated by TPWD as SGCN, including American bumblebee (*Bombus pensylvanicus*), plains spotted skunk (*Spilogale interrupta*), western spotted skunk (*Spilogale gracilis*), plateau spot-tailed earless lizard (*Holbrookia lacerata*), and western box turtle (*Terrapene ornata*) is low to moderate. In addition, SGCN bat species may utilize structures and could therefore occur in developed areas. The potential of occurrence of the SGCN plant species tree dodder (*Cuscuta exaltata*) is low. SGCN species do not have formal protected status but are being monitored by TPWD.

Site-specific and species-specific field surveys would be required to determine the quality of habitat and potential for impacts to federally and state-listed species. Coordination with UWFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD would likely be required to obtain their recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may nest in the project area. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15.

Cultural Considerations

The background literature review identified 33 cultural resources that intersect with the approximate 2,320-acre project area (Table 5.2.24-3). The cultural resources include six archaeological sites (i.e., 41CM298, 41CM303, 41CM358, 41CM359, 41CM360, and 41CM443), one cemetery (i.e., Brehmer Cemetery), three NRHP-listed districts (i.e., Mission Valley School and Teacherage, Pape-Brocher

[5] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation (IPaC) Resource List – Comal County. https://ipac.ecosphere.fws.gov/.

[6] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Comal County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

Homestead, and Walzem Homestead), and 10 NRHP-eligible properties [7,8]. As part of the NRHP-listed districts, Mission Valley School and Teacherage is also a Recorded Texas Historic Landmark (RTHL) and includes one historical marker and nine contributing resources within the limits of the project area; the Pape-Borchers Homestead is also an archaeological site (i.e., 41CM303) and includes four contributing resources within the limits of the project area; and the Walzem Homestead includes one contributing resource within the limits of the project area. Out of the total six archaeological sites within the project area, one is listed on the NRHP as part of a historic district (i.e., 41CM303), three are ineligible for listing on the NRHP (i.e., 41CM298, 41CM360, and 41CM443), and two remain undetermined (i.e., 41CM358, and 41CM359). Additionally, the historical map review identified 62 potential historic-age structures that intersect with the project area [9].

In the State of Texas, all human burials are protected by law [10], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project area and the remains are determined to be Native American, they will be handled in accordance with procedures established through coordination with the THC, and work in the affected area could only resume according to THC authorization.

A probability model was used to assess the overall archaeological site potential, which included low, medium, and high potential zones. The model indicated that 93% of the project area had a high likelihood of containing significant unidentified archaeological resources and 7% had a moderate likelihood. No areas were identified by the model as having a low probability. Areas with greater archaeological probability are located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project area that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area. Next, the cultural resources within the project area were evaluated according to its NRHP eligibility. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts, properties or archaeological sites, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 points. In addition, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. The points for all cultural resources within the project area were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for the project equaled 218.5.

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[7] Texas Historical Commission (THC). 2024. *Texas Archeological and Historical Sites Atlas.* Available at: https://atlas.thc.texas.gov/. Accessed July 2024.
[8] Texas Department of Transportation (TxDOT). 2024. TxDOT Historic Resources Aggregator, TxDOT Environmental Affairs Division. Austin, Texas Available at: https://txdot.maps.arcgis.com/apps/webappviewer/index.html?id=e13ba0aa78bf4548a8e98758177a8dd5. Accessed July 2024.
[9] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed September 2024.
[10] According to the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

Table 5.2.24-3 Cultural Resources Results for the NBU Trinity Well Field Expansion WMS

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Archaeological Site (41CM298)	Lithic Scatter/Quarry	Prehistoric	Ineligible (THC 11/3/2006)	Intersect
Archaeological Site (41CM358)	Lithic Scatter/Workshop Site	Prehistoric	Undetermined	Intersect
Archaeological Site (41CM359)	Lithic Scatter	Prehistoric	Undetermined	Intersect
Archaeological Site (41CM360)	Lithic Scatter	Prehistoric	Ineligible within ROW (THC 9/6/2022)	Intersect
Archaeological Site (41CM443)	Lithic Scatter/Quarry/ Historical Graffiti	Prehistoric and Historic	Ineligible within ROW (THC 12/17/2022)	Intersect
Brehmer Cemetery (CM-C194)	Cemetery	Historic	Undetermined	Adjacent
Mission Valley School and Teacherage	Historic District/Recorded Texas Historic Landmark/OTHM	Historic	Listed	Intersect
Cistern (1)	Historic Property (Contributing Resource)	Historic	Listed	Intersect
Cistern (2)	Historic Property (Contributing Resource)	Historic	Listed	Intersect
Garage	Historic Property (Contributing Resource)	Historic	Listed	Intersect
Outhouse (1)	Historic Property (Contributing Resource)	Historic	Listed	Intersect
Outhouse (2)	Historic Property (Contributing Resource)	Historic	Listed	Intersect
Playground	Historic Property (Contributing Resource)	Historic	Listed	Intersect
Shed	Historic Property (Contributing Resource)	Historic	Listed	Intersect
Teacherage	Historic Property (Contributing Resource)	Historic	Listed	Intersect
Woodshed	Historic Property (Contributing Resource)	Historic	Listed	Intersect
Pape-Borchers Homestead (41CM303)	Historic District/ Archaeological Site	Historic	Listed	Intersect
Garage	Historic Property (Contributing Resource)	Historic	Listed	Intersect

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Trough	Historic Property (Contributing Resource)	Historic	Listed	Intersect
Tractor Shed	Historic Property (Contributing Resource)	Historic	Listed	Intersect
Well House	Historic Property (Contributing Resource)	Historic	Listed	Intersect
Walzem Homestead	Historic District	Historic	Listed	Intersect
Stock Tank	Historic Property (Contributing Resource)	Historic	Listed	Intersect
Barn (1)	Historic Property	Historic	Eligible	Intersect
Barn (2)	Historic Property	Historic	Eligible	Intersect
Farmstead Bungalow	Historic Property	Historic	Eligible	Intersect
Garage	Historic Property	Historic	Eligible	Intersect
Molasses Shed	Historic Property	Historic	Eligible	Intersect
Open Air Tractor Shed	Historic Property	Historic	Eligible	Intersect
Original Farmstead Home	Historic Property	Historic	Eligible	Intersect
Rocky Pylons	Historic Property	Historic	Eligible	Intersect
Schuetzen Verein	Historic Property	Historic	Eligible	Intersect
Water Tank	Historic Property	Historic	Eligible	Intersect
None (N=62)	Buildings/Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**218.5**

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, five archaeological sites, three NRHP districts and 14 contributing resources, 10 NRHP-eligible properties, one cemetery, one historical marker, and 62 potential historic-age structures are located within the project area; the probability model indicates a high likelihood of buried deposits; and the project assessment score is 218.5. Based on these results, a cultural resources assessment for the final design plan is likely necessary as well as a buffer zone of at least 100 feet between the cemetery and the proposed development.

5.2.24.4 Engineering and Costing

Preliminary engineering and costing analyses have been performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required to deliver treated water to the existing water distribution system. The estimated costs for Environmental and Archaeology Studies and Mitigation were provided by NBU. A cost estimate summary for the NBU Trinity Well Field Expansion WMS is provided in Table 5.2.24-4.

Table 5.2.24-4 Cost Estimate Summary for the NBU Trinity Well Field Expansion WMS

Item	Estimated Costs
Pump Stations	$2,540,000
Well Fields (wells, pumps, and piping)	$3,762,000
Storage Tanks (other than at booster pump stations)	$3,763,000
Advanced Water Treatment Facility Expansion (3.6 MGD)	$24,629,000
Integration, Relocations, Backup Generator, and Other	$83,000
TOTAL COST OF FACILITIES	**$34,777,000**
Planning (3%)	$1,043,000
Design (7%)	$2,434,000
Construction Engineering (1%)	$348,000
Legal Assistance (2%)	$696,000
Fiscal Services (2%)	$696,000
All Other Facilities Contingency (20%)	$6,955,000
Environmental and Archaeology Studies and Mitigation	$150,000
Interest During Construction (3.5% for 1 year with a 0.5% ROI)	$1,528,000
TOTAL COST OF PROJECT	**$48,627,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,416,000
O&M	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$76,000
Intakes and Pump Stations (2.5% of cost of facilities)	$63,000
Advanced Water Treatment Facility	$4,121,000
Pumping Energy Costs (3,121,775 kWh at 0.09 $/kWh)	$281,000
TOTAL ANNUAL COST	**$7,957,000**
Available Project Yield (acft/yr)	3,900
Annual Cost of Water ($ per acft)*	$2,040
Annual Cost of Water After Debt Service ($ per acft)*	$1,164

Item	Estimated Costs
Annual Cost of Water ($ per 1,000 gallons)*	$6.26
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$3.57
*Based on a Peaking Factor of 1.04.	

5.2.24.5 Implementation Considerations

Implementation considerations for the NBU Trinity Well Field Expansion WMS include the following:

- TCEQ:
  - Review and approval of technical specifications for all new or rehabilitated components of the public water system;
  - Review and approval of facilities and water quality to begin operations; and
  - Review and approval of injection well permit.
- EAA:
  - Obtain a "Drilling Through the Edwards Aquifer" Well Construction Permit from the EAA for the construction of wells passing through the Edwards Aquifer;
  - Verify available groundwater quantity and well productivity;
  - Verify water quality; and
  - Verify minimal impacts to the aquifers, particularly as it relates to applicable DFCs.
- The Comal Trinity GCD regulates the Trinity Aquifer in Comal County. Thus, any local permits and approvals from the GCD are required.

5.2.25 SAWS Expanded Local Carrizo Project

The SCTRWPG identified the SAWS Expanded Local Carrizo Project as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.25.1 Description of Water Management Strategy

SAWS currently produces approximately 9,900 acft/yr of groundwater from the Carrizo Aquifer from wells located at the SAWS H_2Oaks Center in southern Bexar County[1]. This WMS includes expansion of the current well field to produce an additional 21,000 acft/yr of water from 12 new wells in the Carrizo-Wilcox Aquifer in Bexar County (Figure 5.2.25-1). The well fields would be located northeast of the H_2Oaks Center, where the groundwater will be treated for delivery through SAWS' distribution system. The project will be constructed in three phases, all of which are anticipated to be implemented by the 2030 decade. The wells will serve a dual function to both produce water from the Carrizo-Wilcox Aquifer and perform recharge and recovery of ASR water.

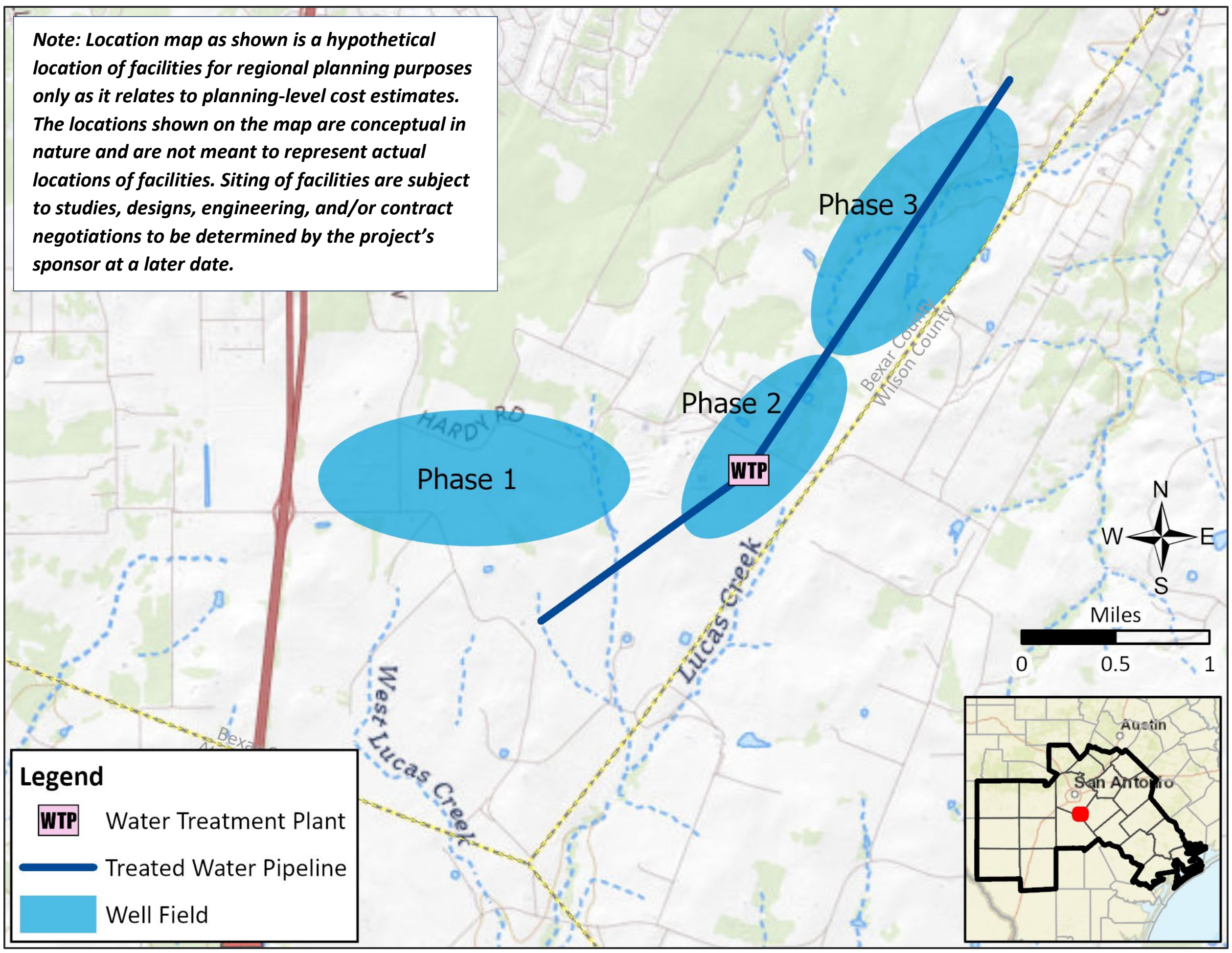

Figure 5.2.25-1 Approximate Location for the SAWS Expanded Local Carrizo Project

[1] SAWS Draft 2024 Water Management Plan. https://www.saws.org

5.2.25.2 Available Yield

The WMS includes development of additional fresh groundwater from the Carrizo Sands of the Carrizo-Wilcox Aquifer. Based on available hydrogeologic information [2], the SAWS Expanded Local Carrizo Project will consist of 12 wells constructed in three phases (Table 5.2.25-1). The expected depth for each new Carrizo Aquifer well will range from 550 to 850 feet below ground surface (average depth of 575 feet) and will produce approximately 1,400 gpm per well. The wells will be screened in the Carrizo Sand formation, just down-dip of the Carrizo Aquifer outcrop. Water in the Carrizo formation has a TDS concentration of less than 300 mg/L and relatively high concentrations of iron and manganese. Treatment will require iron and manganese removal at the H_2Oaks Center before being sent to the distribution system.

Table 5.2.25-1 SAWS Expanded Local Carrizo Project Phases

Phase	Number of Wells	Available Yield (acft/yr)	Implementation Decade
1	4*	7,000	2030
2	4*	7,000	2030
3	4	7,000	2030
Total	**12**	**21,000**	**2030**
* Includes one contingency well in this phase.			

Several SAWS projects are located in the vicinity of the SAWS Expanded Local Carrizo Project, including the following:

- The existing SAWS Local Carrizo Project;
- The existing SAWS Brackish Groundwater Project;
- The SAWS ASR project that stores Edwards Aquifer water in the Carrizo Aquifer;
- The planned SAWS Expanded Brackish Groundwater Project (refer to Section 5.2.26); and
- The planned SAWS Regional Wilcox Project (refer to Section 5.2.27).
- As part of future planning for this SAWS Expanded Local Carrizo Project, the cumulative effects of recharge operations and pumping will be thoroughly evaluated for SAWS operations and impacts to neighboring groundwater users. There is no local groundwater conservation district that regulates groundwater production or well spacing in the Carrizo Aquifer in Bexar County.

The Evergreen UWCD regulates groundwater production, well spacing, and other requirements in the Carrizo-Wilcox Aquifer in Bexar County. In 2021, GMA-13 established DFCs for the Carrizo-Wilcox Aquifer [3]. On the basis of the approved DFCs, the TWDB determined that the MAG estimate for the

[2] Schorr et al. 2023, Conceptual Model Report: Update to the Groundwater Availability Model for Southern Portion of the Carrizo-Wilcox, Queen City, and Sparta Aquifers. TWDB. https://www.twdb.texas.gov/groundwater/models/gam/czwx_s/South%20QCSCW%20ConceptualModelRpt_Final.pdf?d=53611.5

[3] Texas Water Development Board, Groundwater Management Area 13 – Desired Future Conditions. https://www.twdb.texas.gov/groundwater/dfc/docs/summary/GMA13_DFC_2021.pdf

Carrizo-Wilcox Aquifer in Bexar County is 67,849 acft/yr in 2080 [4]. Review of the TWBD historic groundwater pumping data for the entire Carrizo-Wilcox Aquifer in Bexar County indicates that production has been highly variable since 2008, ranging from less than 1,000 acft/yr to more than 10,000 acft/yr with no discernable trend. Even if the largest estimated historic production of 10,436 acft/yr is assumed, approximately 57,000 acft/yr is remaining of available MAG for additional projects.

5.2.25.3 Environmental Factors

The project was evaluated to determine its potential impacts on environmental factors. Table 5.2.25-2 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.25-2 Summary of Potential Project Effects on Environmental Factors for the SAWS Expanded Local Carrizo Project

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	1,270
Potential Species Impact Score	6
Potential Habitat Impact Score	1
Potential Stream Construction Impact Score	2
Potential Stream Flow / Water Quality Impact Score	1
Potential Cultural Resources Impact Score	60.5

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project is located in the Post Oak Savanna ecoregion. As mapped by the Texas Parks and Wildlife Department (TPWD) [5], the project area is primarily situated within savannah grassland vegetation communities. Small areas of woody vegetation are mapped, including live oak motte and woodland, post oak motte and woodland, and mesquite shrubland. The proposed pipeline crosses riparian vegetation zones identified and mapped by TPWD as riparian live oak forest, riparian deciduous shrubland, and riparian herbaceous vegetation.

Based on TPWD vegetation mapping, the project may have the potential to impact 27 acres of agricultural resources, including 13 acres of row crops and 14 acres mapped as Sandyland Grassland which may include pasture areas used for grazing or hay production.

The proposed well pads would result in conversion of land use from undeveloped vegetation or agricultural use (mostly open fields) to small areas of industrial use. Project pipeline easements would

[4] Wade, S.C. 2022. GAM Run 21-018 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers in GMA-13: TWDB. https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR21-018_MAG.pdf

[5] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/

require removal of woody vegetation and long-term maintenance (mowing, woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species that are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each WMS to determine the best course of action regarding revegetation.

Aquatic Resources

The project area contains several unnamed intermittent streams and their associated floodplains. The project does not cross any water bodies designated as impaired in the Texas Integrated Report of 303(d) listed water bodies[6]. The National Wetlands Inventory (NWI) mapping shows two freshwater ponds in the project area. The project area does not contain impaired stream segments as defined by TCEQ or ecologically significant stream segments as designated by TPWD.

The project will require an on-site delineation of streams, ponds, and wetlands. Well field facilities can typically be sited to avoid impacts to Waters of the United States, including wetlands. Stream crossing for pipeline construction would result in temporary stream impacts that would require US Army Corps of Engineers (USACE) permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58 – Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including if permanent impacts would occur to over 0.1 acre of Waters of the United States. The USACE permit requires that there will be no change in preconstruction contours of Waters of the United States. Utility crossings under streams (e.g., through horizontal directional drilling) would not require a USACE permit.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened, endangered, and candidate species and species of concern that have potential to occur in Bexar County[7,8]. Suitable habitat may occur for the federally endangered black lace cactus (*Echinocereus reichenbachii var. albertii*), proposed endangered tricolored bat (*Perimyotis subflavus*), and the monarch butterfly *(Danaus plexippus),* which is a candidate for federal listing as a threatened or endangered species. Suitable habitat may occur for state-listed threatened species, including white-faced ibis (*Plegadis chihi*), Texas horned lizard (*Phrynosoma cornutum*), and Texas tortoise (*Gopherus berlandieri*).

There is potential for suitable habitat for numerous wildlife species designated by TPWD as Species of Greatest Conservation Need (SGCN) including American bumblebee (*Bombus pensylvanicus*), Strecker's chorus frog (*Pseudacris streckeri*), Woodhouse's toad (*Anaxyrus woodhousii*), eastern spotted skunk (*Spilogale putorius*), and plains spotted skunk (*Spilogale interrupta*). In addition, SGCN bat species may

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[6] Texas Commission on Environmental Quality (TCEQ). 2024. 2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d). https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir

[7] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Bexar County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[8] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation (IPaC) Resource List – Bexar County. https://ipac.ecosphere.fws.gov/location/index.

utilize structures and could therefore occur in developed areas. The SGCN list also includes numerous plant species. SGCN species do not have formal protected status but are being monitored by TPWD.

Site-specific field surveys would be required to determine the quality of habitat for federally and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be required to obtain its recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species in the project area.

Migratory birds may nest in the project area. The federal Migratory Bird Treaty Act (MBTA) protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15.

Cultural Considerations

For linear portions of the project (i.e., project alignment), a background literature review was performed for the alignment and a 300-foot radius around the project alignment. For the area portion of the project (i.e., project area), a background literature review was conducted of the area portion only. The background literature review identified four cultural resources that intersect with the approximate 1,490-acre project area and alignment, as shown in Table 5.2.25-3.

The identified cultural resources include two prehistoric archaeological sites (i.e., 41BX1461 and 41BX1963), and two cemeteries (i.e., Jhon Schock Shely Cemetery and site 41BX1463) [9]. Of the identified sites, two are ineligible for listing on the NRHP (i.e., 41BX1461 and 41BX1963), and two remain undetermined (i.e., Jhon Schock Shely Cemetery and site 41BX1463) [10] for listing on the NRHP. Additionally, the historical map review identified 26 potential historic-age structures that intersect with the project area and alignment [11].

In the State of Texas, all human burials are protected by law [12], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project area or alignment and the remains are determined to be Native American, they will be managed in accordance with procedures established through coordination with the THC, and work in the affected area could only resume according to THC authorization.

A probability model was used to assess the overall archaeological site potential, which included low, medium, and high potential zones. The model indicated that 34% of the project area and alignment had a moderate likelihood of containing significant unidentified archaeological resources and 66% had a low likelihood. No areas were identified by the model as having a high probability. Areas with moderate

[9] Texas Historical Commission (THC). 2024. *Texas Archeological and Historical Sites Atlas.* Available at: https://atlas.thc.texas.gov/. Accessed July 2024.
[10] THC (2024).
[11] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed September 2024.
[12] According to the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

archaeological probability are located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project area and alignment that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area and alignment. Next, the cultural resources within the project area and alignment were evaluated according to its NRHP eligibility. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts, properties or archaeological sites, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. The points for all cultural resources within the project area and alignment were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for the project equaled 60.5.

Table 5.2.25-3 Cultural Resources Results for the SAWS Expanded Local Carrizo Project

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Archaeological Site (41BX1461)	Lithic Scatter	Prehistoric	Ineligible (THC 6/28/2002)	Intersect
Archaeological Site (41BX1463)	Cemetery	Historic	Undetermined (THC 4/8/2002)	Intersect
Archaeological Site (41BX1963)	Lithic Scatter	Prehistoric	Ineligible (THC 4/12/2013)	Intersect
Jhon Shock Shely (BC-189)	Cemetery	Historic	Undetermined	Intersect
None (N=26)	Buildings/Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**60.5**

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, three archaeological sites, two cemeteries (cemetery site 41BX1463 is also considered an archaeological site), and 26 potential historic-age structures are located within the project area and alignment; the probability model indicates a low to moderate likelihood of buried deposits; and the project assessment score is 60.5. Based on these results, a cultural resources assessment for the final design plan is likely necessary, as well as buffer zones of at least 100 feet between the cemeteries and the proposed development.

5.2.25.4 Engineering and Costing

Preliminary engineering and costing analyses have been performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The total project cost estimate summary for all three phases is shown in Table 5.2.25-7. Cost estimate summaries for the SAWS Expanded Local Carrizo Project for Phase 1, Phase 2, and Phase 3 are summarized in Table 5.2.25-4, Table 5.2.25-5, and Table 5.2.25-6, respectively.

The cost estimate summaries include facilities required for water production, collection, and transmission but do not include costs of the H_2Oaks Center WTP expansion or expanding transmission facilities to deliver the treated water to portions of SAWS' distribution system. The H_2Oaks WTP expansion and the SAWS Southeast Integration Pipeline are included in the 2026 Region L Water Plan as part of the Facilities Expansion WMS. As such, information and costs associated with these two treatment and transmission facilities expansions are discussed in Section 5.2.8, Facilities Expansion WMS.

Table 5.2.25-4 Cost Estimate Summary for the SAWS Expanded Local Carrizo Project – Phase 1

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$12,234,000
TOTAL COST OF FACILITIES	**$12,234,000**
Planning (3%)	$367,000
Design (7%)	$856,000
Construction Engineering (1%)	$122,000
Legal Assistance (2%)	$245,000
Fiscal Services (2%)	$245,000
All Other Facilities Contingency (20%)	$2,447,000
Environmental & Archaeology Studies and Mitigation	$105,000
Land Acquisition and Surveying (45 acres)	$42,000
Interest During Construction (3.5% for 1 year with a 0.5% ROI)	$542,000
TOTAL COST OF PROJECT	**$17,205,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$1,211,000
O&M	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$122,000
Pumping Energy Costs (2,950,610 kW-hr @ 0.09 $/kW-hr)	$266,000
TOTAL ANNUAL COST	**$1,599,000**
Available Project Yield (acft/yr)	7,000
Annual Cost of Water ($ per acft)*	$228
Annual Cost of Water After Debt Service ($ per acft)*	$55
Annual Cost of Water ($ per 1,000 gallons)*	$0.70
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.17
* Based on a peaking factor of 1.0.	

Table 5.2.25-5 Cost Estimate Summary for the SAWS Expanded Local Carrizo Project – Phase 2

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$6,096,000
TOTAL COST OF FACILITIES	**$6,096,000**
- Planning (3%)	$183,000
- Design (7%)	$427,000
- Construction Engineering (1%)	$61,000
Legal Assistance (2%)	$122,000
Fiscal Services (2%)	$122,000
All Other Facilities Contingency (20%)	$1,219,000
Environmental & Archaeology Studies and Mitigation	$23,000
Land Acquisition and Surveying (11 acres)	$9,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$269,000
TOTAL COST OF PROJECT	**$8,531,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$600,000
O&M	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$61,000
Pumping Energy Costs (2,619,050 kW-hr @ 0.09 $/kW-hr)	$236,000
TOTAL ANNUAL COST	**$897,000**
Available Project Yield (acft/yr)	7,000
Annual Cost of Water ($ per acft)*	$128
Annual Cost of Water After Debt Service ($ per acft)*	$42
Annual Cost of Water ($ per 1,000 gallons)*	$0.39
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.13
* Based on a peaking factor of 1.0.	

Table 5.2.25-6 Cost Estimate Summary for the SAWS Expanded Local Carrizo Project – Phase 3

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$7,996,000
TOTAL COST OF FACILITIES	**$7,996,000**
Planning (3%)	$240,000
Design (7%)	$560,000
Construction Engineering (1%)	$80,000
Legal Assistance (2%)	$160,000
Fiscal Services (2%)	$160,000
All Other Facilities Contingency (20%)	$1,599,000
Environmental & Archaeology Studies and Mitigation	$64,000
Land Acquisition and Surveying (28 acres)	$26,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$354,000
TOTAL COST OF PROJECT	**$11,239,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$791,000
O&M	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$80,000
Pumping Energy Costs (5,575,739 kW-hr @ 0.09 $/kW-hr)	$502,000
TOTAL ANNUAL COST	**$1,373,000**
Available Project Yield (acft/yr)	7,000
Annual Cost of Water ($ per acft)*	$196
Annual Cost of Water After Debt Service ($ per acft)*	$83
Annual Cost of Water ($ per 1,000 gallons)*	$0.60
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.26
* Based on a peaking factor of 1.0.	

Table 5.2.25-7 Total Project Cost Estimate Summary for the SAWS Expanded Local Carrizo Project – Phases 1, 2, and 3

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$26,326,000
TOTAL COST OF FACILITIES	**$26,326,000**
- Planning (3%)	$790,000
- Design (7%)	$1,843,000
- Construction Engineering (1%)	$263,000
Legal Assistance (2%)	$527,000
Fiscal Services (2%)	$527,000
All Other Facilities Contingency (20%)	$5,265,000
Environmental & Archaeology Studies and Mitigation	$192,000
Land Acquisition and Surveying (84 acres)	$77,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,164,000
TOTAL COST OF PROJECT	**$36,974,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$2,601,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$263,000
Pumping Energy Costs (10,113,860 kW-hr @ 0.09 $/kW-hr)	$910,000
TOTAL ANNUAL COST	**$3,774,000**
Available Project Yield (acft/yr)	21,000
Annual Cost of Water ($ per acft)*	$180
Annual Cost of Water After Debt Service ($ per acft)*	$56
Annual Cost of Water ($ per 1,000 gallons)*	$0.55
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.17
* Based on a peaking factor of 1.0.	

5.2.25.5 Implementation Considerations

The SAWS Expanded Local Carrizo Project is planned to be located north/northeast of the existing SAWS ASR well field (Figure 5.2.25-1), which currently stores Edwards Aquifer water in the Carrizo Aquifer. Groundwater withdrawals from the new SAWS Expanded Local Carrizo Project wells would affect groundwater gradients, flow rates, and mixing rates of SAWS' water stored in the nearby ASR well field. Increased extraction from the Carrizo Aquifer would increase movement of water from the ASR well field toward the Carrizo Aquifer wells and cause more rapid mixing of stored Edwards Aquifer groundwater with native Carrizo Aquifer groundwater. Implications of increased groundwater withdrawals will be fully evaluated during the planning and design phases and prior to implementation of the SAWS Expanded Local Carrizo Project.

Implementation of the SAWS Expanded Local Carrizo Project includes the following considerations:

- Verification of available groundwater quantity and well productivity;
- Verification of water quality for concentrations of constituents, such as TDS, chloride, sulfate, iron, manganese, and hydrogen sulfide;
- Potential for differing water qualities/chemical constituents in the water;
- Regulations by TCEQ; and

Potential impacts on the following natural resources:

- Endangered and threatened species;
- Water levels in the aquifer, including potential dewatering of the current artesian part of the aquifer;
- Baseflow in streams; and
- Wetlands.

Competition with others in the area for groundwater in the Carrizo Aquifer, including the following:

- Private water purveyors;
- Public water purveyors in the area; and/or
- Future oil and gas drilling operations.

5.2.26 SAWS Expanded Brackish Groundwater Project

The SCTRWPG identified the SAWS Expanded Brackish Groundwater Project as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.26.1 Description of Water Management Strategy

As part of a multi-stage water supply plan, SAWS identified the Carrizo-Wilcox Aquifer in Wilson County as a potential source of groundwater for its customers. SAWS currently owns and operates a brackish groundwater desalination project in Bexar County, known as Phase 1. This WMS includes an expansion of SAWS' existing Carrizo-Wilcox Aquifer brackish groundwater project into Wilson County through two additional phases (Phases 2 and 3). An approximate project location is shown on Figure 5.2.26-1.

The project is designed to supply 22,400 acft/yr of treated water by the 2040 decade; however, the available yield varies because of MAG limitations. The project includes expansions of the existing SAWS brackish groundwater desalination WTP, which would include iron and manganese removal and reverse osmosis treatment. Phase 2 would include a 12 MGD expansion of the existing brackish desalination plant, located near the H_2Oaks Center. Phase 3 would include an 8 MGD expansion of the existing brackish desalination plant. Once treated, potable water will be delivered through SAWS' distribution system. Brine concentrate will be disposed of via deep well injections in Wilson County near the existing SAWS brackish concentrate injection wells. Phase 2 would include two new injection wells and Phase 3 would include one new injection well.

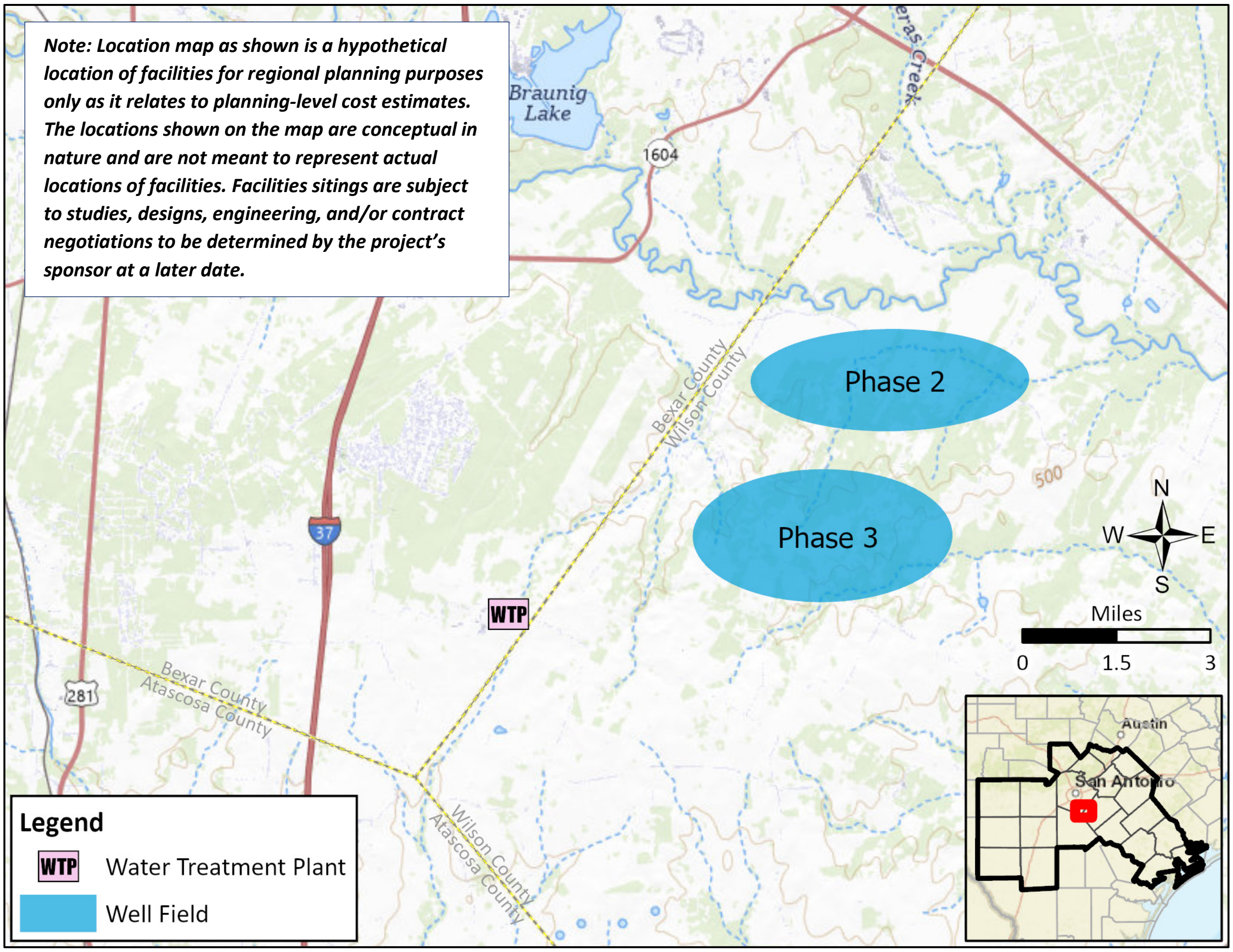

Figure 5.2.26-1 Approximate Location for the SAWS Expanded Brackish Groundwater Project

5.2.26.2 Available Yield

This WMS is planned for full completion by 2040 and has an available yield that varies by decade because of MAG limitations. Table 5.2.26-1 provides a summary of the yield as envisioned by the sponsor (Envisioned Yield) and the yield available considering MAG constraints (MAG-Constrained Yield) for the SAWS Expanded Brackish Groundwater Project. The MAG-Constrained Yield is the available yield included in DB27.

Table 5.2.26-1 Envisioned and MAG-Constrained Yields for the SAWS Expanded Brackish Groundwater Project (acft/yr)

Phase and Yield Type	2030	2040	2050	2060	2070	2080
Phase 2 – Envisioned Yield	0	13,440	13,440	13,440	13,440	13,440
Phase 2 – MAG-Constrained Yield	0	1,587	4,016	8,453	10,976	10,952
Phase 3 – Envisioned Yield	0	8,960	8,960	8,960	8,960	8,960
Phase 3 – MAG-Constrained Yield	0	1,058	2,677	5,636	7,317	7,302
Total Envisioned Yield	**0**	**22,400**	**22,400**	**22,400**	**22,400**	**22,400**
Total MAG-Constrained Yield	**0**	**2,645**	**6,693**	**14,089**	**18,293**	**18,254**

The Evergreen UWCD regulates groundwater production, well spacing, and other requirements in the Carrizo-Wilcox Aquifer in Wilson County. In 2021, GMA-13 established DFCs for the Carrizo-Wilcox Aquifer [1]. On the basis of the approved DFCs, the TWDB determined that the MAG estimate for the Carrizo-Wilcox Aquifer in Wilson County is 125,670 acft/yr in 2080 [2].

For most aquifers in the region, GCDs have adopted desired future conditions (DFCs). In some GCDs, full use of all groundwater supplies (permitted, grandfathered and exempt) may result in non-achievement of the DFCs for an aquifer. To ensure consistency with the DFCs, TWDB requires that groundwater availability for each aquifer be limited for planning purposes to the MAG for the discrete geographic-aquifer unit (i.e., aquifer/county/basin unit). This has resulted, for planning purposes only, in adjustments to permit amounts, and a lack of firm water available for future permits in this plan for some areas for certain time periods. This should not be construed as recommending or requiring that GCDs make these adjustments, or deny future permit applications. As described in Guiding Principle V (refer to Appendix 5A), this is not intended to influence or interfere with the regulatory decisions made by the governing boards of permitting entities. SCTRWPG recognizes and supports the ability of permit holders to exercise their rights to groundwater use in accordance with their permits and it recognizes and supports a GCD's discretion to issue permits and grandfather historical users for amounts in excess of the MAG. SCTRWPG may not modify groundwater permits that GCDs have already issued or limit future permits that GCDs may issue. If MAG estimates are modified during or after this planning cycle, the SCTRWPG may amend this plan to adjust WMS supply volumes that are affected by the modified MAG estimate(s).

Phases 2 and 3 of the project will be located in Wilson County, northeast of the existing ASR wells. Wells in this area are expected to produce approximately 800 gpm each and have a completion depth of approximately 2,300 feet below surface. Phase 2 is designed to produce 12 MGD (13,440 acft/yr) of potable water and is expected to be online by the 2040 decade. The new brackish groundwater well field in Phase 2 would include 14 wells. Phase 3 is designed to produce 8 MGD (8,960 acft/yr) of potable water and is expected to be online by the 2040 decade. The new brackish groundwater well field in Phase 3 would include seven wells.

Water from the Carrizo-Wilcox Aquifer in this area is expected to have a TDS concentration of about 1,500 mg/L. Therefore, reverse osmosis technology is planned for the desalination treatment plant expansions. Groundwater in this aquifer area and depth typically has elevated concentrations of iron and manganese, requiring treatment and removal prior to public consumption. Disposal of the brine concentrate is planned by deep well injection into the Edwards Limestone near the existing SAWS concentrate injection wells. The injection wells are anticipated to have a depth of approximately 5,000 feet. Phase 2 would include two new concentrate injection wells and Phase 3 would include one new concentrate injection well.

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[1] Texas Water Development Board, Groundwater Management Area 13 – Desired Future Conditions. https://www.twdb.texas.gov/groundwater/dfc/docs/summary/GMA13_DFC_2021.pdf

[2] Wade, S.C. 2022. GAM Run 21-018 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers in GMA-13: TWDB. https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR21-018_MAG.pdf

5.2.26.3 Environmental Factors

The project was evaluated to determine its potential impacts on environmental factors. Table 5.2.26-2 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.26-2 Summary of Potential Project Effects on Environmental Factors for the SAWS Expanded Brackish Groundwater Project

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	184
Potential Species Impact Score	6
Potential Habitat Impact Score	1
Potential Stream Construction Impact Score	2
Potential Stream Flow / Water Quality Impact Score	1
Potential Cultural Resources Impact Score	173.5

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project area occurs in the Post Oak Savannah ecoregion and crosses a variety of vegetation types, mostly open fields and pastures. As mapped by TPWD [3], dominant vegetation types in the project area are savannah grassland, post oak motte and woodland, and live oak motte and woodland. Riparian communities in the project area include floodplain hardwood forest, floodplain herbaceous vegetation, and riparian hardwood forest.

Based on TPWD vegetation mapping, the project may potentially impact 184 acres of agricultural resources, including 162 acres mapped as row crops, and 22 acres of Sandyland Grassland which may include pasture areas used for grazing.

The proposed well pads and any new storage facilities would result in conversion of land use from undeveloped fields or agricultural use to small areas of industrial use. Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing, woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species that are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each WMS to determine the best course of action regarding revegetation.

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[3] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/

Aquatic Resources

The project area contains numerous unnamed intermittent streams. The NWI mapping shows 77 acres of mapped freshwater ponds and wetlands within the project area.

The project area does not include stream segments have been designated as impaired stream segments in the Texas Integrated Report of 303(d) listed water bodies [4]. This list identifies the water bodies or segments in Texas that do not meet assigned water quality standards. The project area does not contain ecologically significant stream segments, as designated by TPWD.

The project will require an on-site delineation of streams, ponds, and wetlands. Well field facilities can typically be sited to avoid impacts to Waters of the United States including wetlands. Stream crossings for pipeline construction would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including if there would be permanent impacts to over 0.1 acre of Waters of the United States. The USACE permit requires that no change will occur in pre-construction contours of Waters of the United States. Utility crossings under streams (e.g., through horizontal directional drilling) would not require a USACE permit.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened, endangered, and candidate species and species of concern that may occur in Wilson County [5, 6]. The project area may contain suitable habitat for the federally endangered black lace cactus (*Echinocereus reichenbacchii* var. *albertii*), the proposed federally endangered tricolored bat (*Perimyotis subflavus*), and the monarch butterfly (*Danaus plexippus*), which is a candidate for federal listing as a threatened or endangered species.

Suitable habitat may occur for the state-listed threatened species white-faced ibis (*Plegadis ibis*), wood stork (*Mycteria americana*), Texas horned lizard (*Phrynosoma cornutum*), and Texas tortoise (*Gopherus berlandieri*). The project area may contain a potential for suitable habitat for numerous wildlife species designated by TPWD as SGCN including American bumblebee (*Bombus pensylvanicus*), Strecker's chorus frog (*Pseudacris streckeri*), Woodhouse's toad (*Anaxyrus woodhousii*), western burrowing owl (*Athene cunicularia hypugaea*), eastern spotted skunk (*Spilogale putorius*), and plains spotted skunk (*Spilogale interrupta*). In addition, SGCN bat species may utilize structures and could therefore occur in developed areas. The SGCN list also includes numerous plant species, including many for which detailed habitat requirements have not been developed by TPWD. SGCN species do not have formal protected status but are being monitored by TPWD.

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[4] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir

[5] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Wilson County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[6] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Wilson County. https://ipac.ecosphere.fws.gov/location/index.

Site-specific field surveys would be required to determine the quality of habitat for federally and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be required to obtain its recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may nest in the project area. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15. Although it is no longer on the federal endangered species list, the bald eagle is protected by the federal Bald and Golden Eagle Protection Act, which prohibits impacts to the eagles unless permitted by USFWS. Preconstruction surveys for active bird nests and presence of eagles are recommended.

Cultural Considerations

The background literature review identified two cultural resources within the project area (Table 5.2.26-3) [7]. The identified cultural resources are Canada Verde Cemetery (WN-C021), in the eastern end of the northern segment of the project area, and the Chisholm Trail that crosses the southern segment of the project area. Additionally, the historical map review identified 142 potential historic-age buildings/structures that are within the project area [8].

In the State of Texas, all human burials are protected by law [9], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project area and the remains are determined to be Native American, they will be handled in accordance with procedures established through coordination with the THC, and work in the affected area could only resume in accordance with THC authorization.

A probability model was used to assess the overall archaeological site potential, which included low, medium, and high potential zones. The model indicated that 1% of the project alignment had a high likelihood of containing significant unidentified archaeological resources, 63% had a moderate likelihood, and 36% had a low likelihood. Areas with greater archaeological probability are located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project area that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area. Next, the cultural resources within the project area were evaluated according to its NRHP eligibility. The values attributed to each resource type include: NRHP-listed or

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[7] Texas Historical Commission (THC). 2024. *Texas Archeological and Historical Sites Atlas.* Available at: https://atlas.thc.texas.gov/. Accessed September 2024.

[8] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed September 2024.

[9] According to the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

NRHP-eligible districts, properties or archaeological sites, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. The points for all cultural resources within the project area were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for the project equaled 173.5.

Table 5.2.26-3 Cultural Resources Results for the SAWS Expanded Brackish Groundwater Project

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Canada Verde Cemetery	Cemetery	Historic	Undetermined	Intersect
Chisholm Trail	Historic Trail	Historic	Undetermined	Intersect
None (N=142)	Buildings/Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**173.5**

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, one cemetery and 142 potential historic-age structures are located within the project area. The probability model for the project indicates a low to moderate likelihood of buried deposits; the project assessment score is 173.5. Based on these results, a cultural resources assessment for the final design plan is likely necessary, as well as a buffer zone of at least 100 feet between the cemetery and the proposed development.

5.2.26.4 Engineering and Costing

Preliminary engineering and costing analyses were performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required for a new brackish groundwater well field, expansion of the brackish desalination water treatment plant, brine concentrate disposal via deep well injection, and conveyance of potable water to existing integration pipelines that currently deliver water recovered from the existing local projects.

Because this WMS is MAG-constrained, cost estimate summaries for the SAWS Expanded Brackish Groundwater Project are included for the Envisioned Yield and for the MAG-Constrained Yield. All cost estimates consider infrastructure and capacities necessary to deliver the sponsor’s Envisioned Yield, despite the limited groundwater availability. Therefore, project costs are the same for the Envisioned and MAG-Constrained summaries but unit costs vary, as they are dependent on the yield. For the MAG-Constrained cost estimate summaries, annual unit costs were calculated using the MAG-Constrained Yield in the first decade of implementation. The following cost estimate summary tables are included:

- Envisioned Yield Cost Summary – Phase 2: Table 5.2.26-4
- Envisioned Yield Cost Summary – Phase 3: Table 5.2.26-5

- Total Envisioned Yield Cost Summary – Phases 2 and 3: Table 5.2.26-6
- MAG-Constrained Yield Cost Summary – Phase 2: Table 5.2.26-7
- MAG-Constrained Yield Cost Summary – Phase 3: Table 5.2.26-8
- Total MAG-Constrained Yield Cost Summary – Phases 2 and 3: Table 5.2.26-9

Table 5.2.26-4 Cost Estimate Summary for the SAWS Expanded Brackish Groundwater Project (Envisioned Yield) – Phase 2

Item	Estimated Costs
Primary Pump Station (12.6 MGD)	$1,666,000
Transmission Pipeline (42 in. dia., 5.9 miles)	$11,776,000
Well Fields (wells, pumps, and piping)	$68,225,000
Water Treatment Plant Expansion (12 MGD)	$52,785,000
Integration, Relocations, Backup Generator & Other	$29,000
TOTAL COST OF FACILITIES	**$134,481,000**
Planning (3%)	$4,034,000
Design (7%)	$9,414,000
Construction Engineering (1%)	$1,345,000
Legal Assistance (2%)	$2,690,000
Fiscal Services (2%)	$2,690,000
Pipeline Contingency (15%)	$1,766,000
All Other Facilities Contingency (20%)	$24,541,000
Environmental and Archaeology Studies and Mitigation	$1,708,000
Land Acquisition and Surveying (293 acres)	$1,703,000
Interest During Construction (3.5% for 1 year with a 0.5% return on investment)	$5,992,000
TOTAL COST OF PROJECT	**$190,364,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$13,392,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$800,000
Intakes and Pump Stations (2.5% of cost of facilities)	$42,000
Water Treatment Plant	$9,897,000
Pumping Energy Costs (3,468,502 kilowatt-hour [kW-h] at 0.09 $/kW-h)	$312,000
TOTAL ANNUAL COST	**$24,443,000**
Available Project Yield (acft/yr)	13,440
Annual Cost of Water ($ per acft)*	$1,819
Annual Cost of Water After Debt Service ($ per acft)*	$822
Annual Cost of Water ($ per 1,000 gallons)*	$5.58
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$2.52
*Based on a peaking factor of 1.0.	

Table 5.2.26-5 Cost Estimate Summary for the SAWS Expanded Brackish Groundwater Project (Envisioned Yield) – Phase 3

Item	Estimated Costs
Primary Pump Station (8.4 MGD)	$1,205,000
Transmission Pipeline (42 in. dia., 5.9 miles)	$11,776,000
Well Fields (wells, pumps, and piping)	$44,753,000
Water Treatment Plant Expansion (8 MGD)	$35,133,000
Integration, Relocations, Backup Generator & Other	$15,000
TOTAL COST OF FACILITIES	**$92,882,000**
Planning (3%)	$2,786,000
Design (7%)	$6,502,000
Construction Engineering (1%)	$929,000
Legal Assistance (2%)	$1,858,000
Fiscal Services (2%)	$1,858,000
Pipeline Contingency (15%)	$1,766,000
All Other Facilities Contingency (20%)	$16,221,000
Environmental and Archaeology Studies and Mitigation	$1,106,000
Land Acquisition and Surveying (231 acres)	$1,224,000
Interest During Construction (3.5% for 1 year with a 0.5% return on investment)	$4,132,000
TOTAL COST OF PROJECT	**$131,264,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$9,235,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$565,000
Intakes and Pump Stations (2.5% of cost of facilities)	$30,000
Water Treatment Plant	$6,588,000
Pumping Energy Costs (6,608,157 kilowatt-hour [kW-h] at 0.09 $/kW-h)	$595,000
TOTAL ANNUAL COST	**$17,013,000**
Available Project Yield (acft/yr)	8,960
Annual Cost of Water ($ per acft)*	$1,899
Annual Cost of Water After Debt Service ($ per acft)*	$868
Annual Cost of Water ($ per 1,000 gallons)*	$5.83
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$2.66
*Based on a peaking factor of 1.0.	

Table 5.2.26-6 Total Project Cost Estimate Summary for the SAWS Expanded Brackish Groundwater Project (Envisioned Yield) – Phases 2 and 3

Item	Estimated Costs
Primary Pump Station (12.6 MGD)	$1,666,000
Transmission Pipeline (42 in. dia., 5.9 miles)	$23,553,000
Well Fields (wells, pumps, and piping)	$112,978,000
Water Treatment Plant Expansion (20 MGD)	$87,919,000
Integration, Relocations, Backup Generator & Other	$29,000
TOTAL COST OF FACILITIES	**$226,145,000**
Planning (3%)	$6,784,000
Design (7%)	$15,830,000
Construction Engineering (1%)	$2,261,000
Legal Assistance (2%)	$4,523,000
Fiscal Services (2%)	$4,523,000
Pipeline Contingency (15%)	$3,533,000
All Other Facilities Contingency (20%)	$40,518,000
Environmental and Archaeology Studies and Mitigation	$2,606,000
Land Acquisition and Surveying (403acres)	$2,412,000
Interest During Construction (3.5% for 1 year with a 0.5% return on investment)	$10,046,000
TOTAL COST OF PROJECT	**$319,181,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$22,456,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$1,366,000
Intakes and Pump Stations (2.5% of cost of facilities)	$42,000
Water Treatment Plant	$16,485,000
Pumping Energy Costs (468,100 kilowatt-hour [kW-h] at 0.09 $/kW-h)	$42,000
TOTAL ANNUAL COST	**$40,391,000**
Available Project Yield (acft/yr)	22,400
Annual Cost of Water ($ per acft)*	$1,803
Annual Cost of Water After Debt Service ($ per acft)*	$801
Annual Cost of Water ($ per 1,000 gallons)*	$5.53
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$2.46
*Based on a peaking factor of 1.0.	

Table 5.2.26-7 Cost Estimate Summary for the SAWS Expanded Brackish Groundwater Project (MAG-Constrained Yield) – Phase 2

Item	Estimated Costs
Primary Pump Station (12.6 MGD)	$1,666,000
Transmission Pipeline (42 in. dia., 5.9 miles)	$11,776,000
Well Fields (wells, pumps, and piping)	$68,225,000
Water Treatment Plant Expansion (12 MGD)	$52,785,000
Integration, Relocations, Backup Generator & Other	$29,000
TOTAL COST OF FACILITIES	**$134,481,000**
Planning (3%)	$4,034,000
Design (7%)	$9,414,000
Construction Engineering (1%)	$1,345,000
Legal Assistance (2%)	$2,690,000
Fiscal Services (2%)	$2,690,000
Pipeline Contingency (15%)	$1,766,000
All Other Facilities Contingency (20%)	$24,541,000
Environmental and Archaeology Studies and Mitigation	$1,708,000
Land Acquisition and Surveying (293 acres)	$1,703,000
Interest During Construction (3.5% for 1 year with a 0.5% return on investment)	$5,992,000
TOTAL COST OF PROJECT	**$190,364,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$13,392,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$800,000
Intakes and Pump Stations (2.5% of cost of facilities)	$42,000
Water Treatment Plant	$9,897,000
Pumping Energy Costs (3,468,502 kilowatt-hour [kW-h] at 0.09 $/kW-h)	$312,000
TOTAL ANNUAL COST	**$24,443,000**
Available Project Yield (acft/yr)	1,587
Annual Cost of Water ($ per acft)*	$15,402
Annual Cost of Water After Debt Service ($ per acft)*	$6,963
Annual Cost of Water ($ per 1,000 gallons)*	$47.26
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$21.37
*Based on a peaking factor of 1.0.	

Table 5.2.26-8 Cost Estimate Summary for the SAWS Expanded Brackish Groundwater Project (MAG-Constrained Yield) – Phase 3

Item	Estimated Costs
Primary Pump Station (8.4 MGD)	$1,205,000
Transmission Pipeline (42 in. dia., 5.9 miles)	$11,776,000
Well Fields (wells, pumps, and piping)	$44,753,000
Water Treatment Plant Expansion (8 MGD)	$35,133,000
Integration, Relocations, Backup Generator & Other	$15,000
TOTAL COST OF FACILITIES	**$92,882,000**
Planning (3%)	$2,786,000
Design (7%)	$6,502,000
Construction Engineering (1%)	$929,000
Legal Assistance (2%)	$1,858,000
Fiscal Services (2%)	$1,858,000
Pipeline Contingency (15%)	$1,766,000
All Other Facilities Contingency (20%)	$16,221,000
Environmental and Archaeology Studies and Mitigation	$1,106,000
Land Acquisition and Surveying (231 acres)	$1,224,000
Interest During Construction (3.5% for 1 year with a 0.5% return on investment)	$4,132,000
TOTAL COST OF PROJECT	**$131,264,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$9,235,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$565,000
Intakes and Pump Stations (2.5% of cost of facilities)	$30,000
Water Treatment Plant	$6,588,000
Pumping Energy Costs (6,608,157 kilowatt-hour [kW-h] at 0.09 $/kW-h)	$595,000
TOTAL ANNUAL COST	**$17,013,000**
Available Project Yield (acft/yr)	1,058
Annual Cost of Water ($ per acft)*	$16,080
Annual Cost of Water After Debt Service ($ per acft)*	$7,352
Annual Cost of Water ($ per 1,000 gallons)*	$49.34
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$22.56
*Based on a peaking factor of 1.0.	

Table 5.2.26-9 Total Project Cost Estimate Summary for the SAWS Expanded Brackish Groundwater Project (MAG-Constrained Yield) – Phases 2 and 3

Item	Estimated Costs
Primary Pump Station (12.6 MGD)	$1,666,000
Transmission Pipeline (42 in. dia., 5.9 miles)	$23,553,000
Well Fields (wells, pumps, and piping)	$112,978,000
Water Treatment Plant Expansion (20 MGD)	$87,919,000
Integration, Relocations, Backup Generator & Other	$29,000
TOTAL COST OF FACILITIES	**$226,145,000**
Planning (3%)	$6,784,000
Design (7%)	$15,830,000
Construction Engineering (1%)	$2,261,000
Legal Assistance (2%)	$4,523,000
Fiscal Services (2%)	$4,523,000
Pipeline Contingency (15%)	$3,533,000
All Other Facilities Contingency (20%)	$40,518,000
Environmental and Archaeology Studies and Mitigation	$2,606,000
Land Acquisition and Surveying (403acres)	$2,412,000
Interest During Construction (3.5% for 1 year with a 0.5% return on investment)	$10,046,000
TOTAL COST OF PROJECT	**$319,181,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$22,456,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$1,366,000
Intakes and Pump Stations (2.5% of cost of facilities)	$42,000
Water Treatment Plant	$16,485,000
Pumping Energy Costs (468,100 kilowatt-hour [kW-h] at 0.09 $/kW-h)	$42,000
TOTAL ANNUAL COST	**$40,391,000**
Available Project Yield (acft/yr)	2,645
Annual Cost of Water ($ per acft)*	$15,271
Annual Cost of Water After Debt Service ($ per acft)*	$6,781
Annual Cost of Water ($ per 1,000 gallons)*	$46.86
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$20.81
*Based on a peaking factor of 1.0.	

5.2.26.5 Implementation Considerations

Implementation of the SAWS Expanded Brackish Groundwater Project includes the following considerations:

- Verification of available groundwater quantity and well productivity;
- Verification of water quality for concentrations of dissolved constituents, such as TDS, chloride, sulfate, iron, manganese, and hydrogen sulfide;
- Verification of the potential for deep well injection of concentrate;
- Verification that desalinated Carrizo-Wilcox Aquifer water is compatible with other water sources being used by customers and will meet all water quality requirements in the end user's distribution system;
- Potential for differing water qualities/chemical constituents in the water;
- Regulations by TCEQ;
- Regulations by and securing permits from the EUWCD; and
- Experience in operating and maintaining a desalination water treatment plant.

Additional implementation considerations may include impacts on the following:

- Endangered and threatened species;
- Water levels in the aquifer, including potential dewatering of the current artesian part of the aquifer;
- Baseflow in streams; and
- Wetlands.

Additional considerations include competition with others in the area for groundwater in the Carrizo-Wilcox Aquifer from the following:

- Private water purveyors;
- Public water purveyors in the area; and/or
- Future oil and gas drilling operations.

5.2.27 SAWS Regional Wilcox Project

The SCTRWPG identified the SAWS Regional Wilcox Project as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.27.1 Description of Water Management Strategy

As part of a multi-stage water supply plan, SAWS identified the SAWS Regional Wilcox Project in the Carrizo-Wilcox Aquifer in Wilson County as a potential source for its customers. SAWS currently owns and operates a brackish groundwater desalination project in Bexar County, which is presently online. This WMS evaluation includes expansion of SAWS' existing Carrizo-Wilcox Aquifer brackish groundwater project into Wilson County in two phases (Phases 1 and 2). Figure 5.2.27-1 provides the approximate project location of the two phases for the SAWS Regional Wilcox Project.

The project is designed to supply 50,000 acft/yr of treated water by the 2050 decade; however, the available yield varies because of MAG limitations. The project includes expansions of the existing SAWS brackish groundwater desalination WTP, which would include iron and manganese removal and reverse osmosis treatment. Phase 1 would include a 28.6 MGD expansion of the existing brackish desalination plant, located near the H2Oaks Center. Phase 2 would include a 16.1 MGD expansion of the existing brackish desalination plant. Once treated, potable water will be delivered through SAWS' distribution system. Brine concentrate will be disposed of via deep well injections in Wilson County near the existing SAWS brackish concentrate injection wells. Phase 1 would include four new injection wells and Phase 2 would include two new injection wells.

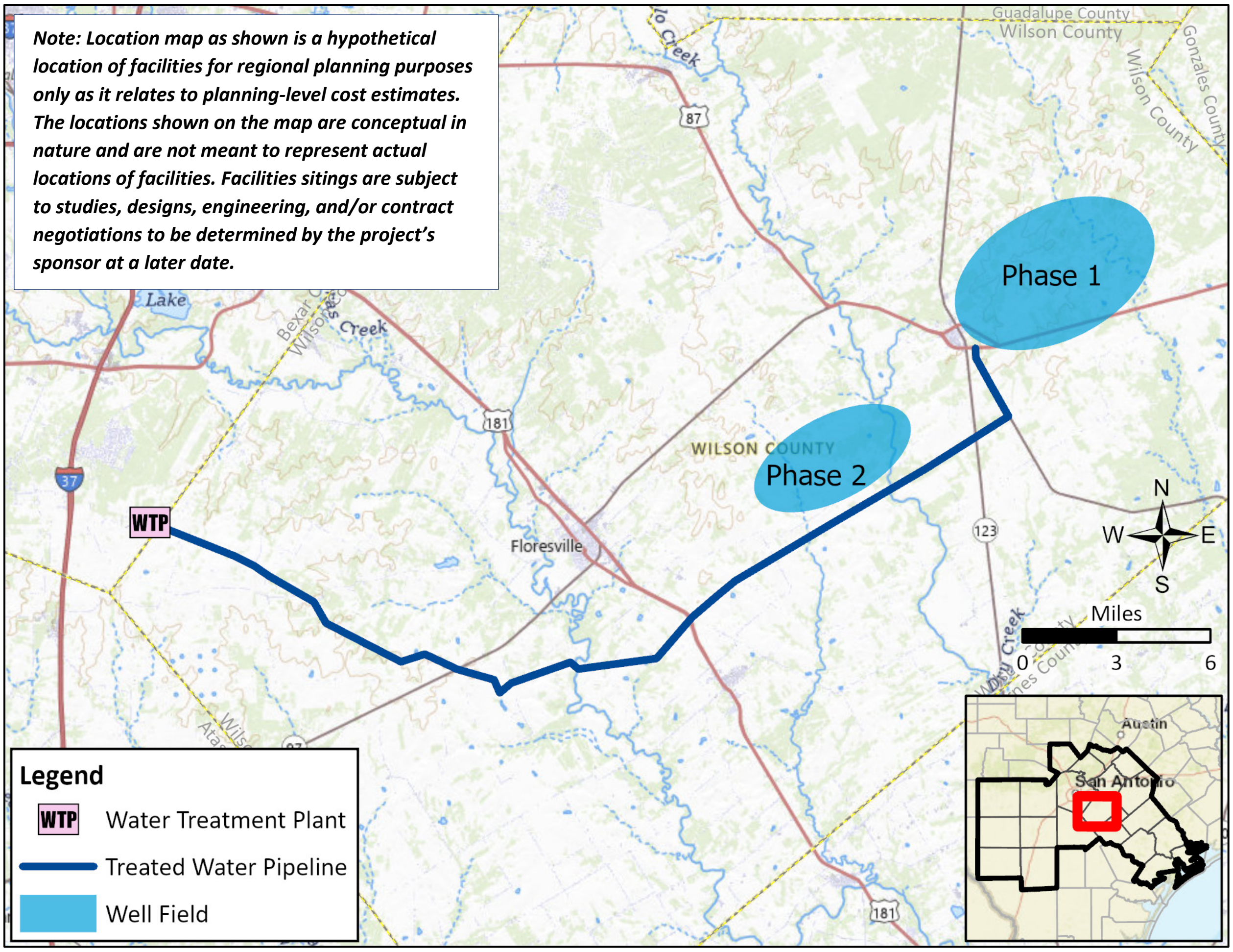

Figure 5.2.27-1 Approximate Location for the SAWS Regional Wilcox Project

5.2.27.2 Available Yield

This WMS is planned for full completion by 2050 and has an available yield that varies by decade because of MAG limitations. Table 5.2.27-1 provides a summary of the yield as envisioned by the sponsor (Envisioned Yield) and the yield available considering MAG constraints (MAG-Constrained Yield) for the SAWS Regional Wilcox Project. The MAG-Constrained Yield is the available yield included in DB27.

Table 5.2.27-1 Envisioned and MAG-Constrained Yields for the SAWS Regional Wilcox Project (acft/yr)

Phase and Yield Type	2030	2040	2050	2060	2070	2080
Phase 1 – Envisioned Yield	0	0	32,000	32,000	32,000	32,000
Phase 1 – MAG-Constrained Yield	0	0	9,564	20,127	26,132	26,078
Phase 2 – Envisioned Yield	0	0	18,000	18,000	18,000	18,000
Phase 2 – MAG-Constrained Yield	0	0	5,379	11,321	14,699	14,669
Total Envisioned Yield	**0**	**0**	**50,000**	**50,000**	**50,000**	**50,000**
Total MAG-Constrained Yield	**0**	**0**	**14,943**	**31,448**	**40,831**	**40,747**

The Evergreen UWCD regulates groundwater production, well spacing, and other requirements in the Carrizo-Wilcox Aquifer in Wilson County. In 2021, GMA-13 established DFCs for the Carrizo-Wilcox Aquifer [1]. On the basis of the approved DFCs, the TWDB determined that the MAG estimate for the Carrizo-Wilcox Aquifer in Wilson County is 125,670 acft/yr in 2080 [2].

For most aquifers in the region, GCDs have adopted desired future conditions (DFCs). In some GCDs, full use of all groundwater supplies (permitted, grandfathered and exempt) may result in non-achievement of the DFCs for an aquifer. To ensure consistency with the DFCs, TWDB requires that groundwater availability for each aquifer be limited for planning purposes to the MAG for the discrete geographic-aquifer unit (i.e., aquifer/county/basin unit). This has resulted, for planning purposes only, in adjustments to permit amounts, and a lack of firm water available for future permits in this plan for some areas for certain time periods. This should not be construed as recommending or requiring that GCDs make these adjustments, or deny future permit applications. As described in Guiding Principle V (refer to Appendix 5A), this is not intended to influence or interfere with the regulatory decisions made by the governing boards of permitting entities. SCTRWPG recognizes and supports the ability of permit holders to exercise their rights to groundwater use in accordance with their permits and it recognizes and supports a GCD's discretion to issue permits and grandfather historical users for amounts in excess of the MAG. SCTRWPG may not modify groundwater permits that GCDs have already issued or limit future permits that GCDs may issue. If MAG estimates are modified during or after this planning cycle, the SCTRWPG may amend this plan to adjust WMS supply volumes that are affected by the modified MAG estimate(s).

Phase 1 is located northeast of Stockdale in eastern Wilson County, and Phase 2 is located northeast of Floresville in central Wilson County. Wells in this area are expected to produce approximately 800 gpm each and have a completion depth of approximately 2,300 feet below surface. Phase 1 is designed to produce 28.5 MGD (32,000 acft/yr) of potable water and is expected to be online by the 2050 decade. The new well field in Phase 1 would include 33 wells, including six contingency wells. Phase 2 is designed to produce 16 MGD (18,000 acft/yr) of potable water and is expected to be online by the 2050 decade. The new well field in Phase 2 would include 19 production wells, including three contingency wells.

Water from the Carrizo-Wilcox Aquifer in this area is expected to have a TDS concentration of about 1,500 mg/L. Therefore, reverse osmosis technology is planned for the desalination treatment plant expansions. Groundwater in this aquifer area and depth typically has elevated concentrations of iron and manganese, requiring treatment and removal prior to public consumption. Disposal of the brine concentrate is planned by deep well injection into the Edwards Limestone near the existing SAWS concentrate injection wells. The injection wells are anticipated to have a depth of approximately 5,000 feet. Phase 1 would include four new concentrate injection wells and Phase 2 would include two new concentrate injection wells.

[1] Texas Water Development Board, Groundwater Management Area 13 – Desired Future Conditions. https://www.twdb.texas.gov/groundwater/dfc/docs/summary/GMA13_DFC_2021.pdf.

[2] Wade, S.C. 2022. GAM Run 21-018 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers in GMA-13: TWDB. https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR21-018_MAG.pdf.

5.2.27.3 Environmental Factors

The project was evaluated to determine its potential impacts on environmental factors. Table 5.2.27-2 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.27-2 Summary of Potential Project Effects on Environmental Factors for the SAWS Regional Wilcox Project

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	2,973
Potential Species Impact Score	7
Potential Habitat Impact Score	2
Potential Stream Construction Impact Score	4
Potential Stream Flow / Water Quality Impact Score	1
Potential Cultural Resources Impact Score	291.6

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project area occurs in the Post Oak Savannah ecoregion and crosses a variety of vegetation types, mostly open fields and pastures. As mapped by TPWD,[3] dominant vegetation types in the project area are savannah grassland and disturbance/tame grassland. Small areas of mapped woody vegetation communities include post oak motte and woodland and mesquite shrubland. The linear components of the project cross riparian vegetation zones along streams, mapped by TPWD as floodplain and riparian herbaceous vegetation, floodplain and riparian hardwood forest, and floodplain live oak and deciduous shrubland.

Based on TPWD vegetation mapping, the project may potentially impact 2,973 acres of agricultural resources, including 355 acres mapped as row crops, and 2,618 acres of disturbance or tame grassland which may include pasture areas used for grazing.

The proposed well pads facilities would result in conversion of land use from undeveloped fields or agricultural use to small areas of industrial use. Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing, woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species that are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each WMS to determine the best course of action regarding revegetation.

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[3] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/.

Aquatic Resources

The project area contains several mapped streams and their associated floodplains including the San Antonio River, Wallace Branch, Mariana Branch, Marcelinas Creek, Cibolo Creek, and numerous unnamed tributaries. The NWI mapping shows one freshwater forested/shrub wetlands and several ponds in the project area.

The project crosses Segment 1911 of the San Antonio River and Segment 1902 of Lower Cibolo Creek; these stream segments have been designated as impaired stream segments in the Texas Integrated Report of 303(d) listed water bodies [4]. This list identifies the water bodies or segments in Texas that do not meet assigned water quality standards. The project area does not contain ecologically significant stream segments as designated by TPWD.

The project will require an on-site delineation of streams, ponds, and wetlands. Well field facilities can typically be sited to avoid impacts to Waters of the United States including wetlands. Stream crossings for pipeline construction would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including if there would be permanent impacts to over 0.1 acre of Waters of the United States. The USACE permit requires that no change will be present in preconstruction contours of Waters of the United States. Utility crossings under streams (e.g., through horizontal directional drilling) would not require a USACE permit.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened, endangered, and candidate species and species of concern that may occur in Bexar and Wilson Counties [5, 6, 7, 8]. The project area may contain suitable habitat for the federally endangered black lace cactus (*Echinocereus reichenbacchii* var. *albertii*), the proposed federally endangered tricolored bat (*Perimyotis subflavus*), and the monarch butterfly (*Danaus plexippus*), which is a candidate for federal listing as a threatened or endangered species. The black rail (*Laterallus jamaicensis*), also under federal review as a threatened species, has low potential to occur in wetland areas in the project region.

Suitable habitat may occur for the state listed threatened species white-faced ibis (*Plegadis ibis*), Texas horned lizard (*Phrynosoma cornutum*), and Texas tortoise (*Gopherus berlandieri*). The state-threatened bald eagle (*Haliaeetus leucocephalus*) has been observed in areas of the lower San Antonio River. There is potential for suitable habitat for numerous wildlife species designated by TPWD as SGCN including American bumblebee (*Bombus pensylvanicus*), Strecker's chorus frog (*Pseudacris streckeri*),

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[4] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir.

[5] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Bexar County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[6] Texas Parks and Wildlife Department (TPWD). 2019. Annotated County Lists of Rare Species – Wilson County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[7] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Bexar County. https://ipac.ecosphere.fws.gov/location/index.

[8] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Wilson County. https://ipac.ecosphere.fws.gov/location/index.

Woodhouse's toad (*Anaxyrus woodhousii*), western burrowing owl (*Athene cunicularia hypugaea*), eastern spotted skunk (*Spilogale putorius*), and plains spotted skunk (*Spilogale interrupta*). In addition, SGCN bat species may utilize structures and could therefore occur in developed areas. The SGCN list also includes numerous plant species, including many for which detailed habitat requirements have not been developed by TPWD. SGCN species do not have formal protected status but are being monitored by TPWD. Migratory birds may occur in the project area, particularly in riparian zones.

The project area is likely to contain suitable habitat for federally endangered freshwater mussel species. Suitable habitat may occur in perennial rivers/streams and perennial pools of intermittent streams. If any such habitat would be affected by construction, presence/absence surveys and relocation of native mussel species would be required. Handling and relocation of aquatic species must be conducted by TPWD-permitted personnel and in accordance with an approved Aquatic Resources Relocation Plan. Furthermore, these candidate species may be listed as threatened or endangered during the project timeline; in which case, any species impacts would require USFWS consultation.

Site-specific field surveys would be required to determine the quality of habitat for federally and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be required to obtain its recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request pre-construction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may nest in the project area. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct pre-construction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15. Although it is no longer on the federal endangered species list, the bald eagle is protected by the federal Bald and Golden Eagle Protection Act, which prohibits impacts to the eagles unless permitted by USFWS. Preconstruction surveys for active bird nests and presence of eagles are recommended.

Cultural Considerations

For linear portions of the project (i.e., pipeline alignments), a background literature review was performed for the alignment and a 300-foot radius around the project alignment. For the area portion of the project (i.e., well fields), a background literature review was conducted of just the area portion. The background literature review identified 18 cultural resources that intersect with the approximate 22,346-acre project area and alignment or are immediately adjacent (i.e., within 300 feet) to the project's pipeline alignment (Table 5.2.27-3) [9]. The project area and alignment contain eight archaeological sites (i.e., 41WN6, 41WN12, 41WN21, 41WN22, 41WN23, 41WN25, 41WN111, and 41WN113), four cemeteries (i.e., Bird Cemetery, Old Wheeler Cemetery, Pleasant Valley Cemetery, and Steele Branch Cemetery), two vicinity cemeteries (i.e., Gouger Cemetery and Svoboda Family Cemetery), and two historic trails (i.e., Chisholm Trail, and El Camino Real de Los Tejas). One of the cemeteries contains a historical marker (i.e., Old Wheeler Cemetery). Cultural resources located immediately adjacent to the project's pipeline alignment include a single archaeological site (i.e., 41WN115). Out of the nine archaeological sites within the project area, alignment, and immediately adjacent to the

[9] Texas Historical Commission (THC). 2024. Texas Archeological and Historical Sites Atlas. Available at: https://atlas.thc.texas.gov/. Accessed September 2024.

pipeline alignment, all are undetermined for listing on the NRHP. Additionally, the historical map review identified 221 potential historic-age structures that intersect with the project area and alignment [10].

Vicinity cemeteries are very general areas where a cemetery location was reported at one time, but the exact location is unknown or could not be confirmed. If project impacts are to occur near the vicinity cemetery location, further work (e.g., pedestrian survey and/or metal detecting) or construction monitoring might be needed to ensure human burials are not present in the project area and alignment. In the State of Texas, all human burials are protected by law [11], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project area or alignment and the remains are determined to be Native American, they will be handled in accordance with procedures established through coordination with the THC, and work in the affected area could only resume per THC authorization.

A probability model was used to assess the overall archaeological site potential, which included low, medium, and high potential zones. The model indicated that 2% of the project area and alignment had a high likelihood of containing significant unidentified archaeological resources, 5% had a moderate likelihood, and 93% had a low likelihood. Areas with greater archaeological probability are located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project area and alignment that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area and alignment. Next, the cultural resources within the project area and alignment were evaluated according to its NRHP eligibility. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts, properties or archaeological sites, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. The points for all cultural resources within the project area and alignment were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for the project equaled 291.6.

Table 5.2.27-3 Cultural Resources Results for the SAWS Regional Wilcox Project

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Archaeological Site (41WN6)	Lithic Scatter	Prehistoric	Undetermined	Intersect
Archaeological Site (41WN12)	Lithic Scatter	Prehistoric	Undetermined	Intersect
Archaeological Site (41WN21)	Lithic Scatter	Prehistoric	Undetermined	Intersect
Archaeological Site (41WN22)	Unknown	Unknown	Undetermined	Intersect

[10] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the USGS Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed September 2024.

[11] According to the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Archaeological Site (41WN23)	Lithic Scatter	Prehistoric	Undetermined	Intersect
Archaeological Site (41WN25)	Lithic Scatter	Prehistoric	Undetermined	Intersect
Archaeological Site (41WN111)	Lithic Scatter	Prehistoric	Undetermined	Intersect
Archaeological Site (41WN113)	Lithic Scatter	Prehistoric	Undetermined	Intersect
Archaeological Site (41WN115)	Lithic Scatter	Prehistoric	Undetermined	Adjacent
Bird Cemetery (WN-C109)	Cemetery	Historic	Undetermined	Intersect
Old Wheeler Cemetery (WN-C017)	Cemetery/OTHM	Historic	Undetermined	Intersect
Pleasant Valley Cemetery (WN-C005)	Cemetery	Historic	Undetermined	Intersect
Steele Branch Cemetery (WN-C006)	Cemetery	Historic	Undetermined	Intersect
Gouger Cemetery (WN-C058)	Vicinity Cemetery	Historic	Undetermined	Intersect
Svoboda Family Cemetery (WN-C131)	Vicinity Cemetery	Historic	Undetermined	Intersect
Chisholm Trail	Historic Trail	Historic	Listed (segments)	Intersect
El Camino Real De Los Tejas	Historic Trail	Historic	Listed (segments)	Intersect
None (N=221)	Buildings/ Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**291.6**

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, the project area and alignment contain eight archaeological sites, four cemeteries, two vicinity cemeteries, two historic trails, one historical marker, and 221 potential historic-age structures; in addition, one archaeological site is located immediately adjacent to the project's pipeline alignment. The probability model for the project indicates a low to moderate likelihood of buried deposits, resulting in a project assessment score is 291.6. Based on these results, a cultural resources assessment for the final design plan is likely necessary, as well as a buffer zone of at least 100 feet between the cemetery and the proposed development.

5.2.27.4 Engineering and Costing

Preliminary engineering and costing analyses were performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required for a new brackish groundwater well field, expansion of the brackish desalination water treatment plant, brine concentrate storage, concentrate disposal via deep well injection, and conveyance of potable water to existing integration pipelines that currently deliver water recovered from the existing local projects.

Because this WMS is MAG-constrained, cost estimate summaries for the SAWS Regional Wilcox Project are included for the Envisioned Yield and for the MAG-Constrained Yield. All cost estimates consider infrastructure and capacities necessary to deliver the sponsor's Envisioned Yield, despite the limited groundwater availability. Therefore, project costs are the same for the Envisioned and MAG-Constrained summaries but unit costs vary, as they are dependent on the yield. For the MAG-Constrained cost estimate summaries, annual unit costs were calculated using the MAG-Constrained Yield in the first decade of implementation. The following cost estimate summary tables are included:

- Envisioned Yield Cost Summary – Phase 2: Table 5.2.27-4
- Envisioned Yield Cost Summary – Phase 3: Table 5.2.27-5
- Total Project Envisioned Yield Cost Summary – Phases 2 and 3: Table 5.2.27-6
- MAG-Constrained Yield Cost Summary – Phase 2: Table 5.2.27-7
- MAG-Constrained Yield Cost Summary – Phase 3: Table 5.2.27-8
- Total Project MAG-Constrained Yield Cost Summary – Phases 2 and 3: Table 5.2.27-9

Table 5.2.27-4 Cost Estimate Summary for the SAWS Regional Wilcox Project (Envisioned Yield) – Phase 1

Item	Estimated Costs
Primary Pump Station (30.1 MGD)	$62,136,000
Transmission Pipeline (42 in. dia.)	$215,050,000
Transmission Pump Station(s) & Storage Tank(s)	$4,600,000
Well Fields (wells, pumps, and piping)	$340,383,000
Water Treatment Plant Expansion (28.6 MGD)	$124,725,000
Integration, Relocations, Backup Generator & Other	$3,419,000
TOTAL COST OF FACILITIES	**$750,313,000**
Planning (3%)	$22,509,000
Design (7%)	$52,522,000
Construction Engineering (1%)	$7,503,000
Legal Assistance (2%)	$15,006,000
Fiscal Services (2%)	$15,006,000
Pipeline Contingency (15%)	$32,257,000
All Other Facilities Contingency (20%)	$107,053,000
All Other Facilities Contingency (20%)	$107,053,000
Environmental and Archaeology Studies and Mitigation	$8,474,000
Land Acquisition and Surveying (1,373 acres)	$8,746,000
Interest During Construction (3% for 2 years with a 0.5% return on investment)	$33,020,000
TOTAL COST OF PROJECT	**$1,052,409,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$73,808,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$5,635,000
Intakes and Pump Stations (2.5% of cost of facilities)	$1,553,000
Water Treatment Plant	$23,386,000
Pumping Energy Costs (111,570,693 kilowatt-hour [kW-h] at 0.09 $/kW-h)	$10,041,000
TOTAL ANNUAL COST	**$114,423,000**
Available Project Yield (acft/yr)	32,000
Annual Cost of Water ($ per acft)	$3,576
Annual Cost of Water After Debt Service ($ per acft)	$1,269
Annual Cost of Water ($ per 1,000 gallons)	$10.97
Annual Cost of Water After Debt Service ($ per 1,000 gallons)	$3.89
*Based on a peaking factor of 1.0.	

Table 5.2.27-5 Cost Estimate Summary for the SAWS Regional Wilcox Project (Envisioned Yield) – Phase 2

Item	Estimated Costs
Transmission Pump Station(s) & Storage Tank(s)	$1,024,000
Well Fields (wells, pumps, and piping)	$87,479,000
Water Treatment Plant Expansion (16.1 MGD)	$69,167,000
TOTAL COST OF FACILITIES	**$157,670,000**
Planning (3%)	$4,730,000
Design (7%)	$11,037,000
Construction Engineering (1%)	$1,577,000
Legal Assistance (2%)	$3,153,000
Fiscal Services (2%)	$3,153,000
All Other Facilities Contingency (20%)	$31,534,000
Environmental and Archaeology Studies and Mitigation	$1,826,000
Land Acquisition and Surveying (303 acres)	$1,447,000
Interest During Construction (3% for 2 years with a 0.5% return on investment)	$7,025,000
TOTAL COST OF PROJECT	**$223,152,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$15,701,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$885,000
Water Treatment Plant	$12,969,000
Pumping Energy Costs (913,225 kilowatt-hour [kW-h] at 0.09 $/kW-h)	$82,000
TOTAL ANNUAL COST	**$29,637,000**
Available Project Yield (acft/yr)	18,000
Annual Cost of Water ($ per acft)*	$1,647
Annual Cost of Water After Debt Service ($ per acft)*	$774
Annual Cost of Water ($ per 1,000 gallons)*	$5.05
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$2.38
*Based on a peaking factor of 1.0.	

Table 5.2.27-6 Total Project Cost Estimate Summary for the SAWS Regional Wilcox Project (Envisioned Yield) – Phases 1 and 2

Item	Estimated Costs
Primary Pump Station (30.1 MGD)	$62,136,000
Transmission Pipeline (42 in. dia.)	$215,050,000
Well Fields (wells, pumps, and piping)	$427,862,000
Water Treatment Plant Expansion (44.7 MGD)	$193,892,000
Integration, Relocations, Backup Generator & Other	$3,419,000
TOTAL COST OF FACILITIES	**$902,359,000**
Planning (3%)	$27,071,000
Design (7%)	$63,165,000
Construction Engineering (1%)	$9,024,000
Legal Assistance (2%)	$18,047,000
Fiscal Services (2%)	$18,047,000
Pipeline Contingency (15%)	$32,257,000
All Other Facilities Contingency (20%)	$137,462,000
Planning (3%)	$27,071,000
Environmental and Archaeology Studies and Mitigation	$10,300,000
Land Acquisition and Surveying (1,597 acres)	$10,193,000
Interest During Construction (3% for 2 years with a 0.5% return on investment)	$39,797,000
TOTAL COST OF PROJECT	**$1,267,722,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$88,958,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$6,463,000
Intakes and Pump Stations (2.5% of cost of facilities)	$1,553,000
Water Treatment Plant	$36,355,000
Pumping Energy Costs (128,011,441 kilowatt-hour [kW-h] at 0.09 $/kW-h)	$11,521,000
TOTAL ANNUAL COST	**$144,850,000**
Available Project Yield (acft/yr)	50,000
Annual Cost of Water ($ per acft)*	$2,897
Annual Cost of Water After Debt Service ($ per acft)*	$1,118
Annual Cost of Water ($ per 1,000 gallons)*	$8.89
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$3.43
*Based on a peaking factor of 1.0.	

Table 5.2.27-7 Cost Estimate Summary for the SAWS Regional Wilcox Project (MAG-Constrained Yield) – Phase 1

Item	Estimated Costs
Primary Pump Station (30.1 MGD)	$62,136,000
Transmission Pipeline (42 in. dia.)	$215,050,000
Transmission Pump Station(s) & Storage Tank(s)	$4,600,000
Well Fields (wells, pumps, and piping)	$340,383,000
Water Treatment Plant Expansion (28.6 MGD)	$124,725,000
Integration, Relocations, Backup Generator & Other	$3,419,000
TOTAL COST OF FACILITIES	**$750,313,000**
Planning (3%)	$22,509,000
Design (7%)	$52,522,000
Construction Engineering (1%)	$7,503,000
Legal Assistance (2%)	$15,006,000
Fiscal Services (2%)	$15,006,000
Pipeline Contingency (15%)	$32,257,000
All Other Facilities Contingency (20%)	$107,053,000
All Other Facilities Contingency (20%)	$107,053,000
Environmental and Archaeology Studies and Mitigation	$8,474,000
Land Acquisition and Surveying (1,373 acres)	$8,746,000
Interest During Construction (3% for 2 years with a 0.5% return on investment)	$33,020,000
TOTAL COST OF PROJECT	**$1,052,409,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$73,808,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$5,635,000
Intakes and Pump Stations (2.5% of cost of facilities)	$1,553,000
Water Treatment Plant	$23,386,000
Pumping Energy Costs (111,570,693 kilowatt-hour [kW-h] at 0.09 $/kW-h)	$10,041,000
TOTAL ANNUAL COST	**$114,423,000**
Available Project Yield (acft/yr)	9,564
Annual Cost of Water ($ per acft)	$11,964
Annual Cost of Water After Debt Service ($ per acft)	$4,247
Annual Cost of Water ($ per 1,000 gallons)	$36.71
Annual Cost of Water After Debt Service ($ per 1,000 gallons)	$13.03
*Based on a peaking factor of 1.0.	

Table 5.2.27-8 Cost Estimate Summary for the SAWS Regional Wilcox Project (MAG-Constrained Yield) – Phase 2

Item	Estimated Costs
Transmission Pump Station(s) & Storage Tank(s)	$1,024,000
Well Fields (wells, pumps, and piping)	$87,479,000
Water Treatment Plant Expansion (16.1 MGD)	$69,167,000
TOTAL COST OF FACILITIES	**$157,670,000**
Planning (3%)	$4,730,000
Design (7%)	$11,037,000
Construction Engineering (1%)	$1,577,000
Legal Assistance (2%)	$3,153,000
Fiscal Services (2%)	$3,153,000
All Other Facilities Contingency (20%)	$31,534,000
Environmental and Archaeology Studies and Mitigation	$1,826,000
Land Acquisition and Surveying (303 acres)	$1,447,000
Interest During Construction (3% for 2 years with a 0.5% return on investment)	$7,025,000
TOTAL COST OF PROJECT	**$223,152,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$15,701,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$885,000
Water Treatment Plant	$12,969,000
Pumping Energy Costs (913,225 kilowatt-hour [kW-h] at 0.09 $/kW-h)	$82,000
TOTAL ANNUAL COST	**$29,637,000**
Available Project Yield (acft/yr)	5,379
Annual Cost of Water ($ per acft)*	$5,510
Annual Cost of Water After Debt Service ($ per acft)*	$2,591
Annual Cost of Water ($ per 1,000 gallons)*	$16.91
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$7.95
*Based on a peaking factor of 1.0.	

Table 5.2.27-9 Total Project Cost Estimate Summary for the SAWS Regional Wilcox Project (MAG-Constrained Yield) - Phases 1 and 2

Item	Estimated Costs
Primary Pump Station (30.1 MGD)	$62,136,000
Transmission Pipeline (42 in. dia.)	$215,050,000
Well Fields (wells, pumps, and piping)	$427,862,000
Water Treatment Plant Expansion (44.7 MGD)	$193,892,000
Integration, Relocations, Backup Generator & Other	$3,419,000
TOTAL COST OF FACILITIES	**$902,359,000**
Planning (3%)	$27,071,000
Design (7%)	$63,165,000
Construction Engineering (1%)	$9,024,000
Legal Assistance (2%)	$18,047,000
Fiscal Services (2%)	$18,047,000
Pipeline Contingency (15%)	$32,257,000
All Other Facilities Contingency (20%)	$137,462,000
Planning (3%)	$27,071,000
Environmental and Archaeology Studies and Mitigation	$10,300,000
Land Acquisition and Surveying (1,597 acres)	$10,193,000
Interest During Construction (3% for 2 years with a 0.5% return on investment)	$39,797,000
TOTAL COST OF PROJECT	**$1,267,722,000**
ANNUAL COST	
Debt Service (3.5%, 20 years)	$88,958,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of cost of facilities)	$6,463,000
Intakes and Pump Stations (2.5% of cost of facilities)	$1,553,000
Water Treatment Plant	$36,355,000
Pumping Energy Costs (128,011,441 kilowatt-hour [kW-h] at 0.09 $/kW-h)	$11,521,000
TOTAL ANNUAL COST	**$144,850,000**
Available Project Yield (acft/yr)	14,943
Annual Cost of Water ($ per acft)*	$9,694
Annual Cost of Water After Debt Service ($ per acft)*	$3,740
Annual Cost of Water ($ per 1,000 gallons)*	$29.74
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$11.48
*Based on a peaking factor of 1.0.	

5.2.27.5 Implementation Considerations

Implementation of the SAWS Regional Wilcox Project includes the following considerations:

- Verification of available groundwater quantity and well productivity;
- Verification of water quality for concentrations of dissolved constituents, such as TDS, chloride, sulfate, iron, manganese, and hydrogen sulfide;
- Verification that desalinated Carrizo-Wilcox Aquifer water is compatible with other water sources being used by customers and will meet all water quality requirements in the end user's distribution system;
- Verification of the potential for deep well injection of concentrate;
- Potential for differing water qualities/chemical constituents in the water;
- Regulations by TCEQ;
- Regulations by and securing permits from the Evergreen UWCD; and
- Experience in operating and maintaining a desalination water treatment plant.

Additional implementation considerations may include impacts on the following:

- Endangered and threatened species;
- Water levels in the aquifer, including potential dewatering of the current artesian part of the aquifer;
- Baseflow in streams; and
- Wetlands.

Additional considerations include competition with others in the area for groundwater in the Carrizo - Wilcox Aquifer from the following:

- Private water purveyors;
- Public water purveyors in the area; and/or
- Future oil and gas drilling operations.

5.2.28 SSLGC Expanded Brackish Wilcox Project

The SCTRWPG identified the SSLGC Expanded Brackish Wilcox Project as a potentially feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.28.1 Description of Water Management Strategy

This WMS is an expansion of an existing SSLGC wellfield in the Brackish Wilcox Aquifer in Gonzales County. The SSLGC Expanded Brackish Wilcox Project is designed to supply 5,000 acft/yr of treated water by the 2040 decade; however, the available yield varies because of MAG limitations. The project includes seven new brackish groundwater wells and a 5 MGD expansion of the existing WTP from 35 MGD to 40 MGD. Brackish groundwater from this WMS would be blended with raw groundwater from the Carrizo Aquifer, which has lower TDS concentrations. The blended water is estimated to have a TDS concentration of 450 mg/L before entering the WTP. The primary recipients of the water are the cities of Schertz and Seguin. Figure 5.2.28-1 illustrates the approximate project location.

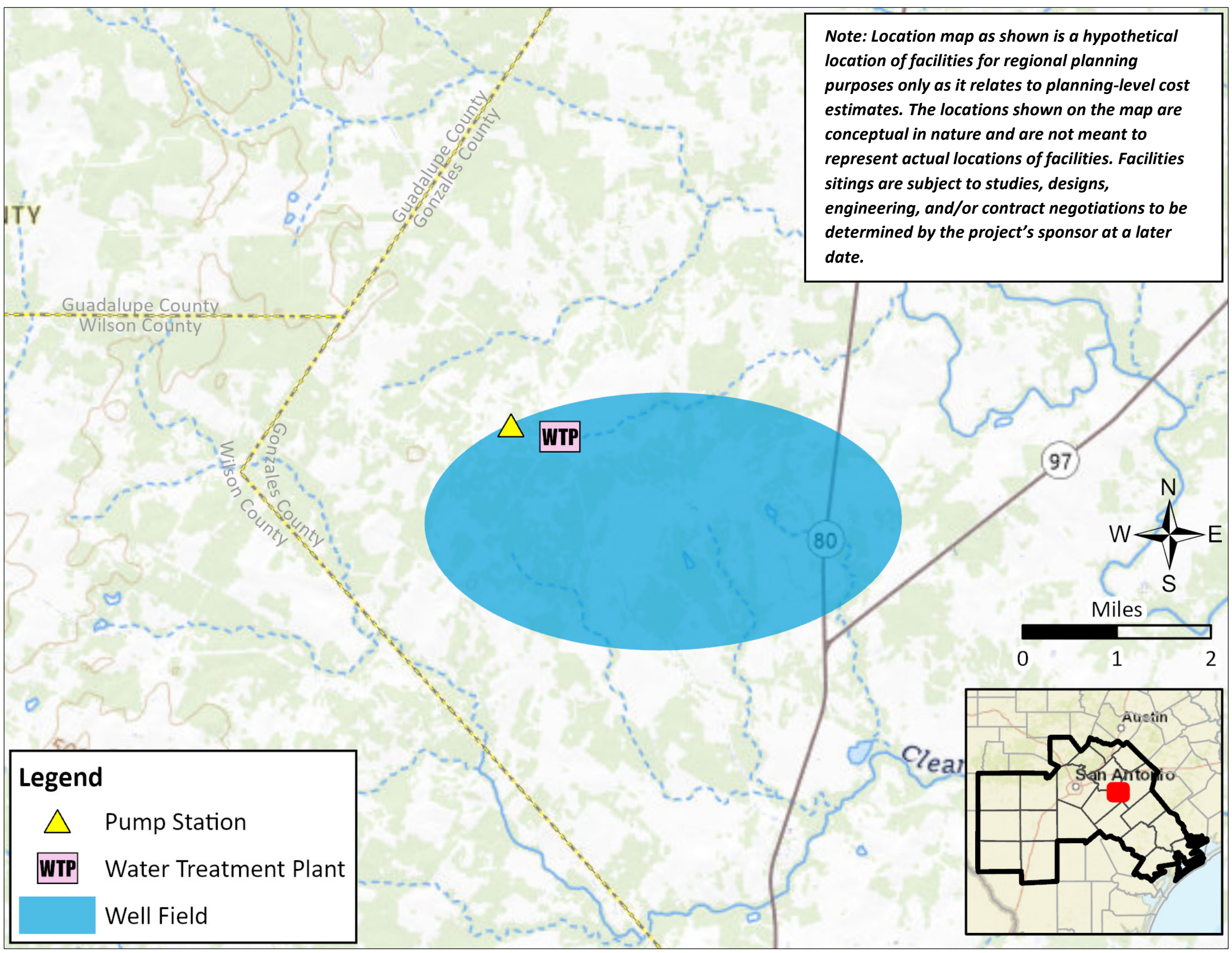

Figure 5.2.28-1 Approximate Location for the SSLGC Expanded Brackish Wilcox Project

5.2.28.2 Available Yield

This WMS is planned for full completion by 2040 and has an available yield that varies by decade because of MAG limitations. Table 5.2.28-1 provides a summary of the yield as envisioned by the sponsor (Envisioned Yield) and the yield available considering MAG constraints (MAG-Constrained Yield) for the SSLGC Expanded Brackish Wilcox Project. The MAG-Constrained Yield is the available yield included in DB27.

Table 5.2.28-1 Envisioned and MAG-Constrained Yields for the SSLGC Expanded Brackish Wilcox Project (acft/yr)

Phase and Yield Type	2030	2040	2050	2060	2070	2080
Envisioned Yield	0	5,000	5,000	5,000	5,000	5,000
MAG-Constrained Yield	0	3,430	5,000	5,000	5,000	4,236

The Gonzales County UWCD regulates groundwater production, well spacing, and other requirements in the Carrizo-Wilcox Aquifer in Gonzales County. In 2021, GMA-13 established DFCs for the Carrizo-Wilcox Aquifer [1]. On the basis of the approved DFCs, the TWDB determined that the MAG estimates for the Carrizo-Wilcox Aquifer in Gonzales County ranges between 60,431 acft/yr and 103,707 acft/yr [2].

Production and/or drilling permits for these wells may be required in accordance with specific GCD rules. For most aquifers in the region, GCDs have adopted DFCs. In some GCDs, full use of all groundwater supplies (permitted, grandfathered and exempt) may result in non-achievement of the DFCs for an aquifer. To ensure consistency with the DFCs, TWDB requires that groundwater availability for each aquifer be limited for planning purposes to the MAG for the discrete geographic-aquifer unit (i.e., aquifer/county/basin unit). In some instances, the sum of existing supplies and future supplies (as groundwater-based WMSs) are greater than the MAG or groundwater availability for a discrete geographic-aquifer unit. This has resulted, for regional water planning purposes only, in adjustments to available yields shown in this plan, and a lack of firm water available for future projects in this plan for some areas for certain time periods. This should not be construed as recommending or requiring that GCDs make these adjustments or deny future permit applications. As described in Guiding Principle V (refer to Appendix 5A), this is not intended to influence or interfere with the regulatory decisions made by the governing boards of permitting entities. The SCTRWPG recognizes and supports the ability of permit holders to exercise their rights to groundwater use in accordance with their permits and it recognizes and supports a GCD's discretion to issue permits and grandfather historical users for amounts in excess of the MAG. The SCTRWPG may not modify groundwater permits that GCDs have already issued or limit future permits that GCDs may issue. If MAG estimates are modified during or after this

[1] Texas Water Development Board, Groundwater Management Area 13 – Desired Future Conditions. https://www.twdb.texas.gov/groundwater/dfc/docs/summary/GMA13_DFC_2021.pdf

[2] Wade, S.C. 2022. GAM Run 21-018 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers in GMA-13: TWDB. https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR21-018_MAG.pdf

planning cycle, the SCTRWPG may amend this plan to adjust WMS supply volumes that are affected by the modified MAG estimate(s).

The proposed wells are in the confined part of the Wilcox Aquifer and are approximately 12 miles downdip of the outcrop. Wells in this area are expected to produce approximately 800 gpm each and have a completion depth of approximately 1,800 feet to 2,400 feet below surface. The new brackish groundwater well field would include seven wells. The majority of the wells are planned to be screened in the Carrizo Sand instead of the Wilcox Group for water quality and depth considerations. Water quality of groundwater from the Carrizo Sand often has elevated concentrations of iron and manganese, which require removal before public use.

Water from the Carrizo-Wilcox Aquifer in this area is expected to have a TDS concentration of about 1,500 mg/L. Typically, reverse osmosis technology would be used to treat the brackish groundwater; however, SSLGC will blend the raw brackish groundwater from this WMS with Carrizo groundwater, which has TDS concentrations of about 300 mg/L. The resulting blended water is estimated to have a TDS concentration of 450 mg/L before entering the WTP for treatment. SSLGC plans to expand their existing conventional WTP from 35 MGD to 40 MGD to handle the new capacity from this well field. It is anticipated that the conventional WTP will include iron and manganese removal. The treated water will be transported to customers via future pipelines shared between SSLGC and CVLGC. These pipelines are included in a separate WMS entitled, “SSLGC Expanded Carrizo Project” (refer to Section 5.2.29).

5.2.28.3 Environmental Factors

The project was evaluated to determine its potential impacts on environmental factors. Table 5.2.28-2 provides a quantitative reporting of the project’s potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.28-2 Summary of Potential Project Effects on Environmental Factors for the SSLGC Expanded Brackish Wilcox Project

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	21
Potential Species Impact Score	9
Potential Habitat Impact Score	2
Potential Stream Construction Impact Score	4
Potential Stream Flow / Water Quality Impact Score	2
Potential Cultural Resources Impact Score	59.47

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project area occurs in the Blackland Prairie and Post Oak Savannah ecoregions. As mapped by TPWD [3]; the project area is primarily grassland and savanna with some wooded areas along streams. The

[3] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/

predominant vegetation communities are savanna grassland, mesquite shrubland, disturbance/tame grassland, and live oak motte and woodland.

Based on TPWD vegetation mapping, the project may have the potential to impact 490 acres of agricultural resources, including 1 acre mapped as row crops and 489 acres mapped as tame/disturbance grassland which may include pasture areas used for grazing or hay production. The proposed well field expansion would result in conversion of land use from undeveloped vegetation or agricultural lands (mostly open fields) to small areas of industrial use.

Aquatic Resources

The project area contains mapped intermittent streams and several unnamed tributaries, including Murray Branch, Nose Creek, Red Branch, and Salt Branch. The Texas Integrated Report of 303(d)-listed water bodies [4] identifies the water bodies or segments in Texas that do not meet assigned water quality standards. The well field project area does not contain listed water bodies. The project area does not contain ecologically significant stream segments as designated by TPWD.

The project will require an on-site delineation of streams, ponds, and wetlands. Well field facilities can typically be sited to avoid impacts to waters of the United States, including wetlands. Since the project would rely on existing pipeline, environmental impacts from the pipeline component should be limited to ongoing maintenance activities.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that have potential to occur in Gonzales County [5, 6]. Suitable habitat may occur for the monarch butterfly (*Danaus plexippus*), which is a candidate for federal listing as a threatened or endangered species.

Suitable habitat may occur for the state-listed threatened species such as white-faced ibis (*Plegadis chihi*), white-tailed hawk (*Buteo albicaudatus*), and Texas horned lizard (*Phrynosoma cornutum*).

There is potential for suitable habitat for numerous wildlife species designated by TPWD as SGCN, including American bumblebee (*Bombus pensylvanicus*), Strecker's chorus frog (*Pseudacris streckeri*), Woodhouse's toad (*Anaxyrus woodhousii*), western burrowing owl (*Athene cunicularia hypugaea*), eastern spotted skunk (*Spilogale putorius*), and plains spotted skunk (*Spilogale interrupta*). In addition, SGCN bat species may utilize structures and could therefore occur in developed areas. The SGCN list also includes numerous plant species, including many for which detailed habitat requirements have not been developed by TPWD. SGCN species do not have formal protected status but are being monitored by TPWD.

Site-specific field surveys would be required to determine the quality of habitat for federally and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If

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[4] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir

[5] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Gonzales County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[6] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation (IPaC) Resource List – Gonzales County. https://ipac.ecosphere.fws.gov/location/index

TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be required to obtain their recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may nest in the project area. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15.

Cultural Considerations

The background literature review identified one cultural resource that intersects with the approximate 6,974-acre project area (Table 5.2-28-3) [7]. This is archaeological site 41GZ208, located within the northern portion of the project area. A recommendation for NRHP-listing for the site has not been made by the THC, which indicates that the site should be regarded as undetermined and avoided or further investigated. Additionally, the historical map review identified 46 potential historic-age structures that intersect with the project area [8].

Table 5.2-28-3 Cultural Resources Results for the SSLGC Expanded Brackish Wilcox Project

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Archaeological Site (41GZ208)	Farmstead	Historic	Undetermined	Intersect
None (N=46)	Buildings/Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**59.47**

A probability model was used to assess the overall archaeological site potential, which included low, medium, and high potential zones. The model indicated that 0.1% of the project area had a moderate likelihood of containing significant unidentified archaeological resources and 99.9% had a low likelihood. No areas were identified by the model as having a high probability. Areas with greater archaeological probability are located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project area that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area. Next, the cultural resources within the project area were evaluated according to its NRHP eligibility. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts, properties or archaeological sites, and cemeteries which each received 5 points;

[7] Texas Historical Commission (THC). 2024. *Texas Archeological and Historical Sites Atlas.* Available at: https://atlas.thc.texas.gov/. Accessed October 2024.
[8] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed October 2024.

NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. The points for all cultural resources within the project area were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for the project equaled 59.47.

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, one archaeological site and 46 potential historic-age structures are located within the project area; the probability model indicates a general low likelihood of buried deposits; and the project assessment score is 59.47. Based on these results, a cultural resources assessment for the final design plan is likely necessary.

5.2.28.4 Engineering and Costing

Preliminary engineering and costing analyses were performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required for a new brackish groundwater well field and expansion of the existing conventional water treatment plant with iron and manganese removal.

A cost estimate summary for the SSLGC Expanded Brackish Wilcox Project is provided in Table 5.2.28-4. Infrastructure was sized to deliver the sponsor's Envisioned Yield, but because the project is MAG-limited, the annual unit costs were calculated using the MAG-Constrained Yield in the first decade of implementation. All cost estimates consider infrastructure and capacities necessary to deliver the sponsor's Envisioned Yield, despite the lack of groundwater availability.

Table 5.2.28-4 Cost Estimate Summary for the SSLGC Expanded Brackish Wilcox Project

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$22,784,000
Water Treatment Plant Expansion (5 MGD)	$16,986,000
TOTAL COST OF FACILITIES	**$39,770,000**
- Planning (3%)	$1,193,000
- Design (7%)	$2,784,000
- Construction Engineering (1%)	$398,000
Legal Assistance (2%)	$795,000
Fiscal Services (2%)	$795,000
All Other Facilities Contingency (20%)	$7,954,000

Environmental & Archaeology Studies and Mitigation	$754,000
Land Acquisition and Surveying (56 acres)	$63,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,772,000
TOTAL COST OF PROJECT	**$56,278,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,960,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$228,000
Water Treatment Plant	$1,314,000
Pumping Energy Costs (24,531,791 kW-hr @ 0.09 $/kW-hr)	$2,208,000
Purchase of Water (5,000 acft/yr @ 8.15 $/acft)	$41,000
TOTAL ANNUAL COST	**$7,751,000**
Available Project Yield (acft/yr)	3,430
Annual Cost of Water ($ per acft)*	$2,260
Annual Cost of Water After Debt Service ($ per acft)*	$1,105
Annual Cost of Water ($ per 1,000 gallons)*	$6.93
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$3.39
* Based on a peaking factor of 1.25	

5.2.28.5 Implementation Considerations

Implementation of the SSLGC Expanded Brackish Wilcox Project includes the following considerations:

- Detailed feasibility evaluation, including test drilling and aquifer and water quality testing, followed by more detailed groundwater modeling to confirm results of this preliminary evaluation. This has been largely accomplished through the operation of the SSLGC well field since startup in October 2002;
- Verification of available groundwater quantity and well productivity;
- Verification of water quality for concentrations of dissolved constituents, such as TDS, chloride, sulfate, iron, manganese, and hydrogen sulfide;
- Verification that blended Carrizo Aquifer and Wilcox Aquifer water is compatible with other water sources being used by customers and will meet all water quality requirements in the end user's distribution system;
- Potential for differing water qualities/chemical constituents in the water;
- Regulations by and obtaining permits from the Gonzales County Underground WCD, including the renewal of pumping permits at 5 year intervals.

Additional implementation considerations may include impacts on the following:

- Endangered and threatened species;
- Water levels in the aquifer;
- Baseflow in streams; and
- Wetlands.

Additional considerations include competition with others in the area for groundwater in the Carrizo-Wilcox Aquifer from the following:

- Private water purveyors;
- Public water purveyors in the area; and/or
- Future oil and gas drilling operations.

5.2.29 SSLGC Expanded Carrizo Project

The SCTRWPG identified the SSLGC Expanded Carrizo Project as a potentially feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.29.1 Description of Water Management Strategy

This WMS is an expansion of the existing Schertz-Seguin Water Supply Project, owned and operated by SSLGC. The SSLGC Expanded Carrizo Project is designed to supply 6,000 acft/yr of treated water by the 2030 decade; however, the available yield varies because of MAG limitations. SSLGC has obtained a permit for 4,035 acft/yr from the Carrizo Aquifer in southeastern Guadalupe County, and a permit for 1,290 acft/yr from the Wilcox Aquifer in southeastern Guadalupe County. SSLGC plans to obtain additional permits for 675 acft/yr.

The SSLGC Expanded Carrizo Project will include 10 production wells in a new well field located in southeastern Guadalupe County on lands owned or leased by SSLGC. After treatment at a new 6 MGD WTP, water will be transported to customers via a shared pipeline between SSLGC and CVLGC, which will run parallel to SSLGC's existing transmission pipeline. The primary recipients of the water are the cities of Schertz and Seguin. Figure 5.2.29-1 illustrates the approximate project location.

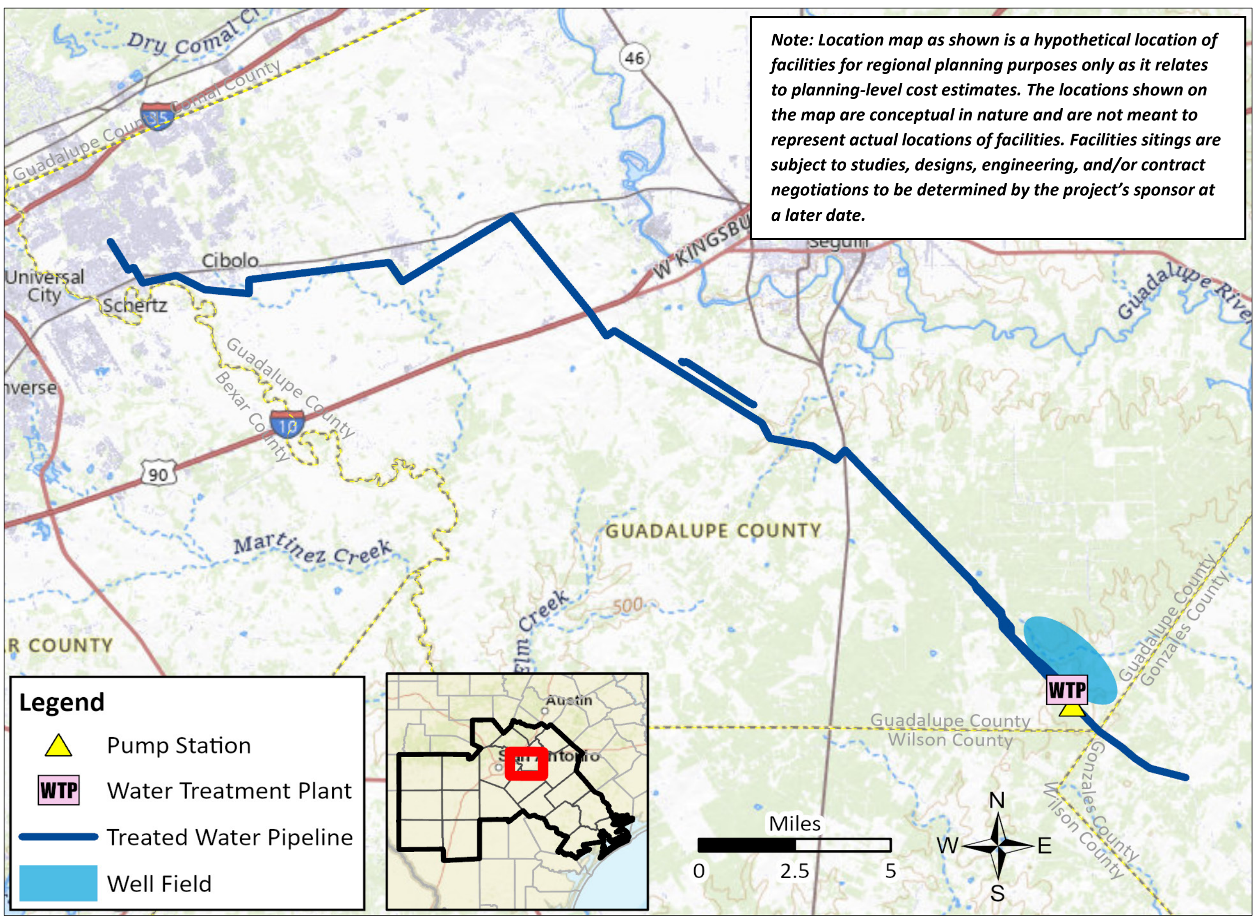

Figure 5.2.29-1 Approximate Location for the SSLGC Expanded Carrizo Project

5.2.29.2 Available Yield

This WMS is planned for full completion by 2030 and has an available yield that varies by decade because of MAG limitations. Table 5.2.29-1 provides a summary of the yield as envisioned by the sponsor (Envisioned Yield) and the yield available considering MAG constraints (MAG-Constrained Yield) for the SSLGC Expanded Carrizo Project. The MAG-Constrained Yield is the available yield included in DB27.

Table 5.2.29-1 Envisioned and MAG-Constrained Yields for the SSLGC Expanded Carrizo Project (acft/yr)

Phase and Yield Type	2030	2040	2050	2060	2070	2080
Envisioned Yield	6,000	6,000	6,000	6,000	6,000	6,000
MAG-Constrained Yield	2,190	1,944	2,228	2,034	2,050	1,972

The Guadalupe County GCD regulates groundwater production, well spacing, and other requirements in the Carrizo-Wilcox Aquifer in Guadalupe County. In 2021, GMA-13 established DFCs for the Carrizo-Wilcox Aquifer [1]. On the basis of the approved DFCs, the TWDB determined that the MAG estimates for the Carrizo-Wilcox Aquifer in Guadalupe County ranges between 39,563 acft/yr and 55,637 acft/yr [2].

Production and/or drilling permits for these wells may be required in accordance with specific GCD rules. For most aquifers in the region, GCDs have adopted DFCs. In some GCDs, full use of all groundwater supplies (permitted, grandfathered and exempt) may result in non-achievement of the DFCs for an aquifer. To ensure consistency with the DFCs, TWDB requires that groundwater availability for each aquifer be limited for planning purposes to the MAG for the discrete geographic-aquifer unit (i.e., aquifer/county/basin unit). In some instances, the sum of existing supplies and future supplies (as groundwater-based WMSs) are greater than the MAG or groundwater availability for a discrete geographic-aquifer unit. This has resulted, for regional water planning purposes only, in adjustments to available yields shown in this plan, and a lack of firm water available for future projects in this plan for some areas for certain time periods. This should not be construed as recommending or requiring that GCDs make these adjustments or deny future permit applications. As described in Guiding Principle V (refer to Appendix 5A), this is not intended to influence or interfere with the regulatory decisions made by the governing boards of permitting entities. The SCTRWPG recognizes and supports the ability of permit holders to exercise their rights to groundwater use in accordance with their permits and it recognizes and supports a GCD's discretion to issue permits and grandfather historical users for amounts in excess of the MAG. The SCTRWPG may not modify groundwater permits that GCDs have already issued or limit future permits that GCDs may issue. If MAG estimates are modified during or after this planning cycle, the SCTRWPG may amend this plan to adjust WMS supply volumes that are affected by the modified MAG estimate(s).

SSLGC currently holds permits to pump 19,362 acft/yr of groundwater from the Carrizo Aquifer in western Gonzales County at its existing Carrizo Wellfield. For this WMS, SSLGC plans to expand into a

[1] Texas Water Development Board, Groundwater Management Area 13 – Desired Future Conditions. https://www.twdb.texas.gov/groundwater/dfc/docs/summary/GMA13_DFC_2021.pdf

[2] Wade, S.C. 2022. GAM Run 21-018 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson Aquifers in GMA-13: TWDB. https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR21-018_MAG.pdf

new well field in Guadalupe County which will provide a supply of 6,000 acft/yr. SSLGC has obtained a permit for 4,035 acft/yr from the Carrizo Aquifer in southeastern Guadalupe County, and a permit for 1,290 acft/yr from the Wilcox Aquifer in southeastern Guadalupe County. SSLGC would need to obtain additional permits for 675 acft/yr.

The project will consist of 10 new production wells: eight wells in the Carrizo Aquifer and two wells in the Wilcox Aquifer. The Carrizo Aquifer, near the planned well field, is in the confined part of the aquifer, and approximately 2 miles downdip of the outcrop. Hydrogeologic maps of the aquifer in this area suggest that wells would be capable of producing more than 500 gpm and have a completion depth of approximately 800 feet deep. The Wilcox Aquifer wells will be capable of producing approximately 400 gpm and be between 1,000 and 1,600 below surface. The majority of the wells are planned to be screened in the Carrizo Sand instead of the Wilcox Group for water quality and depth considerations.

Water from the Carrizo-Wilcox Aquifer in this area is expected to have a TDS concentration of less than 300 mg/L. However, the water quality of groundwater from the Carrizo Sand often has elevated concentrations of iron and manganese, which require removal to meet drinking water quality standards. This WMS includes a new 6 MGD WTP at the new well field for chlorine disinfection and iron and manganese removal. The treated water will be conveyed to customers via future pipelines shared between SSLGC and CVLGC. The shared treated water pipeline is sized to convey yields from this SSLGC Expanded Carrizo Project WMS, the SSLGC Expanded Brackish Wilcox Project WMS (refer to Section 5.2.28), and the CVLGC Carrizo Project WMS (Refer to Section 5.2.19). Pipeline costs are only shared between the CVLGC Carrizo Project WMS and this SSLGC Expanded Carrizo Project WMS.

5.2.29.3 Environmental Factors

The project was evaluated to determine its potential impacts on environmental factors. Table 5.2.29-2 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.29-2 Summary of Potential Project Effects on Environmental Factors for the SSLGC Expanded Carrizo Project

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	155
Potential Species Impact Score	9
Potential Habitat Impact Score	2
Potential Stream Construction Impact Score	31
Potential Stream Flow / Water Quality Impact Score	1
Potential Cultural Resources Impact Score	109

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

The project area occurs in the Blackland Prairies and East Central Texas Plains ecoregions. As mapped by Texas Parks and Wildlife Department (TPWD) [3]; the project area includes a variety of vegetation types -- primarily grassland and savanna with more wooded areas towards the southeastern part of the project area and wooded riparian areas along streams. The predominant vegetation communities are savanna grassland, mesquite shrubland, post oak motte/woodland, and disturbance/tame grassland. The project vicinity is rural, dominated by agricultural uses and undeveloped grassland and wooded areas.

Based on TPWD vegetation mapping, the project may have the potential to impact 155 acres of agricultural resources, including 43 acres mapped as row crops and 112 acres mapped as tame/disturbance grassland which may include pasture areas used for grazing or hay production.

Project pipeline easements would require removal of woody vegetation and long-term maintenance (mowing, woody vegetation clearing) to maintain easement access. Herbaceous vegetation would be expected to quickly re-establish within pipeline easements once construction has been completed. Revegetation of easements and other disturbed areas provides the opportunity to plant native species that are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each water management strategy to determine the best course of action regarding revegetation. Pipeline easements may continue to be used for agricultural purposes.

The proposed well field expansion would result in conversion of land use from undeveloped vegetation and agricultural areas (mostly open fields and shrubland) to small areas of industrial use.

Aquatic Resources

The NHD indicates that the proposed pipeline would cross Santa Clara Creek, Deadman Creek, Sandies Creek, Krams Creek, Konde Branch, Elm Creek, Cottonwood Creek, Campbell Branch, and several unnamed tributaries. The NWI mapping identifies 42 acres of ponds/potential wetlands in the overall project area. The Texas Integrated Report of 303(d)-listed water bodies[4] identifies the water bodies or segments in Texas that do not meet assigned water quality standards. Segment 1803B of Sandies Creek, within the project alignment, and Segment 1913 of Cibolo Creek, south of the pipeline alignment, are listed as impaired. The well field project area does not contain listed impaired water bodies. The project area does not contain ecologically significant stream segments as designated by TPWD.

The project will require an on-site delineation of streams, ponds, and wetlands. Well field facilities can typically be sited to avoid impacts to waters of the United States including wetlands. Stream crossings for pipeline construction would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including if there would be permanent impacts to more than 0.1 acre of waters of the United States. The USACE permit requires that there will be no change in preconstruction contours

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[3] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/.

[4] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d)*. https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir.

of waters of the United States. Utility crossings under streams (e.g., through horizontal directional drilling) would not require a USACE permit.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that have potential to occur in Guadalupe and Gonzales Counties [5],[6],[7],[8]. Suitable habitat may occur for the federally endangered whooping crane (*Grus americana*), false spike (*Fusconaia mitchelli*), Guadalupe orb (*Cyclonaias necki*), candidate monarch butterfly (*Danaus plexippus*), and the proposed endangered tricolored bat (*Perimyotis subflavus*). The whooping crane has a low likelihood to occur during migration, and the project pipeline crosses streams that have a low potential to provide suitable habitat for endangered freshwater mussels.

Suitable habitat may occur for the state-listed threatened species white-faced ibis (*Plegadis chihi*), white-tailed hawk (*Buteo albicaudatus*), Texas horned lizard (*Phrynosoma cornutum*), Texas tortoise (*Gopherus berlandieri*), and timber rattlesnake (*Croatalus horridus*). There is potential for suitable habitat for numerous wildlife species designated by TPWD as SGCN, including American bumblebee (*Bombus pensylvanicus*), Strecker's chorus frog (*Pseudacris streckeri*), Woodhouse's toad (*Anaxyrus woodhousii*), western burrowing owl (*Athene cunicularia hypugaea*), American badger (*Taxidea taxus*), eastern spotted skunk (*Spilogale putorius*), and plains spotted skunk (*Spilogale interrupta*). In addition, SGCN bat species may utilize structures and could therefore occur in developed areas. The SGCN list also includes numerous plant species, including many for which detailed habitat requirements have not been developed by TPWD. SGCN species do not have formal protected status but are being monitored by TPWD.

Site-specific field surveys would be required to determine the quality of habitat for freshwater mussels if streams would be impacted. Consultation with the USFWS would be required if mussel suitable habitat may be affected by pipeline construction activities. The regulatory status of the tricolored bat and monarch butterfly may change during the duration of the project; if these species are listed as threatened or endangered, additional field studies and USFWS consultation may be required. Site-specific field surveys would also be required to determine the quality of habitat for state-listed species. Coordination with TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD will likely be required to obtain their recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may nest in the project area. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a

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[5] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Guadalupe County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[6] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation (IPaC) Resource List – Guadalupe County. https://ipac.ecosphere.fws.gov/location/index.

[7] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Gonzales County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/.

[8] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation (IPaC) Resource List – Gonzales County. https://ipac.ecosphere.fws.gov/location/index.

recommendation to conduct preconstruction nest surveys or avoid vegetation clearing during the general bird nesting season of March 15 to September 15.

Cultural Considerations

The background literature review identified 11 cultural resources that intersect with the approximate 9,583-acre project area and alignment or are immediately adjacent (i.e., within 300 feet) to the project's pipeline alignment (Table 5.2.29-3) [9]. The project area and alignment contain six archaeological sites (i.e., 41GU131, 41GU169, 41GU196, 41GU238, 41GU239, and 41GZ208). Cultural resources located immediately adjacent to the project's pipeline alignment include four archaeological sites (i.e., 41GU19, 41GU192, 41GU194, and 41GU195) and one historical marker (i.e., Cibolo). Out of the 10 archaeological sites within the project area and alignment and immediately adjacent to the pipeline alignment, two are ineligible for listing on the NRHP (i.e., 41GU19 and 41GU131), and eight remain undetermined (i.e., 41GU169, 41GU192, 41GU194, 41GU195, 41GU196, 41GU238, 41GU239, and 41GZ208) [10] for listing on the NRHP. Additionally, the historical map review identified 72 potential historic-age structures that intersect with the project area and alignment or are immediately adjacent to the project's pipeline alignment [11].

A probability model was used to assess the overall archaeological site potential, which included low, medium, and high potential zones. The model indicated that 6% of the project area and alignment had a high likelihood of containing significant unidentified archaeological resources, 10% had a moderate likelihood, and 84% had a low likelihood. Areas with greater archaeological probability are located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project area and alignment that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first calculated for the project area and alignment. Next, the cultural resources within the project area and alignment were evaluated according to its NRHP eligibility. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts, properties or archaeological sites, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. The points for all cultural resources within the project area and alignment were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for the project equaled 109.

[9] Texas Historical Commission (THC). 2024. *Texas Archeological and Historical Sites Atlas.* Available at: https://atlas.thc.texas.gov/. Accessed July 2024.

[10] THC (2024).

[11] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed September 2024.

Table 5.2.29-3 Cultural Resources Results for SSLGC Expanded Carrizo Project

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility	Location
Archaeological Site (41GU19)	Open Campsite	Prehistoric	Ineligible within ROW (THC 5/10/2007)	Adjacent
Archaeological Site (41GU131)	Lithic Scatter / Artifact Scatter	Prehistoric and Historic	Ineligible within ROW (THC 7/5/2011)	Intersect
Archaeological Site (41GU169)	Farmstead	Historic	Undetermined	Intersect
Archaeological Site (41GU192)	Unknown	Unknown	Undetermined	Adjacent
Archaeological Site (41GU194)	Lithic Scatter	Prehistoric	Undetermined	Adjacent
Archaeological Site (41GU195)	Lithic Scatter	Prehistoric	Undetermined	Adjacent
Archaeological Site (41GU196)	Oil tank	Historic	Undetermined	Intersect
Archaeological Site (41GU238)	Unknown	Unknown	Undetermined	Intersect
Archaeological Site (41GU239)	Unknown	Unknown	Undetermined	Intersect
Archaeological Site (41GZ208)	Farmstead	Historic	Undetermined	Intersect
Cibolo	Historical Marker	Historic	Undetermined	Adjacent
None (N=72)	Buildings/Structures	Historic	–	Intersect
Assessment Score Total	**All**	**All**	**All**	**109**

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, the project area and alignment contain six archaeological sites, and 72 potential historic-age structures; in addition, four archaeological sites and one historical marker are located immediately adjacent to the project's pipeline alignment. The probability model for the project indicates a low to moderate likelihood of buried deposits; and the project assessment score is 109. Based on these results, a cultural resources assessment is likely necessary for the final design plan.

5.2.29.4 Engineering and Costing

Preliminary engineering and costing analyses were performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required for a new groundwater well field, new water treatment plant with iron and manganese removal, and conveyance of potable water to the delivery point via shared treated water pipelines with CVLGC.

Although the project is MAG-constrained, cost estimates consider infrastructure and capacities necessary to deliver the sponsor's Envisioned Yield, despite the limited groundwater availability. The annual unit costs were calculated using the available/MAG-constrained yields in the first decade of implementation. The shared pipelines and pump stations are sized to convey the Envisioned Yields from this SSLGC Expanded Carrizo Project WMS, the SSLGC Expanded Brackish Wilcox Project WMS (refer to Section 5.2.28), and the CVLGC Carrizo Project WMS (Refer to Section 5.2.19). For planning purposes, pipelines and pump station costs are only shared between the CVLGC Carrizo Project WMS and this SSLGC Expanded Carrizo Project WMS. A cost estimate summary for the SSLGC Expanded Carrizo Project is provided in Table 5.2.29-4.

Table 5.2.29-4 Cost Estimate Summary for SSLGC Expanded Carrizo Project

Item	Estimated Costs
Primary Pump Station (19.9 MGD)	$6,505,000
Transmission Pipeline (36-42 in. dia., 41.2 miles)	$70,846,000
Transmission Pump Station(s) and Storage Tank(s)	$2,749,000
Well Fields (Wells, Pumps, and Piping)	$22,410,000
Water Treatment Plant (6 MGD)	$27,941,000
Integration, Relocations, Backup Generator & Other	$849,000
TOTAL COST OF FACILITIES	**$131,300,000**
Planning (3%)	$3,939,000
Design (7%)	$9,191,000
Construction Engineering (1%)	$1,313,000
Legal Assistance (2%)	$2,626,000
Fiscal Services (2%)	$2,626,000
Pipeline Contingency (15%)	$10,627,000
All Other Facilities Contingency (20%)	$12,091,000
Environmental & Archaeology Studies and Mitigation	$580,000
Land Acquisition and Surveying (564 acres)	$1,570,000
Interest During Construction (3.5% for 1 year with a 0.5% ROI)	$5,689,000
TOTAL COST OF PROJECT	**$181,552,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$12,715,000
O&M	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$941,000

Item	Estimated Costs
Intakes and Pump Stations (2.5% of Cost of Facilities)	$231,000
WTP	$2,031,000
Pumping Energy Costs (11,240,419 kW-hr @ 0.09 $/kW-hr)	$1,298,000
TOTAL ANNUAL COST	**$17,216,000**
Available Project Yield (acft/yr)	2,190
Annual Cost of Water ($ per acft)*	$7,861
Annual Cost of Water After Debt Service ($ per acft)*	$2,055
Annual Cost of Water ($ per 1,000 gallons)*	$24.12
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$6.31
* Based on a Peaking Factor of 1.25.	

5.2.29.5 Implementation Considerations

Implementation of the SSLGC Expanded Carrizo Project includes the following considerations:

- Detailed feasibility evaluation, including test drilling and aquifer and water quality testing, followed by more detailed groundwater modeling to confirm results of this preliminary evaluation;
- Verification of available groundwater quantity and well productivity;
- Verification of water quality for concentrations of dissolved constituents, such as TDS, chloride, sulfate, iron, manganese, and hydrogen sulfide;
- Verification that blended Carrizo Aquifer and Wilcox Aquifer water is compatible with other water sources being used by customers and will meet all water quality requirements in the end user's distribution system;
- Potential for differing water qualities/chemical constituents in the water;
- Regulations by and obtaining permits from the GCGCD, including the renewal of pumping permits at 5 year intervals.

Additional implementation considerations may include impacts on the following:

- Endangered and threatened species;
- Water levels in the aquifer;
- Baseflow in streams; and
- Wetlands.

Additional considerations include competition with others in the area for groundwater in the Carrizo-Wilcox Aquifer from the following:

- Private water purveyors;

- Public water purveyors in the area; and/or
- Future oil and gas drilling operations.

5.2.30 Victoria ASR Project

The SCTRWPG identified the Victoria ASR Project as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.30.1 Description of Water Management Strategy

Through most of its history, the City of Victoria (Victoria) relied on locally available groundwater supplies withdrawn from the Gulf Coast Aquifer. To support continued growth, limit drawdowns in aquifer levels, and maintain water quality, Victoria obtained a new surface water appropriation (P#5466) in the 1990s that authorized diversions from the Guadalupe River. However, because the appropriation is subject to other senior water rights and includes special conditions requiring streamflow passage for environmental protection, the supplies available under P#5466 are limited during drought. Since the 1990s, Victoria has obtained six additional surface water rights senior in priority to P#5466 from willing sellers.

In 2014, Victoria conducted a study to assess the feasibility of ASR as a water supply source during periods of drought. Based on the favorable results, Victoria plans to firm up its existing water supply with the addition of an ASR project to its water system. Figure 5.2.30-1 shows an approximate location for the Victoria ASR Project.

Like any ASR project, the purpose is to store water during times of plenty and to recover the water during times of shortage. The Victoria ASR Project was designed to consider both the short-term and long-term timeframes. For the short-term or annual cycle, water is stored during winter and spring and recovered during the summer. For the long-term or multi-year cycle, water is stored over several years or even decades to provide emergency supply during a major drought.

Currently, Victoria has one ASR well undergoing cycle testing, which is the process of recharging and recovering ASR water. The ASR well was a retrofit of an existing well, Well #19, which underwent extensive reconditioning and repair to convert it to a functioning ASR well. Victoria is authorized to perform cycle testing of Well #19 under a Class V Underground Injection Control Permit through the TCEQ. As of December 2021, Victoria has established storage of approximately 615 acft in the Gulf Coast Aquifer. The targeted total storage volume is approximately 165,000 acft, including 83,000 acft of buffer zone water.

The Victoria ASR Project involves conducting the necessary studies and testing to obtain the required TCEQ permits for implementation of new ASR wells; acquisition of necessary well drilling and production permits; and design and construction of wells, pipelines, and other associated ASR facilities.

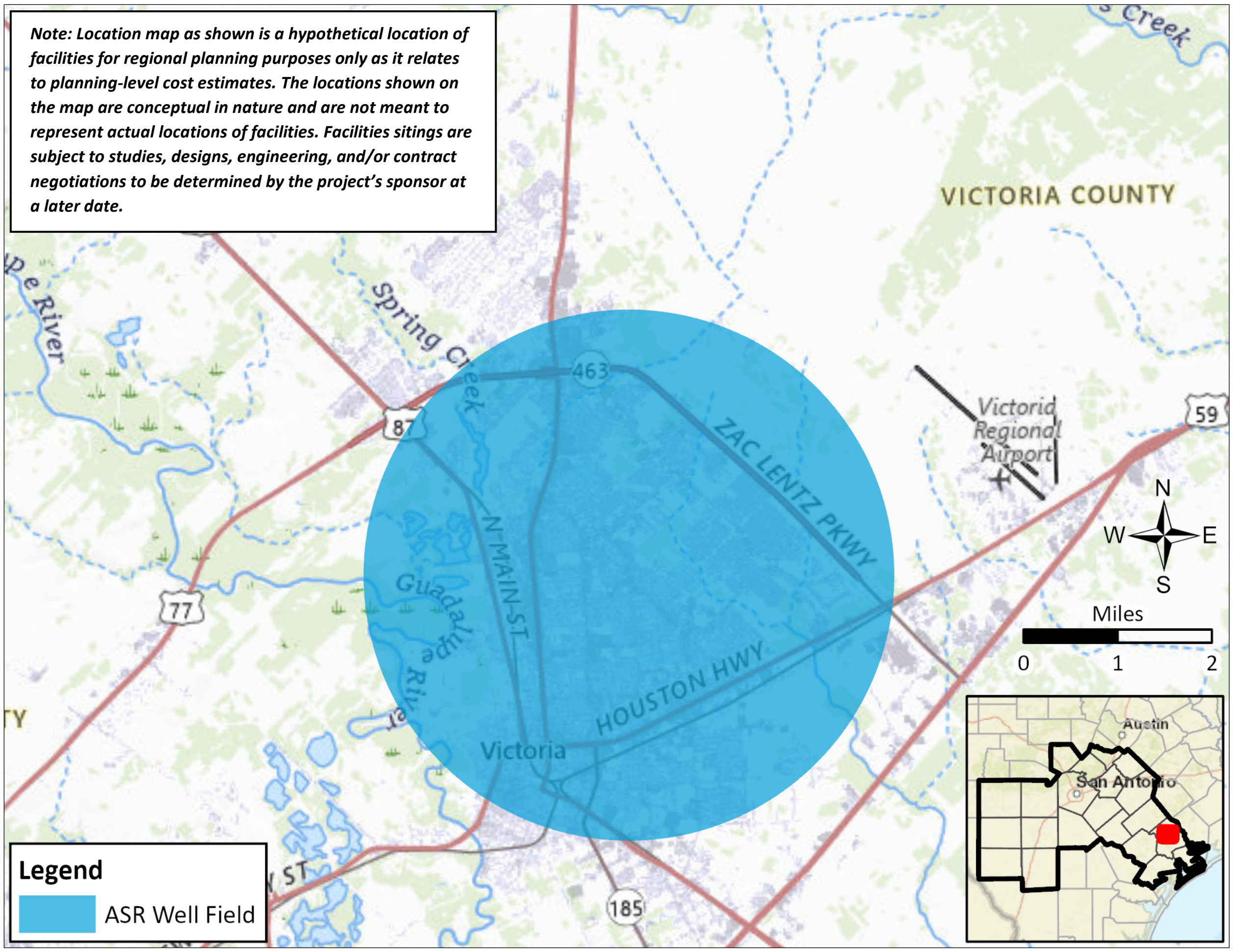

Figure 5.2.30-1 Approximate Location of the Victoria ASR Project

5.2.30.2 Available Yield

This WMS has a firm yield of 7,000 acft/yr and is planned for full completion by 2030. Table 5.2.30-1 provides a summary of the available yield for the Victoria ASR Project.

Table 5.2.30-1 Available Yield for the Victoria ASR Project (acft/yr)

WMS	2030	2040	2050	2060	2070	2080
Victoria ASR Project	7,900	7,900	7,900	7,900	7,900	7,900

The City of Victoria currently has six surface water rights totaling 27,007 acft/yr. When the City has excess treated water in its distribution system, that water will be injected via the proposed ASR wells for storage in the Gulf Coast Aquifer. The City will be able to recover the stored water for treatment and distribution. Feasibility studies have determined that the ASR project's objectives can be met utilizing the existing water treatment plant's rated capacity of 25.2 MGD.

The project will increase the firm supply incrementally up to 7,900 acft/yr. The targeted stored water volume within the aquifer will be 82,000 acft with an additional 83,000 acft buffer zone volume that would remain in the aquifer, resulting in a target total storage volume of 165,000 acft. As mentioned previously, Victoria already has one ASR well that was retrofitted to convert it from a conventional groundwater well to an ASR well. As of 2021, the City of Victoria has established storage of approximately 615 acft in the Gulf Coast Aquifer.

ASR wellfield capacity is dependent on aquifer recharge capacity, which is estimated to be 2.3 MGD (1,600 gpm) per well, based on recent studies and information obtained from cycle testing of the City's existing, retrofitted ASR well. The recovery rate is estimated to be 4.53 MGD (3,100 gpm) per well. When fully developed, the ASR Project is anticipated to include 5 to 10 wells that are collectively capable of groundwater recovery at a rate of approximately 23.0 MGD (16,000 gpm) and recharge at a rate of approximately 1.2 MGD (800 gpm).

5.2.30.3 Environmental Factors

The project was evaluated to determine its potential impacts on environmental factors. Table 5.2.30-2 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.30-2 Summary of Potential Project Effects on Environmental Factors for the Victoria ASR Project

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	5,521
Potential Species Impact Score	3
Potential Habitat Impact Score	1
Potential Stream Construction Impact Score	1
Potential Stream Flow / Water Quality Impact Score	2
Potential Cultural Resources Impact Score	1,566

Environmental Considerations

Since the potential project could occur within various locations within Victoria, the environmental constraints analysis encompassed the area within city limits. Individual project components can likely be sited to avoid sensitive habitat features. It was assumed that there would not be significant project impacts in the Guadalupe River.

Vegetation and Land Use, and Agricultural Resources

The project area occurs in the Gulf Prairies and Marshes ecoregion and includes a mix of developed urban area and undeveloped vegetation communities. As mapped by TPWD,[1] the dominant vegetation types in the project area are urban low intensity, Gulf Coast coastal prairie, urban high intensity, row crops, floodplain hardwood forest, and floodplain grassland. Much of the urban uses in the project area would be expected to contain maintained lawns and landscape species.

[1] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/

Based on TPWD vegetation mapping, the Victoria ASR project area includes 703 acres of agricultural resources mapped as row crops and 4,818 acres mapped as coastal prairie that may be used for livestock grazing or hay production.

Aquatic Resources

The project area contains approximately 10 linear miles of intermittent streams and 5.5 linear miles of perennial streams. The Guadalupe River flows generally north to south along the western side of the city and has an extensive floodplain area; Pacedo Creek flows generally northwest to southeast through the eastern side of the city. The NWI mapping shows 29.5 acres of emergent wetlands, 216 acres of forested wetlands, and 56 acres of ponds. The Texas Integrated Report of 303(d) listed water bodies[2] identifies the water bodies or segments in Texas that do not meet assigned water quality standards. Segment 1803 of the Guadalupe River is classified as an impaired stream segment. The project area does not contain ecologically significant stream segments as designated by TPWD.

The project will require an on-site delineation of streams, ponds, and wetlands. Well facilities can typically be sited to avoid impacts to waters of the United States, including wetlands. Stream crossings for pipeline construction, if applicable, would result in temporary stream impacts that would require USACE permitting. Pipeline stream crossings are typically covered by USACE Nationwide Permit 58, Utility Line Activities for Water and Other Substances. A preconstruction notification to the USACE is required under certain conditions, including if there would be permanent impacts to more than 0.1 acre of waters of the United States. The USACE permit requires no change will occur in preconstruction contours of waters of the United States. Utility crossings under streams (e.g., through horizontal directional drilling) would not require a USACE permit.

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened, endangered, and candidate species and species of concern that may occur in Victoria County [3] [4]. Suitable habitat may occur for the proposed federally endangered tricolored bat (*Perimyotis subflavus*), and the monarch butterfly (*Danaus plexippus*), which is a candidate species for federal listing as threatened or endangered. Because of the developed nature of much of the project area, suitable habitat is not expected to occur for most state-listed species; however, suitable habitat for species that utilize open, sparsely vegetated areas, such as the state-threatened Texas horned lizard (*Phrynosoma cornutum*) is possible.

There is low to moderate potential for suitable habitat for several wildlife species designated by TPWD as SGCN: American bumblebee (*Bombus pensylvanicus*), southern crawfish frog (*Lithobates areolatus areolatus*), Strecker's chorus frog (*Pseudacris streckeri*), Woodhouse's toad (*Anaxyrus woodhousii*), western burrowing owl (*Athene cunicularia hypugaea*), eastern spotted skunk (*Spilogale putorius*), and plains spotted skunk (*Spilogale interrupta*). In addition, SGCN bat species may utilize structures and could, therefore, occur in developed areas. SGCN species do not have formal protected status but are being monitored by TPWD.

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[2] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d).* https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24tixr

[3] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Victoria County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[4] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Victoria County. https://ipac.ecosphere.fws.gov/location/index

Site-specific field surveys would be required to determine the quality of habitat and potential for impacts to federal and state-listed species. Coordination with USFWS and TPWD may be required to mitigate species impacts. If TWDB funding/financing will be used for the project, formal coordination with TPWD would likely be required to obtain its recommendations on minimizing impacts to protected species and sensitive habitats. If suitable habitat occurs, TPWD may request preconstruction surveys to search for and relocate any protected species that occur in the project area.

Migratory birds may occur or nest in the project area. The federal MBTA protects birds, nests, and eggs unless permitted by USFWS. TPWD recommendations for project due diligence typically include a recommendation to conduct preconstruction nest surveys or to avoid vegetation clearing during the general bird nesting season from March 15 to September 15. Preconstruction surveys for active bird nests are recommended.

Cultural Considerations

For the proposed project, a background literature review of the project area was performed. The background literature review identified 257 cultural resources within the approximate 15,952-acre project area (Table 5.2.30-3) [5]. These cultural resources are eight archaeological sites, two NRHP-listed historic districts, two NRHP-eligible historic districts with 29 contributing resources, 87 NRHP-listed historic properties, one NRHP-eligible historic property, four SALs, 28 Recorded Texas Historical Landmarks (RTHLs), six cemeteries, eight NRHP-eligible 1936 Texas Centennial Markers, and 83 Official Texas Historical Markers (OTHMs). Note that there are several cultural resources with multiple resource types. Out of the eight archaeological sites, two are NRHP-listed, two are eligible for NRHP-listing, and four remain undetermined for listing on the NRHP. One of the cemeteries (Evergreen) is a designated Historic Texas Cemetery. Additionally, the historical map review identified 816 potential historic-age buildings/structures that are within the project area [6].

In the State of Texas, all human burials are protected by law [7], and warrant avoidance with a minimum 100-foot avoidance buffer. If human burials are encountered in the project area and the remains are determined to be Native American, they will be managed in accordance with procedures established through coordination with the THC, and work in the affected area could only resume per THC authorization.

A probability model was used to assess the overall potential of buried prehistoric archaeological deposits in the project area and alignment, which included low, medium, and high potential zones. The model indicated that 13.3% of the project alignment had a high likelihood of containing significant unidentified archaeological resources, 27.3% had a moderate likelihood, and 59.4% had a low likelihood. Areas with greater archaeological probability are located near previously known archaeological sites, historic features, and landforms adjacent to existing drainage systems.

A cultural assessment score was developed for the project area that considered the probability model of archaeological potential information, as well as the presence of previously recorded cultural resources and known potential historic-age structures. Using the probability model data, a mean score was first

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[5] Texas Historical Commission (THC). 2024. Texas Archeological and Historical Sites Atlas. Available at: https://atlas.thc.texas.gov/. Accessed October 2024.

[6] U.S. Geological Survey (USGS). 2024. TopoView: historical topographic map collection. Published by the U.S. Geological Survey (USGS). Available at: http://ngmdb.usgs.gov/maps/TopoView. Accessed September 2024.

[7] According to the Texas Health and Safety Code Section 711 General Provisions Relating to Cemeteries and the Texas Administrative Code, Title 13, THC, Chapter 22 Cemeteries.

calculated for the project area. Next, the cultural resources within the project area were evaluated according to its NRHP eligibility and SAL designation. The values attributed to each resource type include: NRHP-listed or NRHP-eligible districts and properties or archaeological sites, SALs, and cemeteries which each received 5 points; NRHP undetermined archaeological sites received 2.5 points; and NRHP ineligible archaeological sites received 0.5 point. In addition, RTHLs, potential historic-age structures, historic-age linear features (e.g., historic trails), contributing resources to NRHP districts, and historical markers each received 1 point. For cultural resources with multiple resource types, the values of each resource type were calculated and used to determine the overall assessment score. The points for all cultural resources within the project area were tabulated and added to the mean score for a total cultural assessment score. Based on this methodology, the overall calculated cultural resources assessment score for the project equaled 1,566.

Projects controlled by or located on land owned by a political subdivision of the State of Texas must comply with the ACT. A project that is permitted, licensed, or partially funded by the federal government must also comply with Section 106 of the NHPA. According to the background review results, eight archaeological sites, two NRHP-listed historic districts, two NRHP-eligible historic districts with 29 contributing resources, 87 NRHP-listed historic properties, one NRHP-eligible historic property, four SALs, 28 RTHLs, six cemeteries, eight NRHP-eligible 1936 Texas Centennial Markers, 83 OTHMs, and 816 potential historic-age structures are located within the project area. The probability model for the project indicates a high to moderate likelihood of buried deposits; and the project assessment score is 1,566. Based on these results, SWCA recommends a cultural resources assessment for the final design plan, as well as a buffer zone of at least 100 feet between the cemeteries and the proposed development.

Table 5.2.30-3 Cultural Resources Results for the Victoria ASR Project

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility
41VT7	Archaeological site	Historic	Undetermined
41VT10 (Victoria City Park)	Archaeological site / SAL	Historic	Eligible
41VT105 (McNamara House)	Archaeological site / Historic property / RTHL / OTHM	Historic	Listed
41VT112	Archaeological site / SAL	Prehistoric	Eligible
41VT134 (Schuhmacher Company Building)	Archaeological site / Historic property / SAL	Historic	Listed
41VT138	Archaeological site	Historic	Undetermined
41VT142	Archaeological site	Prehistoric	Undetermined
41VT143	Archaeological site	Historic	Undetermined
Bernhard Electric Building	Historic District	Historic	Listed
De Leon Plaza and Bandstand	Historic District / OTHMs	Historic	Listed
Nine Rivers – Victoria Heights	Historic District	Historic	Eligible
Auto Showroom	Contributing Resource	Historic	Eligible
Bungalow (N=3)	Contributing Resource	Historic	Eligible
Residence (N=2)	Contributing Resource	Historic	Eligible

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility
Restaurant	Contributing Resource	Historic	Eligible
Shop (N=2)	Contributing Resource	Historic	Eligible
WPA Address Marker on Street (N=4)	Contributing Resource	Historic	Eligible
Original Townsite	Historic District	Historic	Eligible
Bungalow (N=3)	Contributing Resource	Historic	Eligible
Former Garage	Contributing Resource	Historic	Eligible
House (N=3)	Contributing Resource	Historic	Eligible
Mansion (N=2)	Contributing Resource	Historic	Eligible
Multiple Dwelling Bungalow	Contributing Resource	Historic	Eligible
Residence (N=3)	Contributing Resource	Historic	Eligible
WPA Address Marker on Street (N=3)	Contributing Resource	Historic	Eligible
Alden, C. R., Building	Historic Property	Historic	Listed
Alonso, Frank, House	Historic Property	Historic	Listed
Barden – O'Connor House	Historic Property	Historic	Listed
Barnes, W. C., House	Historic Property	Historic	Listed
Bernhard Electric Building	Historic Property	Historic	Listed
Bettin, Max, House	Historic Property	Historic	Listed
B'nai Isreal	Historic Property	Historic	Listed
Braman House	Historic Property	Historic	Listed
Buhler, Theodore, House	Historic Property	Historic	Listed
Building at 205 East Constitution	Historic Property	Historic	Listed
Burrough – Daniel House	Historic Property	Historic	Listed
Calhoun Bakery (Gone)	Historic Property	Historic	Listed
Callender House	Historic Property / RTHL / OTHM	Historic	Listed
City of Victoria Pumping Plant – Waterworks	Historic Property / RTHL	Historic	Listed
Clark, Robert, House	Historic Property / RTHL / OTHM	Historic	Listed
Clegg, John H., House	Historic Property	Historic	Listed
Crain, F. H., House	Historic Property	Historic	Listed
Farmers and Merchants Cotton Gin Warehouse	Historic Property	Historic	Listed
Fleming--Welder House	Historic Property / RTHL / OTHM	Historic	Listed
Fossati's	Historic Property / RTHL / OTHM	Historic	Listed
Fox, Jacob, House	Historic Property / RTHL / OTHM	Historic	Listed

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility
Gaylord – Levy House	Historic Property	Historic	Listed
Gervais House	Historic Property	Historic	Listed
Goldman, A., Building	Historic Property	Historic	Listed
Gramann House	Historic Property	Historic	Listed
Hauschild, George and Adele, House (Gone)	Historic Property	Historic	Listed
Hauschild, George H., Building	Historic Property / RTHL	Historic	Listed
Hiller House (501 E. Church)	Historic Property	Historic	Listed
Hiller House (3003 N. Vine)	Historic Property	Historic	Listed
Hill – Howard House	Historic Property / RTHL	Historic	Listed
House at 1602 North Moody	Historic Property	Historic	Listed
House at 304 West Stayton	Historic Property	Historic	Listed
House at 306 East Forrest	Historic Property	Historic	Listed
House at 401 East Stayton	Historic Property	Historic	Listed
House at 402 W. Colorado	Historic Property	Historic	Listed
House at 604 East Santa Rosa	Historic Property	Historic	Listed
Jecker, E. J., House	Historic Property / RTHL / OTHM	Historic	Listed
Jecker, J. T., House	Historic Property	Historic	Listed
Jordan--Koch House	Historic Property	Historic	Listed
Keef – Filley Building	Historic Property	Historic	Listed
Krenek House (Gone)	Historic Property	Historic	Listed
Lander – Hopkins House	Historic Property	Historic	Listed
Lane – Tarkington House	Historic Property	Historic	Listed
Lawrence House	Historic Property	Historic	Listed
Levi – Welder House	Historic Property / RTHL	Historic	Listed
Little House	Historic Property	Historic	Listed
Magnolia Service Station No. 122 (Gone)	Historic Property	Historic	Listed
Martin – Fiek-Thumford, Vera, House	Historic Property	Historic	Listed
McCabe Building (Gone)	Historic Property	Historic	Listed
McCan – Nave House	Historic Property	Historic	Listed
McDonald House	Historic Property	Historic	Listed
McFaddin, James, House	Historic Property / RTHL / OTHM	Historic	Listed
Mitchell, Guy, House	Historic Property	Historic	Listed
Mohris – Abschier House	Historic Property	Historic	Listed

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility
Murphy, Mrs. J. V., House	Historic Property	Historic	Listed
Nave, Royston, Memorial	Historic Property	Historic	Listed
O'Connor, Thomas M., House	Historic Property / RTHL / OTHM	Historic	Listed
O'Connor – Proctor Building	Historic Property	Historic	Listed
Old Brownson School	Historic Property	Historic	Listed
Old Federal Building and Post Office	Historic Property / RTHL / OTHM	Historic	Listed
Old Municipal Assembly Hall (Gone)	Historic Property	Historic	Listed
Old Victoria County Courthouse	Historic Property / OTHM	Historic	Listed
Our Lady of Lourdes Catholic Church	Historic Property / OTHM	Historic	Listed
Pela House	Historic Property / RTHL / OTHM	Historic	Listed
Phillips, Judge Alexander H., House	Historic Property / RTHL	Historic	Listed
Pickering House	Historic Property	Historic	Listed
Presbyterian Iglesia Nicea	Historic Property	Historic	Listed
Proctor House	Historic Property / RTHL / OTHM	Historic	Listed
Proctor--Vandenberge House	Historic Property / RTHL / OTHM	Historic	Listed
Randall Building	Historic Property	Historic	Listed
Roselle--Smith House	Historic Property	Historic	Listed
Schroeder House	Historic Property	Historic	Listed
Sengele, Alphonse T., House	Historic Property / RTHL / OTHM	Historic	Listed
Sigmund House	Historic Property	Historic	Listed
Tasin House	Historic Property	Historic	Listed
Texas Company Filling Station	Historic Property	Historic	Listed
Townsend--Wilkins House	Historic Property	Historic	Listed
Trinity Lutheran Church	Historic Property	Historic	Listed
Vandenberge, J. V., House	Historic Property	Historic	Listed
Victoria County Monument	Historic Property / OTHM	Historic	Listed
Weber--Schuchert House	Historic Property	Historic	Listed
Welder, Robert H., House	Historic Property	Historic	Listed
Wheeler, William, House	Historic Property	Historic	Listed
Woodhouse House	Historic Property / RTHL / OTHM	Historic	Listed
Zahn, Herman and Alvina, House	Historic Property	Historic	Listed
WPA Tile on Concrete Marker Post	Historic Property	Historic	Eligible
Victoria County Courthouse	SAL	Historic	Undetermined

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility
Beck Ranch Headquarters	RTHL	Historic	Undetermined
Friedrech and Margaretha Hiller House	RTHL / OTHM	Historic	Undetermined
Huston-Tilotson College	RTHL	Historic	Undetermined
J. Meredith Tatton House	RTHL / OTHM	Historic	Undetermined
Mundt Place	RTHL / OTHM	Historic	Undetermined
Old L.D. Heaton Home	RTHL / OTHM	Historic	Undetermined
Power Home	RTHL / OTHM	Historic	Undetermined
Robert L. Dabney House	RTHL / OTHM	Historic	Undetermined
Catholic Cemetery #1	Cemetery	Historic	Undetermined
Catholic Cemetery #2	Cemetery	Historic	Undetermined
Catholic Cemetery #3	Cemetery	Historic	Undetermined
Evergreen	Cemetery / OTHM	Historic	Undetermined
Memorial Park	Cemetery / OTHM	Historic	Undetermined
Resurrection	Cemetery	Historic	Undetermined
Beck Ranch Headquarters	OTHM	Historic	Undetermined
Brownson's Bank	OTHM	Historic	Undetermined
Camp Henry E. McCulloch	OTHM	Historic	Undetermined
Camp Victoria	OTHM	Historic	Undetermined
Case, Viola	OTHM	Historic	Undetermined
Cunningham, Abel Seymour	OTHM	Historic	Undetermined
De Leon, Agapito	OTHM	Historic	Undetermined
De Leon, Dona Patricia De La Garza	OTHM	Historic	Undetermined
De Leon, Felix	OTHM	Historic	Undetermined
De Leon, Fernando	OTHM	Historic	Undetermined
De Leon, Silvestre	OTHM	Historic	Undetermined
First Baptist Church of Victoria	OTHM	Historic	Undetermined
First English Evangelical Lutheran Church	OTHM	Historic	Undetermined
First Presbyterian Church	OTHM	Historic	Undetermined
First United Methodist Church	OTHM	Historic	Undetermined
Hauschild Opera House	OTHM	Historic	Undetermined
Henderson House	OTHM	Historic	Undetermined
Hill-O'Connor-Howard House	OTHM	Historic	Undetermined

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility
Home County of William Pinckney McLean	OTHM	Historic	Undetermined
January, Captain James P.	OTHM	Historic	Undetermined
Levi, Abraham, House	OTHM	Historic	Undetermined
Lorenzo Dow Heaton Home	OTHM	Historic	Undetermined
Lowe, Alexander, House	OTHM	Historic	Undetermined
Memorial Square	OTHM	Historic	Undetermined
Mitchell School	OTHM	Historic	Undetermined
Mount Salem American Baptist Church	OTHM	Historic	Undetermined
Phillips-Sale House	OTHM	Historic	Undetermined
Pioneer Marker	OTHM	Historic	Undetermined
Pridham, Peter Underhay	OTHM	Historic	Undetermined
Saint Mary's Catholic Church	OTHM	Historic	Undetermined
Smith, William Robert	OTHM	Historic	Undetermined
Southern Pacific Railroad Depot, Site of	OTHM	Historic	Undetermined
Stapp, Darwin M.	OTHM	Historic	Undetermined
The Victoria Advocate	OTHM	Historic	Undetermined
Tonkawa Bank	OTHM	Historic	Undetermined
Trinity Evangelical Lutheran Church	OTHM	Historic	Undetermined
Van Bibber, John	OTHM	Historic	Undetermined
Victor Marion Rose	OTHM	Historic	Undetermined
Victoria Advocate	OTHM	Historic	Undetermined
Victoria County Honor Roll	OTHM	Historic	Undetermined
Victoria County, C.S.A.	OTHM	Historic	Undetermined
Victoria Pumping Station	OTHM	Historic	Undetermined
Webster Chapel United Methodist Church	OTHM	Historic	Undetermined
Weisiger, Robert S.	OTHM	Historic	Undetermined
Weisiger, Sidney Roper	OTHM	Historic	Undetermined
Wood, John Howland	OTHM	Historic	Undetermined
Don Martin de Leon	1936 Texas Centennial Marker / OTHM	Historic	Eligible
Edward Conrad	1936 Texas Centennial Marker / OTHM	Historic	Eligible

Resource Name	Resource Type	Prehistoric / Historic	NRHP Eligibility
Home of Empresario Martin de Leon	1936 Texas Centennial Marker / OTHM	Historic	Eligible
John J. Linn	1936 Texas Centennial Marker / OTHMs	Historic	Eligible
Site of Round Top House	1936 Texas Centennial Marker / OTHM	Historic	Eligible
Site of Victoria's First Church	1936 Texas Centennial Marker / OTHM	Historic	Eligible
Victor Marion Rose	1936 Texas Centennial Marker / OTHM	Historic	Eligible
Victoria County	1936 Texas Centennial Marker / OTHM	Historic	Eligible
None (N=816)	Buildings / Structures	Historic	–
Assessment Score Total	**All**	**All**	**1,566**

5.2.30.4 Engineering and Costing

Preliminary engineering and costing analyses were performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required for water recharge, recovery, and collection. The City would utilize the existing, conventional water treatment plant at its existing capacity to treat the recovered water. A cost estimate summary for the Victoria ASR Project is provided in Table 5.2.30-4.

Table 5.2.30-4 Cost Estimate Summary for the Victoria ASR Project

Item	Estimated Costs
Pump Stations	$1,673,000
Transmission Pipeline (42 in. dia., 1.1 miles)	$2,349,000
Well Fields (Wells, Pumps, and Piping)	$32,365,000
Integration, Relocations, Backup Generator & Other	$36,000
TOTAL COST OF FACILITIES	**$36,423,000**
Planning (3%)	$1,093,000
Design (7%)	$2,550,000
Construction Engineering (1%)	$364,000
Legal Assistance (2%)	$728,000
Fiscal Services (2%)	$728,000
Pipeline Contingency (15%)	$352,000
All Other Facilities Contingency (20%)	$6,815,000
Environmental & Archaeology Studies and Mitigation	$889,000
Land Acquisition and Surveying (112 acres)	$801,000
Interest During Construction (3.5% for 1 year with a 0.5% ROI)	$1,648,000
TOTAL COST OF PROJECT	**$52,391,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,684,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$348,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$42,000
Pumping Energy Costs (3,487,294 kW-hr @ 0.09 $/kW-hr)	$314,000
TOTAL ANNUAL COST	**$4,388,000**
Available Project Yield (acft/yr)	7,900
Annual Cost of Water ($ per acft)*	$555
Annual Cost of Water After Debt Service ($ per acft)*	$89
Annual Cost of Water ($ per 1,000 gallons)*	$1.70
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.27
*Based on a Peaking Factor of 1.0	

5.2.30.5 Implementation Considerations

The following implementation considerations may apply to the Victoria ASR Project:

- The City currently holds a Class V injection well permit for the existing ASR well. Additional wells will also require Class V injection well permit coverage. Key requirements for permits to construct and operate a Class V injection well are mechanical integrity of the well, pollution control, demonstration of recoverability in the permitting process, and periodic reports;
- The run-of-the-river permits will not need to be amended for injection and recovery operations;
- Because of recent legislation, amendments to Victoria's surface water rights to include aquifer storage authorizations are no longer required;
- Although ASR projects are not subject to regulation by the VCGCD, the design of all wells should be permitted according to VCGCD rules, and all injection and recovery water quality and hydraulic data should be reported to VCGCD. Additionally, as a precautionary method, TCEQ recommends obtaining appropriate GCD permits for all ASR wells if additional water is extracted from the well during cycle testing or normal operations; and
- It may be necessary to obtain the following permits and/or authorizations for pipelines and other conveyance infrastructure:
  - USACE Sections 10 and 404 Dredge and Fill Permits for pipelines;
  - GLO Easements for use of state-owned land;
  - TPWD Sand, Gravel, and Marl permit; and
  - Archaeological surveys for pipeline alignments and facility footprints.

5.2.31 Victoria Groundwater-Surface Water Exchange

The SCTRWPG identified the Victoria Groundwater-Surface Water Exchange WMS as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.31.1 Description of Water Management Strategy

Historically, the City of Victoria (Victoria) has relied primarily on locally-available groundwater supplies withdrawn from the Gulf Coast Aquifer. To support continued growth, limit drawdowns in aquifer levels, and maintain water quality, Victoria obtained a surface water appropriation (P#5466) in the 1990s authorizing diversions of up to 20,000 acft/yr from the Guadalupe River. However, the firm yield of P#5466 is significantly limited during a repeat of the drought of record because it is subject to senior water rights and special conditions requiring inflow passage for environmental protection.

To address the limited firm supply of P#5466, Victoria obtained six additional surface water rights senior in priority to P#5466 and totaling 7,007 acft/yr from willing sellers. Each of these rights has been amended to allow diversions for municipal uses at the same location as P#5466. Two of these water rights, totaling 4,939 acft/yr, include provisions for offset of surface water diversions with discharged groundwater during drought. This groundwater offset effectively firms up these previously interruptible surface water rights. The approximate location of the Victoria Groundwater-Surface Water Exchange WMS is shown on Figure 5.2.31-1.

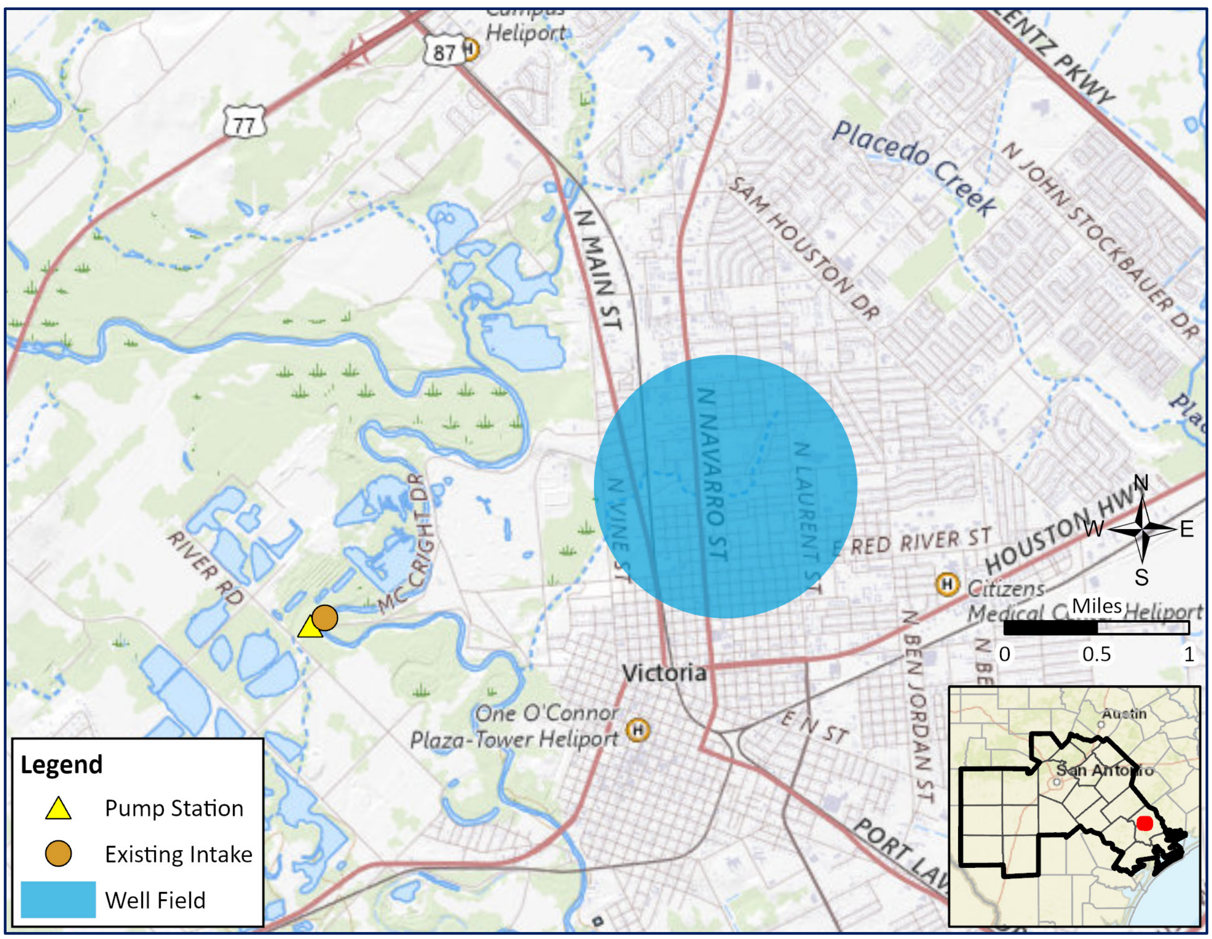

Figure 5.2.31-1 Approximate Location of the Victoria Groundwater-Surface Water Exchange WMS

The Victoria Groundwater-Surface Water Exchange WMS involves the City of Victoria pursuing amendments of the remaining surface water rights that do not already authorize groundwater offset, enabling the City to enhance the firm surface water supply available to Victoria. The Victoria Groundwater-Surface Water Exchange WMS would utilize new and existing infrastructure to pump groundwater that would then be conveyed to a nearby tributary of the Guadalupe River. Existing infrastructure includes the City's surface water treatment plant (SWTP), wells, pipelines, and diversion intake and pump station located along the Guadalupe River (Figure 5.2.31-2). New infrastructure would include pipelines from the various wells and an outfall structure to discharge groundwater into the creek.

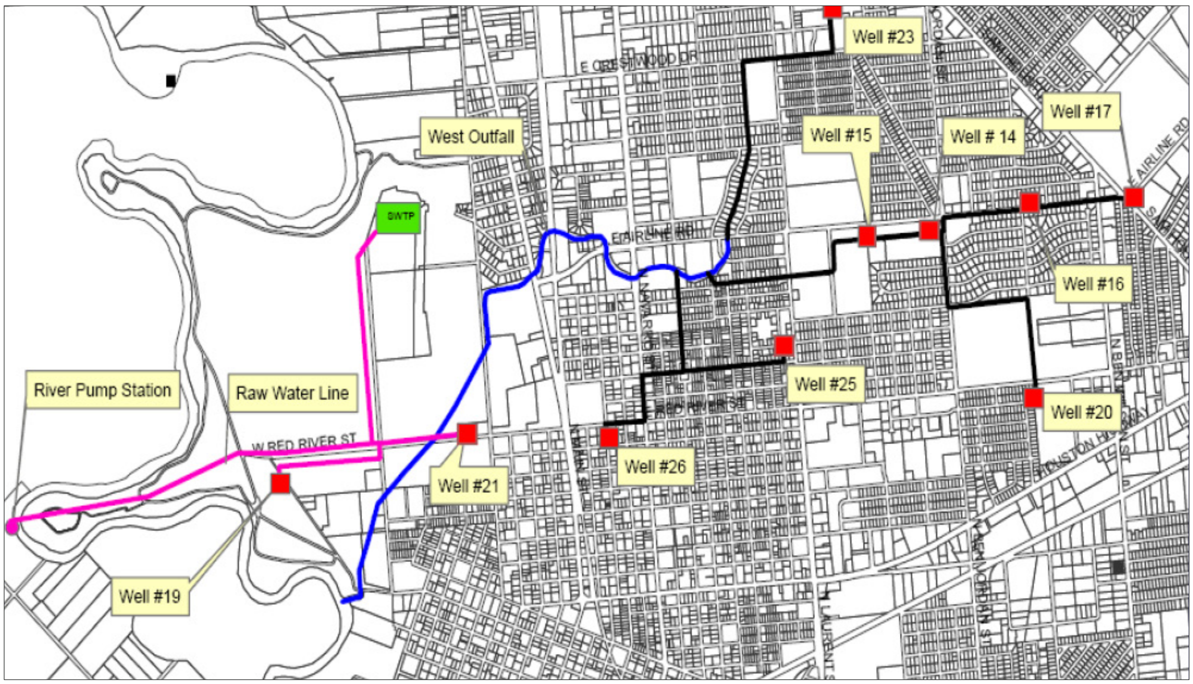

Figure 5.2.31-2 Existing Infrastructure for the Victoria Groundwater-Surface Water Exchange WMS

5.2.31.2 Available Yield

This WMS has a firm yield of 7,240 acft/yr and is planned for implementation by 2030. Table 5.2.31-1 provides a summary of the available yield for the Victoria Groundwater-Surface Water Exchange WMS.

Table 5.2.31-1 Available Yield for the Victoria Groundwater-Surface Water Exchange WMS (acft/yr)

WMS	2030	2040	2050	2060	2070	2080
Victoria Groundwater-Surface Water Exchange	7,240	7,240	7,240	7,240	7,240	7,240

The firm yield was estimated by selecting the limiting constraint (lowest volume available) among the following three factors:

- **Surface Water Rights Eligible for Amendment:** Of the seven existing surface water rights, five permits totaling 22,068 acft/yr in authorized diversion volumes can potentially be amended to authorize groundwater offset during drought.

- **Physical Well Production Capacity:** Victoria's existing wells included in this WMS have infrastructure and physical characteristics capable of producing a total of approximately 22,902 acft/yr.
- **Authorized Well Production Volume:** Victoria's existing wells included in this WMS are permitted through the VCGCD, which authorizes a total production volume of 7,240 acft/yr.

The following sections provide additional information regarding the three factors summarized above.

Surface Water Rights Eligible for Amendment

Victoria has seven existing surface water rights that authorize diversions of up to 27,007 acft/yr in total. Two of these permits, totaling 4,939 acft/yr, already include provisions for offset of surface water diversions with discharged groundwater during drought. Therefore, Victoria has up to 22,068 acft/yr in additional surface water rights that could potentially be amended to authorize groundwater offset during drought. Surface water rights held by Victoria are summarized in Table 5.2.31-2.

Table 5.2.31-2 Victoria Surface Water Rights

Water Right CA or Permit No.	Priority Date	Authorized Diversion Volume (acft/yr)	Authorized Offset Volume (ACFT/YR)	Potential Groundwater Offset Volume* (ACFT/YR)
3844	8/16/1918	608	0	608
3858	6/27/1951	1,000	0	1,000
3860	8/15/1951	260	0	260
3862	12/12/1951	263	263	0
3606	7/10/1978	4,676	4,676	0
4117	4/2/1984	200	0	200
5466	5/28/1993	20,000	0	20,000
Total		**27,007**	**4,939**	**22,068**

* Represents the diversion volumes associated with surface water rights that could potentially be amended to authorize groundwater offset during drought.

Physical Well Production Capacity

The City has 10 existing wells that were initially considered for this WMS. However, two of the wells (Wells 19 and 21) are not included in the WMS because their geographic location is not favorable for connecting to the network of the other eight wells. Furthermore, Well 19 was converted to an ASR well and is included in the Victoria ASR Project (refer to Section 5.2.30 for the water management strategy). Table 5.2.31-3 provides the tested capacities of the eight Victoria wells that are included in this WMS. As detailed in this table, physical groundwater production capacity (22,902 acft/yr).

Table 5.2.31-3 Victoria Well Capacities and Authorized Production Volumes

Well No.	Physical Production Capacity (gpm)	Physical Production Capacity (cfs)	Physical Production Capacity (acft/yr)	Authorized Production Capacity (acft/yr)
14	1,560	3.48	2,516	825
15	2,100	4.68	3,387	1,158
16	1,557	3.47	2,511	1,344
17	1,529	3.41	2,466	285
20	1,538	3.43	2,481	623
23	1,830	4.08	2,952	333
25	1,705	3.8	2,750	1,264
26	2,380	5.3	3,839	1,408
Total	**14,199**	**31.65**	**22,902**	**7,240**

* Victoria also has Wells 19 and 21, which are not included in this table, nor in the firm yield estimate for the Victoria Groundwater-Surface Water Exchange WMS because their location and/or their use was converted for ASR purposes.

Authorized Well Production Volume

The City is authorized by the VCGCD to produce a combined total of 7,240 acft/yr from the eight wells included in this WMS. Table 5.2.31-3 provides the authorized well production capacities for the wells included in this WMS.

5.2.31.3 Environmental Factors

The project was evaluated to determine its potential impacts on environmental factors. Table 5.2.31-4 provides a quantitative reporting of the project's potential effects on environmental factors. This information is further described in subsequent subsections.

Table 5.2.31-4 Summary of Potential Project Effects on Environmental Factors for the Victoria Groundwater-Surface Water Exchange WMS

Environmental Factor	Acreage or Impact Score
Potential Agricultural Acreage Impacts (No. Acres)	1
Potential Species Impact Score	2
Potential Habitat Impact Score	1
Potential Stream Construction Impact Score	1
Potential Stream Flow / Water Quality Impact Score	1
Potential Cultural Resources Impact Score	0

Environmental Considerations

Potential environmental issues associated with this water management strategy are rather limited because the physical facilities and surface water and groundwater permits are already in place. Primary environmental concerns would likely be related to potential changes in surface water quality in the Guadalupe River resulting from the offset discharge of groundwater. These concerns could be addressed by integration of special conditions in future surface water rights amendments to authorize groundwater offset like those included in amended CA#18-3862 and P#3606. Such special conditions include compliance with applicable water quality standards, weekly water quality monitoring of both groundwater discharged and the Guadalupe River upstream and downstream of the groundwater discharge, water sample analyses for multiple constituents, biotic and aquatic habitat sampling, and limitation of groundwater discharge to 33% of the flow in the river.

Vegetation and Land Use

The project area lies in both the Post Oak Savanah and Western Gulf Coastal Plain ecoregions and within mostly urban areas within Victoria, Texas. As mapped by TPWD [1], dominant vegetation types in the project area consist of urban low and high intensity; these mapping categories reflect urban development and associated lawns and landscaping that are typically dominated by non-native vegetation. The project area also contains riparian vegetation, mapped by TPWD as floodplain grassland and floodplain hardwood forest, in riparian zones associated with the Guadalupe River.

Based on TPWD vegetation mapping, the project has the potential to impact 1 acre of agricultural resources mapped as row crops. The project proposes to utilize existing facilities and infrastructure; therefore, environmental vegetation, land use and agricultural impacts from construction are expected to be minimal. Existing project pipeline easements would continue to require long-term maintenance (mowing, woody vegetation clearing) to maintain easement access. Maintenance of easements and any required revegetation provides the opportunity to plant native species that are beneficial to native wildlife. Revegetation plans are typically completed during preliminary studies and design phases of projects. It is up to the sponsors of each water management strategy to determine the best course of action regarding revegetation.

Aquatic Resources

The project area includes unnamed, mapped streams and a diversion pump station on the Guadalupe River. NWI mapping shows approximately 2.5 acres of emergent, forested/shrub, and riverine wetlands in the project area.

Segment 1803 of the Guadalupe River is classified as an impaired stream segment in the Texas Integrated Report of 303(d)-listed water bodies occur in the project area [2]. This list identifies the water bodies or segments in Texas that do not meet assigned water quality standards. The Lower Guadalupe River within the project area is listed as an ecologically significant stream segment by TPWD. Because the project proposes to discharge groundwater to the Guadalupe River, this could result in changes to the water quality in the river that could affect sensitive aquatic resources, especially during low-flow/drought conditions. Since the project will utilize existing facilities, no stream/wetland delineations or USACE permitting would be required.

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[1] Texas Parks and Wildlife Department (TPWD). 2024. Ecological Mapping Systems of Texas. https://tpwd.texas.gov/landwater/land/programs/landscape-ecology/ems/

[2] Texas Commission on Environmental Quality (TCEQ). 2024. *2024 Texas Integrated Report of Surface Water Quality for the Clean Water Act Section 305(b) and 303(d)*. https://www.tceq.texas.gov/waterquality/assessment/2024-integrated-report/24txir

Threatened, Endangered, and Species of Concern

Appendix 5D provides a summary of threatened and endangered species and SGCN that may occur in Victoria County [3, 4]. Suitable habitat may occur for the proposed federally endangered tricolored bat (*Perimyotis subflavus*) and the monarch butterfly (*Danaus plexippus*), which is a candidate species for federal listing as threatened or endangered. The Guadalupe River in the project area may contain suitable habitat for federally endangered freshwater mussels. As discussed above, groundwater discharges to the Guadalupe River may affect surface water quality. Since freshwater mussels are sensitive to water quality impacts, the potential for water quality impacts to protected mussel species should be evaluated. If the project is anticipated to affect endangered freshwater mussels, USFWS consultation would be required.

Suitable habitat may occur for state-listed threatened species and numerous wildlife, plant, and insect species designated by TPWD as SGCN. These species do not have formal protected status but are being monitored by TPWD. Migratory birds may occur in the project area, particularly in riparian zones and wetland areas. Habitat and species impacts are expected to be minimal since the project will use existing infrastructure.

Cultural Considerations

Projects in Texas can come under the purview of the NHPA and the ACT. Both are administered by lead federal agencies and the SHPO of Texas at the THC in Austin, Texas. Projects that are permitted, licensed, or partially funded by the federal government must comply with Section 106 of the NHPA and take into consideration the undertaking's effects on historic properties, defined as any property listed in, or eligible for listing in, the NRHP. A project on land owned or operated by a political subdivision of the State of Texas is required under the ACT to assess whether it will impact cultural resources that meet the criteria for listing as an SAL. Because the project will primarily involve the use of existing infrastructure, there WMS is not expected to have an adverse impact on cultural resources. If the project approach is modified to include more extensive facilities, then a cultural resources evaluation may be necessary to determine whether a cultural resources investigation is warranted.

5.2.31.4 Engineering and Costing

Preliminary engineering and costing analyses have been performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required for conveyance of withdrawn water to a tributary of the Guadalupe River and costs associated with amending surface water rights for groundwater offset facilities, O&M costs required for water pipelines and wells, and pumping energy costs. Cost estimates assume that the sponsor will utilize some existing infrastructure, including groundwater wells and pump stations, Guadalupe River intake, pipelines, and conventional WTP. A cost estimate summary for the Victoria Groundwater-Surface Water Exchange is provided in Table 5.2.31-5.

[3] Texas Parks and Wildlife Department (TPWD). 2024. Annotated County Lists of Rare Species – Victoria County. Last Update: August 22, 2024. https://tpwd.texas.gov/gis/rtest/

[4] U.S. Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation Resource List – Victoria County. https://ipac.ecosphere.fws.gov/location/index

Table 5.2.31-5 Cost Estimate Summary for the Victoria Groundwater-Surface Water Exchange WMS

Item	Estimated Costs
Well Field Piping	$10,040,000
TOTAL COST OF FACILITIES	**$10,040,000**
Planning (3%)	$301,000
Design (7%)	$703,000
Construction Engineering (1%)	$100,000
Legal Assistance (2%)	$201,000
Fiscal Services (2%)	$201,000
All Other Facilities Contingency (20%)	$2,008,000
Environmental & Archaeology Studies and Mitigation	$156,000
Interest During Construction (3.5% for 1 year with a 0.5% ROI)	$446,000
TOTAL COST OF PROJECT	**$14,156,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$996,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$100,000
Pumping Energy Costs (4,877,836 kW-hr @ 0.09 $/kW-hr)	$439,000
TOTAL ANNUAL COST	**$1,535,000**
Available Project Yield (acft/yr)	8,544
Annual Cost of Water ($ per acft)*	$180
Annual Cost of Water After Debt Service ($ per acft)*	$63
Annual Cost of Water ($ per 1,000 gallons)*	$0.55
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.19
*Based on a Peaking Factor of 1.0.	

5.2.31.5 Implementation Considerations

Implementation of the Victoria Groundwater-Surface Water Exchange WMS includes the following considerations:

- Amendments to existing TCEQ surface water rights will be necessary to authorize groundwater offset during drought. Coordination with TCEQ prior to submittal of permit amendments is recommended.
- It may be necessary to obtain the following permits or authorizations for the outfall structure and new well field pipelines:
  - USACE Sections 10 and 404 dredge and fill permits;
  - GLO sand and gravel removal permits;
  - GLO easement for use of state-owned land; and
  - TPWD sand, gravel, and marl permit.
- Acquisition of private land for construction of facilities through either negotiations or condemnation.
- Project implementation may require the following additional studies and/or agency coordination:
  - Environmental studies; and
  - Protected species habitat evaluations.

5.2.32 Weather Modification

The SCTRWPG identified the Weather Modification WMS as a potentially-feasible strategy and designated it as a Recommended strategy in the 2026 Regional Water Plan.

5.2.32.1 Description of Water Management Strategy

The Weather Modification WMS consists of cloud seeding by aircraft to increase precipitation and suppress hail formation. The WMS is sponsored by Irrigation WUGs in Atascosa, Bexar, Frio, Karnes, Medina, Uvalde, and Wilson Counties.

Cloud seeding involves introducing hygroscopic flares and/or glaciogenic flares into clouds by an airplane prior to a rainfall event. These flares are similar in size and function to emergency highway flares and contain a type of salt, typically sodium chloride (NaCl) or calcium chloride (CaCl). The flares are dispensed from aircraft flying immediately below or in the updraft regions of clouds. When the flares are burned, they dispense salt particles into the clouds, acting as additional cloud condensation nuclei that attract water vapor. The water vapor condenses and forms cloud droplets in addition to those that are already naturally occurring in the clouds. These droplets then undergo a process known as collision-coalescence or warm rain, in which they grow in size and collide with each other, forming larger droplets that eventually reach rain drop size

The South Texas Weather Modification Association (STWMA) has been intermittently performing cloud seeding in the SCTRWPA and in other Regional Water Planning Areas since the late 1990s. Figure 5.2.32-1 provides a map of counties in which the STWMA performed cloud seeding in 2011 and identifies which of these counties are in the SCTRWPA. Cloud seeding operations are typically performed in the late spring to early fall. The STWMA partners with weather modification scientists and engineers to conduct micro-regionalized meteorological modeling to estimate the precipitation increases attributed to cloud seeding operations.

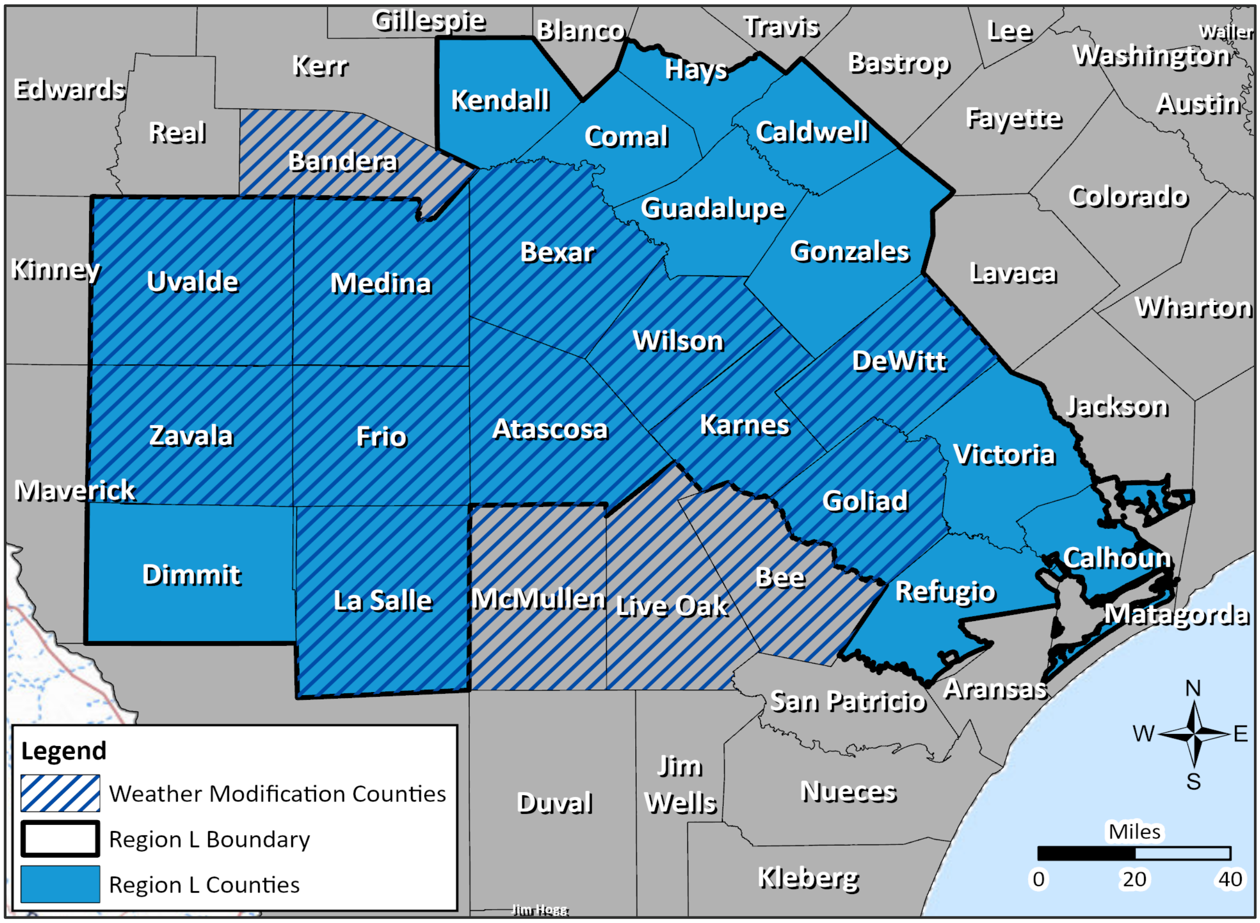

Figure 5.2.32-1 Counties with Weather Modification Operations in 2011

5.2.32.2 Available Yield

This WMS has a firm yield of 76,579 acft/yr and is planned for implementation in the 2030 decade. Table 5.2.32-1 provides a summary of the available yield for the Weather Modification WMS.

Table 5.2.32-1 Available Yield for the Weather Modification WMS (acft/yr)

WUG	2030	2040	2050	2060	2070	2080
Irrigation, Atascosa	20,462	20,462	20,462	20,462	20,462	20,462
Irrigation, Bexar	2,975	2,975	2,975	2,975	2,975	2,975
Irrigation, Frio	12,109	12,109	12,109	12,109	12,109	12,109
Irrigation, Karnes	10,998	10,998	10,998	10,998	10,998	10,998
Irrigation, Medina	13,683	13,683	13,683	13,683	13,683	13,683
Irrigation, Uvalde	5,499	5,499	5,499	5,499	5,499	5,499
Irrigation, Wilson	10,853	10,853	10,853	10,853	10,853	10,853
Total	**76,579**	**76,579**	**76,579**	**76,579**	**76,579**	**76,579**

The 2011 STWMA Annual Report[1] , prepared by Dr. Arquimedes Ruiz-Columbié of Texas Tech University, was referenced to determine the available yield of the Weather Modification WMS. Year 2011 was selected because the drought of record for this area is the 2011 drought. The annual report provides county-level volumetric increases in precipitation, measured in acft/yr, which would be representative of precipitation increases realized for each county during a repeat of the drought of record.

The 2011 STWMA Annual Report evaluated the cloud seeding project from June 4, 2011, to September 29, 2011. During this period, 31 clouds in the SCTRWPA had initial seeding events and 53 clouds in the SCTRWPA had extended seeding events. TITAN and NEXRAD radars were used to perform a micro-regionalization analysis that estimated the performance of the cloud seeding based on increases in precipitation per county, with different zones receiving downwind benefits. The modeling results indicate that weather modification operations in 2011 resulted in an additional 99,700 acft/yr of precipitation that fell upon the SCTRWPA (Table 5.2.32-2).

Table 5.2.32-2 Weather Modification Operations and County-Level Precipitation Increases in 2011

County*	Initial Seeding Events	Extended Seeding Events	Precipitation Increase in 2011 (acft/yr)
Atascosa	8	15	23,200
Bexar	2	4	9,500
Frio	3	5	15,500
Karnes	10	12	13,500
Medina	3	9	18,300
Uvalde	0	1	5,500
Wilson	5	7	14,200
Total	**31**	**53**	**99,700**

* In 2011, weather modification was also performed in non-Region L counties, including Bandera, Bee, McMullen, and Live Oak Counties.

The county-level estimates of precipitation increases represent benefits to not only the sponsors of this WMS (Irrigation WUGs in seven counties) but also to non-Irrigation WUGs, such as municipal and livestock WUGs. To quantify the yield of the Weather Modification WMS and its direct benefits to Irrigation WUG sponsors, the county-level volumetric precipitation increases were multiplied by the proportion of land area within each county identified as “Land in Farms” by the 2022 USDA Census[2]. This acreage is the same value used to estimate water demands associated with irrigation uses in the 2026 Regional Water Plan and represents the area of agricultural land used for crops, pasture, or grazing. Table 5.2.32-3 provides a summary of the county-level yields, calculated by applying each county’s proportion of Land in Farms to total county land area.

[1] Ruiz-Columbié, A. (2011). South Texas Weather Modification Association Annual Evaluation Report 2011. https://www.southtexasweathermodification.com/project.html

[2] U.S. Department of Agriculture, National Agricultural Statistics Service, 2022 Census of Agriculture – County Data, Texas. Irrigation, Table 10.

Table 5.2.32-3 County-Level Yields Based on Proportion of County Land Area and Land in Farms

County	Total County Land Area (ac)	Total Land Area Designated as Land in Farms* (ac)	Proportion of Land in Farms to Total County Land Area	Available Yield (acft/yr)
Atascosa	780,504	688,382	88%	20,462
Bexar	793,805	248,545	31%	2,975
Frio	725,438	566,717	78%	12,109
Karnes	478,559	389,854	81%	10,998
Medina	848,228	634,224	75%	13,683
Uvalde	993,226	993,079	100%	5,499
Wilson	514,388	393,148	76%	10,853
Total	**All**	**All**	**All**	**76,579**

*Source: 2022 USDA Census of Agriculture.

5.2.32.3 Environmental Factors

Environmental Considerations

Vegetation, Land Use, and Agricultural Resources

Due to the identified available yield that this WMS may contribute to irrigation supplies, a potential for beneficial effects on native vegetation communities and agricultural resources exists. Published literature on the potential environmental effects of cloud-seeding salts is limited; however, the potential for negative effects on vegetation and/or crops from cloud-seeding chemicals cannot be ruled out.

Aquatic Resources

The potential for increased water yields for irrigation could result in beneficial impacts on water quantity due to potential increased runoff into streams, wetlands, and other aquatic features. However, these same aquatic features could also experience negative impacts to water quality due to increased runoff of fertilizers and pesticides as well as potential negative impacts from cloud-seeding chemicals.

Threatened, Endangered, and Species of Concern

The potential for increased water yields for irrigation could result in beneficial impacts on protected species that rely on aquatic habitats, such as streams, wetlands, and other aquatic features. However, many rare and protected aquatic species are sensitive to water quality impacts, which may occur because of increased runoff of fertilizers and pesticides as well as potential negative impacts from cloud-seeding chemicals.

Cultural Considerations

This WMS is not anticipated to have significant effects on cultural resources.

5.2.32.4 Engineering and Costing

Preliminary engineering and costing analyses have been performed using 2026 Regional Water Planning methods. Black & Veatch utilized the Uniform Costing Model, which includes standard costing procedures and methods for calculating unit costs. The costing procedures include all facilities required for weather modification activities within the SCTRWPA. Capital costs and O&M costs were provided by the STWMA. A cost estimate summary for the Weather Modification WMS is provided in Table 5.2.32-4.

The total cost of the project includes planning level cost estimates for planning, design, and construction, which are calculated by applying a certain percentage to the facilities costs. Unlike traditional water infrastructure projects, the Weather Modification WMS does not include significant costs associated with design because it is limited to design of flares, mechanisms that attach flares to aircrafts, or elements similar in scope and cost. Therefore, the design cost percentage was reduced from 7% to 3% and then applied to the facilities costs.

Table 5.2.32-4 Cost Estimate Summary for the Weather Modification WMS

Item	Estimated Costs
Airplanes and Associated Infrastructure	$905,000
TOTAL COST OF FACILITIES	**$905,000**
Planning (3%)	$27,000
Design (7%)	$27,000
Construction Engineering (1%)	$9,000
Legal Assistance (2%)	$18,000
Fiscal Services (2%)	$18,000
All Other Facilities Contingency (20%)	$181,000
TOTAL COST OF PROJECT	**$1,185,000**
ANNUAL COST	
Debt Service (3.5 percent, 10 years)	$143,000
Operation and Maintenance	$329,000
TOTAL ANNUAL COST	**$472,000**
Available Project Yield (acft/yr)	76,579
Annual Cost of Water ($ per acft)*	$6
Annual Cost of Water After Debt Service ($ per acft)*	$4
Annual Cost of Water ($ per 1,000 gallons)*	$0.02
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.01
*Based on a Peaking Factor of 1.0.	

5.2.32.5 Implementation Considerations

Implementation considerations for the Weather Modification WMS include the following:

- Federal Aviation Administration (FAA) certification of flare rack installations on aircraft is likely to be necessary.
- Restrictions or prohibitions of cloud seeding operations over large population centers (e.g., San Antonio city limits) may occur.
- Operators should ensure adequate training and standard operating procedures regarding proper handling and clean-up of cloud-seeding salts is available. If a spill is unavoidable, operators should take actions to minimize impacts to soils, vegetation, and wildlife habitats.

5.3 Water Conservation Information and Recommendations

The purpose of this subchapter is to provide a consolidated resource that presents conservation recommendations, including considerations of applicable best management practices appropriate for the SCTRWPA.

The SCTRWPG strongly supports water conservation and generally recommends water conservation for all WUGs in every use category. For the 2026 Region L Regional Water Plan, the SCTRWPG designated Municipal Water Conservation (refer to Section 5.2.1) and Non-Municipal Water Conservation (refer to Section 5.2.2) as Recommended WMSs. Additional information regarding water conservation is included in subsequent sections.

5.3.1 Water Conservation in the 2026 South Central Texas Regional Water Plan

Water conservation is incorporated into the 2026 SCTRWP in the form of passive conservation approaches in the TWDB water demand projections, and also as active approaches in the Municipal and Non-Municipal Conservation WMSs.

5.3.1.1 Plumbing Code Savings

Expected water-efficiency savings are incorporated into the current TWDB municipal water demand projections (refer to Chapter 2) and include estimated or anticipated savings due to state and federal specifications for fixture and appliance design. The savings projected by the TWDB include complete replacement of existing plumbing fixtures to water-efficient fixtures by the year 2045. The projections also assume that all new construction includes water-efficient plumbing fixtures.

Chapter 2, Appendix 2B includes a summary of each municipal WUG’s per capita water use and anticipated plumbing code savings on a per capita water use basis and a volumetric basis. The estimated plumbing code savings in the SCTRWPA is estimated to increase from 19,379 acft/yr in 2030 to 102,085 acft/yr in 2080, as shown in Table 5.3-1.

Table 5.3-1 Estimated Plumbing Code Savings from Passive Water Conservation (acft/yr)

Region	2030	2040	2050	2060	2070	2080
Region L Total	19,379	39,432	54,525	71,267	88,828	102,085

5.3.1.2 GPCD Goals

Per capita water use goals are recommended and described in the Municipal Water Conservation WMS in Section 5.2.1 of the 2026 RWP. Goals are recommended for each planning decade and are based on a WUG’s projected 2030 per capita water use. The SCTRWPG established the following Municipal Water Conservation goals for the 2026 RWP:

- For municipal WUGs having year 2030 water use of 140 GPCD or greater, the goal is to reduce per capita water use by 10% per decade until 140 GPCD is reached; after which, the goal is to reduce per capita water use by 2.5% per decade for the remainder of the planning period;
- For municipal WUGs having year 2030 water use between 80 GPCD and 139 GPCD, the goal is to reduce per capita water use by 2.5% per year for the remainder of the planning period or until 80 GPCD is reached; and

- For municipal WUGs having year 2030 water use less than 80 GPCD, the goal is to maintain per capita water use at or below 80 GPCD throughout the planning horizon.

Section 5.2.1 of the 2026 RWP includes a table of GPCD goals by WUG for each decade of the planning horizon.

5.3.1.3 Water Conservation as Water Management Strategies

Water conservation measures are defined as practices, techniques, programs, and technologies that will protect water resources, reduce consumption of water, reduce the loss or waste of water, or improve the efficiency in the use of water so that a water supply is made available for future or alternative uses. The water conservation water management strategies (refer to Sections 5.2.1 and 5.2.2) includes information, recommendations, and BMPs for all use types. For municipal and irrigation conservation, WUG-specific demand reductions and cost estimates were developed. The following sections summarize the recommended conservation strategies included in the 2026 RWP.

5.3.1.3.1 Municipal Water Conservation

The Municipal Water Conservation WMS is a Recommended strategy for every municipal WUG in the SCTRWPA with a 2030 GPCD greater than 80. The Municipal Water Conservation WMS is not recommended for municipal WUGs with water of 80 GPCD or lower. For the 2026 RWP, conservation is not a Recommended strategy for Randolph Air Force Base, Port Oconnor Improvement District, County Line SUD, and East Medina County SUD because they have GPCDs less than 80.

Two municipal strategies – water loss mitigation and water use reduction – are recommended to reach the target GPCDs. As deteriorating infrastructure can have high rates of water loss, water loss mitigation is recommended through leak detection and repair and utility water audits. Water loss mitigation is estimated to save approximately 7,579 acft/yr in 2030 and 10,394 acft/yr in 2080. Water use reduction includes installation of AMI and non-capital efforts to reduce the consumption of water. Water use reduction is estimated to save approximately 30,356 acft/yr in 2030 and 168,408 acft/yr in 2080.

Beginning in 2004, the Water Conservation Implementation Task Force developed a BMP guide for municipal users [1]. In 2007, the Task Force was succeeded by the WCAC, enacted by the 80th Texas Legislature with the passage of SB 3 and HB 4. The council's primary roles include monitoring trends in water conservation implementation and technologies for potential inclusion as BMPs. Since its inception, WCAC has continually worked with TWDB and TCEQ to update the "Best Management Practices Guide."

A variety of conservation measures are recommended as described in the WCAC Municipal BMP Guide [2], any combination of which can be used to meet the specific goals for a municipality or utility. Conservation can be achieved using a variety of strategies, including the following:

- **Conservation Analysis and Planning**
    - Conservation Coordinator
    - Cost-Effectiveness Analysis

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[1] Water Conservation Implementation Task Force. 2004. *Report to the 79th Legislature, Texas Water Development Board, Special Report*.
[2] Texas Water Development Board (TWDB). 2019. *Best Management Practices for Municipal Water Users*.

- Water Survey for Single-Family and Multi-Family Customers
- Customer Characterization

- **Financial**
  - Water Conservation Pricing
  - Wholesale Agency Assistance Programs
- **System Operations**
  - Metering of all New Connections and Retrofitting of Existing Connections
  - System Water Audit and Water Loss
- **Landscaping**
  - Athletic Field Conservation
  - Golf Course Conservation
  - Landscape Irrigation Conservation and Incentives
  - Park Conservation
  - Residential Landscape Irrigation Evaluations
  - Outdoor Watering Schedule
- **Education and Public Awareness**
  - Public Information
  - School Education
  - Public Outreach and Education
  - Partnerships with Nonprofit Organizations
- **Rebate, Retrofit, and Incentive Programs**
  - Conservation Programs for Industrial, Commercial, and Institutional Accounts
  - Residential Clothes Washer Incentive Program
  - Residential Toilet Replacement Programs
  - Showerhead, Aerator, and Toilet Flapper Retrofit Program
  - Water-Wise Landscape Design and Conversion Programs
  - Customer Conservation Rebates
  - Plumbing Assistance Programs for Economically Disadvantaged Customers
- **Conservation Technology**
  - New Construction Graywater

  - Rainwater Harvesting and Condensate Reuse [3]
  - Reuse of Reclaimed Water [3]
- **Regulatory Enforcement**
  - Prohibition of Wasting Water
  - Conservation Ordinance Planning and Development

The SCTRWPG acknowledges and supports the activities of the WCAC created by HB 4 and SB 3 of the 80th Texas Legislature. In addition, the SCTRWPG acknowledges and supports the implementation of HB 2667 of the 81st Texas Legislature relating to performance standards for plumbing fixtures sold in Texas.

Costs for implementation and administration of the Municipal Water Conservation WMSs to meet the Region L goals is developed individually for WUGs. Total costs for water loss mitigation over the planning horizon is estimated to be $5,605,750,000 ($14,583 per acft/yr). Total cost for water use reduction over the planning horizon is estimated to be $582,531,000 ($3,945 per acft/yr).

5.3.1.3.2 Non-Municipal Water Conservation

The 2026 RWP is the first Region L Regional Water Plan to include Non-Municipal Water Conservation as a Recommended WMS. The WMS arose from the SCTRWPG's collective desire to address significant unmet irrigation needs in previous regional water plans. Inclusion of the Recommended strategy in the Regional and State Water Plans enables certain entities to apply for financial assistance from certain funding sources, such as the State Water Implementation Fund for Texas (SWIFT).

Non-Municipal Water Conservation is included as a Recommended strategy for all Irrigation WUGs with an identified water need. For the 2026 RWP, this includes 15 irrigation WUGs in Atascosa, Bexar, Caldwell, Calhoun, Comal, Dimmit, Goliad, Guadalupe, Karnes, La Salle, Medina, Uvalde, Victoria, Wilson, and Zavala Counties.

The SCTRWPG recommends non-municipal water conservation to improve irrigation efficiencies to reduce the quantity of water use in agriculture per acre irrigated. Irrigation water conservation is recommended as a WMS in counties where irrigation needs are identified or created through groundwater conversions and transfers, but the SCTRWPG supports conservation for irrigation in the entire region. The recommended conservation measures for irrigation include soil moisture monitoring, irrigation scheduling, real-time use metering and monitoring, and soil conservation tillage. Total yield from all measures is 17,720 acft/yr in the SCTRWPA by 2080.

The SCTRWPG further supports and recommends the implementation of water conservation measures included in the WCAC Agricultural BMP Guide [4]. The list of agricultural BMPs is as follows:

- Information Gathering and Education Practices
  - Cost Effectiveness Analysis

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[3] While Rainwater Harvesting, Condensate Reuse, and Reuse of Reclaimed Water are included in the Water Conservation Advisory Council (WCAC) Municipal BMP Guide as water conservation measures, they are not classified as water conservation measures by the TWDB for regional water planning purposes or in DB27.
[4] Texas Water Development Board (TWDB). 2013. *Best Management Practices for Agricultural Water Users*.

  - On-Farm Irrigation Audit
- Cropping and Management Practices
  - Crop Residue Management and Conservation Tillage
  - Irrigation Scheduling
  - Volumetric Measurement of Irrigation Water Use
- Land Management Systems
  - Brush Control/Management[5]
  - Contour Farming
  - Furrow Dikes
  - Land Leveling
- On Farm Water Delivery Systems
  - Drip/Micro-Irrigation System
  - Gated and Flexible Pipe for Field Water Distribution Systems
  - Linear Move Sprinkler Irrigation Systems
  - Lining of On-Farm Irrigation Ditches
  - Low Pressure Center Pivot Sprinkler Irrigation Systems
  - Replacement of On-Farm Irrigation Ditches with Pipelines
  - Surge Flow Irrigation for Field Water Distribution Systems
- Water District Delivery Systems
  - Lining of District Irrigation Canals
  - Replacement of Irrigation District Canals and Lateral Canals with Pipelines
- Miscellaneous Systems
  - Nursery Production Systems
  - Tailwater Recovery and Reuse System [6]

Total cost for implementation and administration of the Non-Municipal Water Conservation WMS is estimated to be $49,085,000 ($305 per acft/yr).

Sufficient data are not currently available for manufacturing, steam-electric power, and mining use categories for the South Central Texas Region to enable accurate demand reduction volumes and costs. However, the SCTRWPG strongly supports and recommends implementation of water conservation

[5] While brush control/management is included in the Water Conservation Advisory Council (WCAC) Agricultural BMP Guide, it is not classified as a water conservation measure by the TWDB for regional water planning purposes or in DB27.

[6] While Tailwater Recovery and Reuse System is included in the Water Conservation Advisory Council (WCAC) Agricultural BMP Guide, it is not classified as a water conservation measure by the TWDB for regional water planning purposes or in DB27.

efforts for all WUGs. The WCAC developed an Industrial BMP Guide [7], which includes the following Industrial BMPs:

- Conservation Analysis and Planning
  - Cost Effectiveness Analysis
  - Industrial Site Specific Conservation
  - Industrial Water Audit
- Educational Practices
  - Management and Employee Programs
- System Operations
- Boiler and Steam Systems
- Industrial Alternative Sources and Reuse of Process Water[8]
- Industrial Submetering
- Industrial Water Waste Reduction
  - Refrigeration
  - Rinsing/Cleaning
  - Water Treatment
- Cooling Systems Management
  - Cooling Systems (other than Cooling Towers)
  - Cooling Towers
  - Once-Through Cooling
- Landscaping
  - Industrial Facility Landscaping

[7] Texas Water Development Board (TWDB). 2013. *Best Management Practices for Industrial Water Users*.
[8] While Reuse of Process Water is included in the Water Conservation Advisory Council (WCAC) Industrial BMP Guide, it is not classified as a water conservation measure by the TWDB for manufacturing and steam-electric power uses in the regional water plan or in DB27. It is, however, considered by the TWDB as a water conservation measure for mining uses in the regional water plan and DB27.

5.3.2 Recent and Recommended Water Conservation Legislation and Policies

Since the last "Water Conservation Advisory Council Report to the 88th Texas Legislature (2022)," the Texas State Legislature made a significant investment in water infrastructure through the passage of

SB 28 and Senate Joint Resolution (SJR) 75 providing for the creation of the Texas Water Fund. In addition, SB 30 authorized a one-time, $1 billion supplemental appropriation of general revenue to the Texas Water Fund, contingent on enactment of SB 28 and approval of SJR 75 by voters. Proposition 6 (the proposition for SJR 75), creating the Texas Water Fund to assist in financing water projects in Texas, passed on November 7, 2023, with more than 77 percent in favor. The Texas Water Fund, managed by TWDB, prioritizes investment in water loss mitigation and other water strategies. The 88th Legislative Session also established the TexMesonet Hydrometeorology Network and create the TexMesonet Advisory Committee through HB 2759 to support a statewide evapotranspiration (ET) network.

In 2024, the WCAC issued a report entitled, *Water Conservation Advisory Council Report to the 89th Texas Legislature*, which the following two additional legislative recommendations:

1. The Council recommends that the Texas Legislature replenish funding in the Agricultural Water Conservation Fund sufficient to support the TWDB's grant and loan program for a total of $15,000,000 for the next 10 years.

2. Increase appropriations by $1,200,000 for the biennium to the TWDB to develop and support a statewide ET network within the TexMesonet. Funding will be used for:

    - Up to 2.5 new full-time equivalent staff positions;
    - Contracting a study on existing TexMesonet weather stations regarding siting requirements to calculate ET (study of fetch);
    - Resources to update existing sites to accommodate ET measurements; and
    - Grants and/or contracts with agencies to provide technical assistance.

5.3.3 Model Water Conservation Plans

Pursuant to TWDB Exhibit C, model water conservation plans are available on the TCEQ website:

- Municipal Water Use by Public Water Supplier (TCEQ-10218): https://www.tceq.texas.gov/downloads/permitting/water-rights/water-conservation/10218.docx
- Wholesale Public Water Suppliers (TCEQ-20162): https://www.tceq.texas.gov/downloads/permitting/water-rights/water-conservation/20162.docx
- Manufacturing/Industrial Use (TCEQ-20839): https://www.tceq.texas.gov/downloads/permitting/water-rights/water-conservation/20839.docx
- Mining Use (TCEQ-20840): https://www.tceq.texas.gov/downloads/permitting/water-rights/water-conservation/20840.docx
- Agricultural Uses:

- Agriculture Non-Irrigation (TCEQ-10541): https://www.tceq.texas.gov/downloads/permitting/water-rights/water-conservation/10541.docx
- Individually-Operated Irrigation System (TCEQ-10238): https://www.tceq.texas.gov/downloads/permitting/water-rights/water-conservation/10238.docx
- Agricultural Water Suppliers Providing Water to More Than One User (TCEQ-10244): https://www.tceq.texas.gov/downloads/permitting/water-rights/water-conservation/10244.docx

Appendix 5A: Guiding Principles of the South Central Texas Regional Water Planning Group

South Central Texas Regional Water Planning Group

Bylaws and Guiding Principles[1]

Region L

South Central Texas Regional Water Planning Group

[1]These Bylaws and Guiding Principles are current as of February 17, 2022

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Acronyms

SCTRWPG:	South Central Texas Regional Water Planning Group
South Texas RWPA:	South Texas RWPA
TAC:	Texas Administrative Code
TCEQ:	Texas Commission on Environmental Quality
TDA:	Texas Department of Agriculture
TPWD:	Texas Parks and Wildlife Department
TWDB:	Texas Water Development Board

Preamble

In 2015, the SCTRWPG developed, adopted, and began to pursue the *2021 Plan Enhancement Process* to improve and clarify the principles by which the SCTRWPG develops its regional water plans.

The TAC requires regional water planning groups to consider timely agency and public comments after the submittal of the Initially Prepared Plan (IPP), and to include in the final adopted plan summaries of all timely written and oral comments received, along with a planning group response explaining any resulting revisions, or justification as to why revisions are unwarranted (*see* 31 TAC § 357.21). To thoroughly consider the comments received from agencies and members of the public, former Chair of the SCTRWPG, Con Mims formed a workgroup comprised of SCTRWPG members and their staff, representing a broad mix of stakeholder interests groups across the region. Many comments received gave rise to fundamental questions central to regional water planning processes and philosophies, the implications of which required the utmost attention of the full SCTRWPG. The workgroup recommended adding the *2021 Plan Enhancement Process* to Chapter 8 (*Policy Recommendations & Unique Sites*) of the 2016 South Central Texas Regional Water Plan. Adopted by SCTRWPG in late 2015, the *2021 Plan Enhancement Process* sought to improve and clarify the principles that guide SCTRWPG decisions.

Beginning in February 2016, the SCTRWPG took up the issues identified by *2021 Plan Enhancement Process* as topics requiring careful consideration of the full Planning Group. From February 2016 to November 2017, the fruits of *2021 Plan Enhancement Process* came to bear in the form of the eleven SCTRWPG Guiding Principles contained herein.

The SCTRWPG Guiding Principles reflect the consensus driven decision making process outlined in Article X, section 2 of the SCTRWPG Bylaws, and generally serve several purposes. From the outset of *2021 Plan Enhancement Process*, the intent has been to provide a thorough response to the comments received following the adoption of the 2015 IPP. The SCTRWPG Guiding Principles serve as a response to the questions raised by those public and agency comments, and identified in the *2021 Plan Enhancement Process*.

Secondly, the Guiding Principles serve as a touchstone for which to reference during the making of any and all SCTRWPG decisions. In this way, the Guiding Principles supplement the SCTRWPG Bylaws, as well as the Water Planning Rules set out in Chapter 357 of the TAC.

Lastly, this document seeks to reconcile competing interests at the onset of the planning process, develop a shared understanding of the approach to the planning process, and to encourage consensus based decision making throughout the planning cycle. The Guiding Principles may also serve to inform future policy recommendations by the SCTRWG. In the *2021 South Central Texas (Region L) Regional Water Plan*, the SCTRWPG included an Other Recommendation (No. 8.8.4), recommending a similar process to other planning groups as it resulted in a shared understanding among the planning group members on how the related specific issues would be addressed during the regional water planning process.

SCTRWPG BYLAWS

ARTICLE I NAMES

Section 1 Organization

The official name of this organization shall be the "South Central Texas Regional Water Planning Group" (SCTRWPG).

Section 2 Regional Water Planning Area

The official name of the regional water planning area designated as Region L by the TWDB in accordance with 31 TAC Chapter 357 on February 19, 1998, shall be the "South Central Texas Regional Water Planning Area" (South Central Texas RWPA). The South Central Texas RWPA consists of Atascosa, Bexar, Caldwell, Calhoun, Comal, DeWitt, Dimmit, Frio, Goliad, Gonzales, Guadalupe, Karnes, Kendall, La Salle, Medina, Refugio, Uvalde, Victoria, Wilson, Zavala and part of Hays Counties.

ARTICLE II ESTABLISHMENT AND PURPOSE

The SCTRWPG was established by appointment of an initial coordinating body of the TWDB on February 19, 1998, and subsequent additional appointments by the initial coordinating body. The purpose of the SCTRWPG shall be to provide comprehensive regional water planning and to carry out the related responsibilities placed on regional water planning groups by state law, including Texas Water Code Chapter 16 and TWDBrules, including 31 TAC Chapters 355, 357 and 358, in and for theSouth Central RWPA.

ARTICLE III PRINCIPAL ADMINISTRATIVE OFFICE

The principal administrative office of the SCTRWPG shall be the principal business offices of the San Antonio River Authority. The administrative officer of the SCTRWPG for purposes of the Texas Open Records Act shall be designated and hold office until replaced by the SCTRWPG. The Chair of the SCTRWPG shall ensure that the mailing address and physical address of the principal office and administrative officer are provided to all members of the SCTRWPG and the Executive Administrator of the TWDB.

ARTICLE IV RESPONSIBILITIES

The SCTRWPG shall have the responsibility for performing the functions defined in Texas Water Code, Chapter 16 and in 31 TAC Chapters 355, 357 and 358 related to regional water planning groups for the South Central Texas RWPA. Foremost among those responsibilities shall be the development of a regional water plan for the South Central Texas RWPA that identifies both short and long-term water supply needs and recommends water management strategies for addressing them.

ARTICLE V VOTING MEMBERSHIP

Section 1 Composition

The initial voting members of the SCTRWPG include the initial coordinating body appointed by the TWDB on February 19, 1998, plus the additional voting members appointed by the initial coordinating body to ensure adequate representation of the interests comprising the South Central Texas RWPA stated in Texas Water Code §16.053(c), if present and other interests determined by the SCTRWPG, to include representatives appointed by Groundwater Management Areas in accordance with Section §16.053(c). Thereafter, the voting membership of the SCTRWPG shall include persons added and exclude those removed as provided under this Article and any 31 TAC § 357.4(g)(4) member selected for voting membership under Article VI.

Section 2 Terms of Office

Except for members appointed by Groundwater Management Areas under Texas Water Code Section §16.053(c). Terms of office for voting members shall be five years.

Section 3 Conditions of Membership

In order to be eligible for voting membership on the SCTRWPG, a candidate must represent the interest for which a member is sought, be willing to participate in the regional water planning process, and abide by these Bylaws.

Section 4 Selection of Members

At least forty-five calendar days prior to the expiration of the term of a voting member, or within two weeks following a Planning Group meeting at which the Planning Group decides to replace a voting member, the SCTRWPG will post public notice on its website and any other relevant websites and notify via email the county clerk in each county located in whole or in part in the SCTRWPG region, identifying the particular interest for which nominations are sought, stating the conditions of membership, delineating the method for submitting nominations, and establishing a deadline for submission of nominations between thirty and forty-five calendar days from the date that public notice was posted. Members of the SCTRWPG may also submit nominations in the manner prescribed in the public notice.

The Executive Committee will receive and process the nominations and after the deadline for submitting nominations, will recommend a nominee for the position to the voting membership as a whole, giving strong consideration to a consensus nominee from those individuals and entities that collectively represent that interest. The Executive Committee shall consider and report all nominations received but may consider only persons who meet the conditions of membership. The voting membership as a whole is not bound by the recommendation of the Executive Committee and may consider any nominee who meets the conditions of membership.

The voting members shall attempt to make a decision for a successor by consensus. If efforts to reach consensus fail, the Chair shall call for a vote on a nominee. An affirmative vote of a majority of the voting membership shall be required to elect a nominee as a new voting member. If voting fails to select a new voting member, the voting members shall consider other nominations until a new member can be selected by consensus or affirmative majority vote of the voting membership.

In addition to selecting new voting members to fill vacancies caused by removal, resignation or the expiration of a term, the voting members may add members to ensure adequate representation of the interests comprising the South Central Texas RWPA by using the selection process set forth in this section. In both the consideration of nominees and the selection of new voting members, the Executive Committee and other voting members shall strive to achieve geographic, ethnic and gender diversity.

Outgoing voting members shall be given the opportunity to fully participate in the selection process for their successors and shall serve until successors take office. However, no member shall participate in a vote in which he/she is a nominee.

A membership created by a Groundwater Management Area in accordance with Texas Water Code §16.053(c) shall be maintained by that Groundwater Management Area. The Planning Group shall notify a Groundwater Management Area of a vacancy created by its appointed member.

Section 5 Attendance

All members shall make a good faith effort to attend all SCTRWPG meetings and hearings. Records of attendance shall be kept by the Secretary at all SCTRWPG meetings and hearings and presented as part of the minutes. Voting members of the SCTRWPG who have missed three consecutive regular meetings, or at least one-half of all meetings in the preceding twelve months, shall be considered to have engaged in excessive absenteeism and are subject to removal from membership under Section 7 of this Article. The Planning Group shall notify any Groundwater Management Area of excessive absenteeism, as defined in this section, of a member appointed by that Groundwater Management Area under Texas Water Code §16.053(c) and request its consideration of replacing that member. Members are encouraged to notify the Chair if they will miss a meeting and/or send a designated alternate.

Section 6 Code of Conduct

Members and designated alternates of the SCTRWPG shall ethically conduct the business of the SCTRWPG and shall avoid any form or appearance of a conflict of interest, real or apparent, by observing the following:

(a) No member or designated alternate of the SCTRWPG shall knowingly:
  (1) Solicit or accept gratuities, favors or anything of monetary value from suppliers or potential suppliers of services, materials or equipment, including subcontractors under recipient contracts or any other person who has a substantial financial interest in the regional water plan; or
  (2) Participate in the selection, award or administration of a procurement where the member or designated alternate has a financial or other substantive interest in the organization being considered for award. Such conflict may be due to any of the following having a financial or familial relationship with the organization:
    i) the member or designated alternate;
    ii) the member's or designated alternate's family;
    iii) the member's or designated alternate's business partner(s); or
    iv) a person or organization that employs, or is about to employ any of the persons listed in (i)-(iii) above; or
  (3) Participates in any deliberation, decision or vote that would constitute a conflict of interest under federal, state or local law.
(b) Potential conflicts of interest shall be clearly stated by the voting member or designated alternate prior to any deliberation or action on an agenda item with which the voting member or designated alternate may be in conflict. Where the potential conflict is restricted to a divisible portion of an agenda item, the Chair may divide the agenda item into parts for deliberation and voting purposes. An abstention from participation in deliberations, decisions or voting and the reasons therefore shall be noted in the minutes.

Section 7 Removal of Voting Members

(a) Grounds for Removal of Voting Members. The following shall constitute grounds for removal of a voting member:
  (1) Engaging in excessive absenteeism as defined under Section 5 of this Article;

(2) Incapacity;
(3) Failure to abide by the code of conduct provisions set forth under Section 6 of this Article;
(4) appointment of a successor by the voting members upon expiration of the member's term;
(5) Change in status so that the member no longer represents the interest he/she was selected to represent;
(6) Falsifying documents;
(7) Any other serious violation of these Bylaws as may be determined by the voting members; or
(8) The voting member's designated alternate engages in any acts described in subdivisions (3), (6) or (7) of this subsection.

(b) Process for Removing Voting Members. Voting members may be removed at any time for any of the grounds for removal of voting members set forth in subsection (a) of this section. Any member with knowledge or suspicion that a voting member or designated alternate has engaged in acts or that events have occurred constituting grounds for removal under subsection (a) of this section shall report such information or suspicion to the Chair. The Chair, upon discovering or receiving such information, shall make a written request to that member for an explanation as to why he/she should not be removed from voting membership. The member shall make written response to the Chair within fifteen calendar days from the date of receipt of the Chair's request. Within five calendar days of receipt of the member's response, the Chair shall forward copies of the response to the Executive Committee. The Chair shall place an item on the next meeting agenda calling for the removal of the member if, 1) after meeting the Executive Committee continues to suspect that grounds for removal may exist; 2) the member fails to make a timely response to the Chair's request; or 3) the Chair or a majority of the Executive Committee requests its inclusion on the agenda after reviewing the written response from the accused member. At the meeting, the member subject to the possible removal action may request evidence of why he/she should not be removed. The voting members may remove the member by affirmative vote of a majority of the voting membership. The member subject to the removal action shall not participate in any way in the removal decision, nor shall his/her membership count as part of the total voting membership for purposes of calculating the vote.

(c) A Groundwater Management Area whose appointed member has acted in a way that constitutes grounds for removal, under subsection (a), above, shall be so notified by the Planning Group with a request for the Groundwater Management Area's consideration of replacement of that member.

ARTICLE VI NON-VOTING MEMBERSHIP

Section 1 Mandatory Members

The voting members of the SCTRWPG shall add the non-voting members set forth in 31 TAC §357.4(g)(1)-(g)(3) and (g)(5) and accept the designees appointed by the entities set forth therein. Such designees shall have no terms of office and shall serve until replaced by the designating entity. However, if the voting members decide by consensus or affirmative majority vote of the voting membership, that a particular designee is hindering the regional water planning efforts of the SCTRWPG, the Chair shall make a written request to the entity within ten calendar days requesting the designation of another person to serve as the entity's designee.

Section Discretionary Members

The voting members of the SCTRWPG may add or remove as a non-voting member an entity set forth in 31 TAC §357.4(h) by consensus or by a majority vote of the voting membership. If an entity is added, the Chair shall make a written request within ten calendar days to the entity requesting the designation of a person to serve until replaced by the designating entity or until the entity is removed as a non-voting member. However, if the voting members determine by consensus or by a majority vote of the voting membership that a particular entity's designee is hindering the regional water planning efforts of the SCTRWPG but also that the entity should remain as a non-voting member, the Chair shall make a written request to the entity within ten calendar days requesting the designation of another person to serve as the entity's designee.

Section 3 Code of Conduct

All non-voting members shall comply with the code of conduct provisions under Section 6 Article V of these Bylaws.

ARTICLE VII DESIGNATED ALTERNATES

Each member may designate an alternate to represent him/her when he/she is unable to attend a meeting or hearing. Each member must notify the Chair of the name of the member's designated alternate prior to the meeting or hearing at which the designated alternate will appear on behalf of the member. If the member fails to provide such notice, the Chair may forbid the participation of the designated alternate at the meeting or hearing. The Chair shall not recognize the designation of more than one alternate per member at any given time.

The designated alternate shall enjoy the same voting privileges, or lack thereof, and shall be bound by the same duties, terms and conditions as the member they represent, except as otherwise provided in these Bylaws. However, a designated alternate for a voting member who serves as an officer shall not be allowed to serve in the capacity as an officer in the member's absence.

Because it is important in achieving consensus for all members to participate actively, keep up-to-date on the progress of the group, and develop a common base of information, members shall in good faith attempt to minimize the number of time they are absent from meetings or are represented by their designated alternates.

The Administrative Officer shall maintain a current list of all members and their designated alternates.

ARTICLE VIII OFFICERS

Section 1 Officers; Restrictions and Terms of Office

Voting members of the SCTRWPG shall elect from the voting membership a Chair, Vice-Chair and Secretary to serve as officers. Each officer shall serve a term of one calendar year.

Except as provided under Section 4 of this Article, an officer shall serve a term of one calendar year. Except as provided under Section 4 of this Article, an officer shall serve until his/her successor takes office. No two voting members representing the same interest shall serve as officers at the same time. Elections shall be held annually, with no restrictions on the number of consecutive terms an individual may serve as an officer other than those that apply because of his/her status as a voting member under these Bylaws.

Section 2 Selection

Officers shall be elected at the first meeting of each calendar year. Nominations shall be made from the floor by voting members. The voting members shall elect officers from among the nominees by consensus or by affirmative vote of a majority of the voting membership.

Section 3 Removal of Officers

Any officer may be removed from office for any of the grounds for removal of voting members set forth under Article V of these Bylaws, or for repeated failure to carry out the duties of the office, by a consensus or by majority vote of the voting membership. Removal of an officer shall be set as an agenda item at the next scheduled meeting upon written request signed by five voting members to the Chair or Secretary. The Chair or Secretary receiving the request shall notify the officer in writing that he/she shall be subject to a removal action at the next scheduled meeting. At that meeting, the officer subject to the possible removal action may present evidence of why he/she should not be removed. If the Chair is the subject of the possible removal action, The Vice-Chair shall preside over the meeting during the agenda item concerning the Chair's removal. The officer subject to the removal action shall not participate in any way in the removal decision, nor shall his/her membership count as part of the total membership for purposes of calculating the vote. The notice of the meeting shall be posted in accordance with the Open Meetings Act and shall state that the issue of possibly removing the officer will be on the agenda. Any vacancy caused by the removal shall be filled as provided under Section 4 of this Article.

Section 4 Vacancies of Officers

Whenever an officer vacancy exists, the vacancy shall be filled at the next properly noticed SCTRWPG meeting. Nominations shall be made from the floor by voting members. The voting members shall elect a replacement officer from among the nominees by consensus or by affirmative vote of a majority of the voting membership. The next highest-ranking officer shall serve in the vacant position until a successor takes office, unless the office of the Secretary becomes vacant, in which case the Chair shall appoint a willing voting member to serve as Secretary until the successor to the Secretary takes office. The person selected to fill a vacancy for an officer shall serve for the unexpired term of his/her predecessor in office.

Section 5 Duties of Each Officer

(a) Chair: The Chair shall be the executive officer of the SCTRWPG. The Chair will preside at all meetings of the SCTRWPG and perform all duties provided by these Bylaws. The Chair may establish and appoint such committees as may be necessary or desirable to assist in conducting the business of the SCTRWPG, or as may be directed by the SCTRWPG. If the Chair is unable to carry out his/her duties, the Vice-Chair shall assume the duties of the Chair.

(b) Vice-Chair: The Vice-Chair shall assist the Chair in the discharge of his/her duties and, in the absence of the Chair, shall assume the Chair's full responsibilities and duties. In the event the Chair is unable to carry out his/her duties, the Vice-Chair shall serve as Chair until the SCTRWPG elects a new Chair under Section 4 of this Article. The Vice-Chair shall perform other duties as assigned by the Chair or these Bylaws.

(c) Secretary: The Secretary or the Administrative Officer shall maintain the minutes and take attendance of the SCTRWPG meetings. The minutes and attendance shall be kept as part of the SCTRWPG official records. The Secretary, or the Administrative Officer, shall ensure that all notices are properly posted as provided in the Bylaws, as required by law and as required by the Texas Open Meetings Act. The Secretary shall perform other duties as assigned by the Chair or these Bylaws. If both the Chair and Vice-Chair are unable to carry out the duties of the Chair, the Secretary shall assume the duties of the Chair.

Section 6 Executive Committee

The Executive Committee shall be composed of five SCTRWPG members, including the Chair, Vice-Chair, Secretary and two members-at-large. No two voting members representing the same interest shall serve as members of the Executive Committee at the same time. The two members-at-large shall be elected annually in the same manner and with the same terms as set forth for the election of officers under this Article. Members-at-large shall be removed and their vacancies filled in the manner prescribed for officers under this Article.

The Executive Committee shall be responsible for carrying out the duties imposed on it in these Bylaws. The voting members of the SCTRWPG may delegate any administrative decisions to the Executive Committee unless provided otherwise in these Bylaws.

All meetings of the Executive Committee shall comply with the provisions related to meetings generally as set forth in Article IX of these Bylaws.

ARTICLE IX MEETINGS

Section 1 Open Meetings and Notice

All meetings of the SCTRWPG, its committees and/or sub-groups, shall be posted and open to the public in the manner of a governmental body under the Texas Open Meetings Act and as set forth in TWDB rules. All actions of the SCTRWPG shall be deliberated and undertaken in open meeting, unless otherwise authorized by the Texas Open Meetings Act. The time and place of meetings shall be set to facilitate, to the greatest extent possible, the participation of the public in the regional water planning process. Copies of all materials presented or discussed shall be made available for public inspection prior to and following any meeting of the SCTRWPG, to the extent reasonably possible.

Section 2 Regular or Called Meetings

At the first meeting of each calendar year, the SCTRWPG shall establish and adopt a regular meeting schedule for the ensuing year. The Chair or a majority of the voting members of the SCTRWPG may also call a special or emergency meeting of the SCTRWPG. The Secretary or Administrative Officer shall ensure that an advance notice and an agenda for regular meetings will be provided to the full membership of the SCTRWPG at least seven calendar days in advance by first class U.S. Mail, facsimile or electronic mail. Supporting information and member-requested materials shall be distributed to the full membership with the notice and agenda or at the meeting, as deemed appropriate by the Chair.

Section 3 Agenda

The Secretary of the SCTRWPG shall ensure that agendas are prepared and distributed for all meetings, in accordance with this Article. Items shall be placed on the agenda at the request of anyvoting member of the SCTRWPG. Copies of the agenda and all supporting information shall be made available for public inspection prior to and following any meeting of the SCTRWPG.

Section 4 Quorum

A quorum of the SCTRWPG shall be a simple majority of the voting members or their designated alternates excluding vacancies. No less than a quorum shall be necessary to conduct any business of the SCTRWPG.

Section 5 Applicability of Robert's Rules of Order

Except as otherwise provided in these Bylaws, meetings of the SCTRWPG shall be conducted under the provisions of the most current edition of Robert's Rules of Order. However, failure to follow such rules shall not constitute grounds for appeal of an action or a decision of the SCTRWPG.

Section 6 Public Meetings Required by Law

The SCTRWPG shall post notice and conduct public meetings specifically required by statute and/or TWDB rule, including those set forth for preplanning, draft regional water plan presentation, adoption of amendments to the regional water plan, and final regional water plan adoption, in accordance with the requirements of the relevant state law and/or TWDB rules. Notification requirements may be different from those in Section 1 of this Article and are specifically delineated in Texas Water Code §16.053 and/or31 TAC §357.12.

Section 7 Minutes

(a) The Secretary shall ensure that minutes of all meetings of the SCTRWPG are prepared. The minutes shall:
   (1) state the subject of each deliberation;
   (2) indicate each vote, order, decision or other action taken;
   (3) indicate those members in attendance, noting the presence of a quorum, and noting the presence of those members of the public who participate in the course of the meeting;
   (4) represent an accurate summary of the meeting's record; and state any other information required by these Bylaws to be included in the minutes.

(b) The Secretary shall ensure that true copies of the minutes are provided to the full membership as soon as possible following the meeting.

Section 8 Protocols for Public Communication at Regional Water Planning Group Meetings

(a) Oral Comments on Issues under the South Central Texas Regional Water Planning Group (Region L) Jurisdiction. Any person wishing to make an oral presentation at a Region L planning group meeting on any matter under Region L's jurisdiction must complete a registration form that indicates the agenda item or other topic on which they wish to comment, along with the speaker's name, address and other relevant information. Any person making an oral presentation to the

Region L planning group may distribute related materials to the planning group at the meeting.

(b) Time Allocation. The presiding officer may limit the length of time for each speaker to three (3) minutes. Speakers may not trade or donate time to other speakers with permission from the presiding officer, and repetitive testimony shall be minimized or disallowed at the discretion of the presiding officer.

(c) Time to Speak. Citizens to be heard will be given an opportunity to speak at the beginning of the meeting prior to any actions by the Region L planning group. The presiding officer has the discretion to allow citizens to speak at another time in the meeting if it is deemed relevant to the planning group's deliberations by the presiding officer and is not disruptive to the conduct of the meeting.

(d) Rules of Decorum. Speakers and members of the audience must avoid disruptive behavior that interferes with the orderly conduct of a public meeting. Placards, banners, and hand-held signs are not allowed in planning group meetings, and speakers and members of the audience must avoid personal affronts, profanity, booing, excessive noise, and other disruptive conduct. The presiding officer may direct that anyone who disrupts a meeting be removed from the room. Members of the planning group, if recognized by the presiding officer, may ask clarifying questions of a speaker, but no extended verbal exchange between the planning group members and the speaker will be permitted.

(e) Recording. Any person making an audio or video recording of all or any part of a planning group meeting must do so in a manner that is not disruptive to the meeting. During a meeting, members of the public must remain in or behind the public seating area and are not permitted to record from any other area of the meeting room.

ARTICLE X MAKING DECISIONS

Section 1 Applicability; No Written Proxies

(a) Unless the method for making a particular decision is set forth in these Bylaws, the SCTRWPG, its committees and subgroups shall make all decisions using the process set forth in Section 2 of this Article

(b) Written proxies shall not be allowed in any decision-making by the SCTRWPG, its committees or its subgroups. However, designated alternates shall be allowed to participate in decision making as set forth in these Bylaws. (Moved to Article VII)

Section 2 Decision-Making Process

(a) Use of Consensus. The SCTRWPG shall attempt to make decisions using a consensus decision-making process. Consensus is an agreement built by identifying and exploring all members' interests and by assembling a package agreement which satisfies these interests to the greatest extent possible. A consensus is reached when all voting members agree that their major interests have been taken into consideration and addressed in a satisfactory manner so that they can support the decision of the group. The process of building consensus involves the development of alternatives and the assessment of the impacts of those alternatives.

Consensus does not necessarily mean unanimity. Some members may strongly endorse a particular solution while others may accept it as a workable agreement. A member can participate in the consensus without embracing each element of the agreement with the same fervor as other members, or necessarily having each of his/her interests satisfied to the fullest extent. In a consensus agreement, the members recognize that, given the combination of gains and trade-offs in the decision package and given the current circumstances and alternative options, the resulting agreement is the best one the voting members can make at this time.

(b) Failure to Reach Consensus. If after good faith negotiations it appears likely to the Chair that the voting members will be unable to reach consensus, the Chair shall entertain the following:

(1) a motion to put the issue to a vote to be conclusively decided by agreement of a majority of the voting membership; or
(2) a motion to put the issue to a vote as to whether to submit the issue to Alternative Dispute Resolution ("ADR") as set forth under Section 3 of this Article and identifying the members that shall participate in the ADR procedure ("ADR members"), such motion to be decided either by consensus or agreement of not less than a majority of the voting membership.

(c) Decision-Making Process for Committees. Committees established in accordance with these Bylaws shall use the process described in subsection (a) and (b)(1), above.

Section 3 Alternative Dispute Resolution

(a) If a vote under Section 2 (b)(2) of this Article prevails, the ADR members shall agree upon the method of ADR and the use of a mutually acceptable impartial third party to facilitate resolution of the dispute. The ADR procedures shall be in writing, shall be executed by all ADR members before ADR begins, and shall include the following:
(1) The type or series of ADR criteria determined by all ADR members to be appropriate for the size and complexity of the issue, project or proposed action in dispute;
(2) The length of time to be allowed the parties to engage in any ADR procedure;
(3) The name(s) of the impartial third party who will facilitate any process, procedure or method by which a resolution may be agreed upon;
(4) An agreement between all ADR members as to the method of payment for any costs associated with an ADR procedure, such method being subject to approval by the SCTRWPG;

(5) An agreement between all ADR members that the impartial third party may not compel the ADR members to

enter into a binding agreement, nor shall the impartial third party have the authority to sanction or penalize any ADR member;

(6) An agreement between all ADR members that, by mutual consent, they may permit persons who are not ADR members to be included as participants in discussion and as experts;

(7) An agreement between all ADR members that they will continue with ADR procedures through the time frame established in subdivision (2) of this subsection until a settlement is reached, one of the ADR members withdraws from the process, or the impartial third party concludes and informs the parties that ADR measures are not working; and

(8) An agreement between all ADR members that any ADR procedure used shall provide the method(s) by which any agreement between the parties shall become effective, such as a change order to a plan or a written agreement governing the issue.

(b) An agreement or settlement reached under this section shall not become binding on the ADR members until all ADR members agree in writing to all of the terms of the agreement or settlement.

(c) If the ADR members reach an agreement on the issue, the voting members shall once again consider the issue using the decision-making process set forth under Section 2 of this Article. However, if the voting members fail to reach consensus on the issue a second time, the Chair shall call for a vote as provided under Section 2(b)(1) of this Article. The parties shall use the procedures set forth in this Article until the issue is resolved or abandoned.

Section 4 Final Adoption of Regional Water Plan; Amendments

The voting members of the SCTRWPG shall finally adopt the regional water plan for the South Central Texas RWPA and any amendments thereto in accordance with this article.

ARTICLE XI BOOKS AND RECORDS

Section 1 Required Documents and Retainment

Records of the SCTRWPG, in accordance with the Public Information Act, shall be kept at the principal office of the SCTRWPG for a period of at least five years. Minutes shall be maintained at the principal office of the SCTRWPG for as long asthe SCTRWPG exists and for a period of five years thereafter.

Section 2 Inspection and Copying

Records of the SCTRWPG shall be available for inspection and copying at the principal administrative office during normal business hours. Procedures and fees for copying and inspection shall be the same as those used by the political subdivision housing the principal office of the SCTRWPG for inspection and copying of its own public records.

Section 3 Availability of Reports

All reports, planning documents and work products resulting fromprojects funded by the TWDB shall be made available to the TWDB, the TPWD and the TCEQ or their successor agencies. At least one copy of the approved regional water plan shall be placed in the county clerk's office for each county and in at least one public library of each county having land within the South Central Texas RWPA, in accordance with state law.

ARTICLE XII COMMITTEES

Section 1 Establishment

The SCTRWPG may by motion establish committees and subgroups to assist and advise the SCTRWPG in the development of the regional water management plan. The committee or subgroup may be formed to address specific issues assigned by the SCTRWPG and may have a specified term of membership.

Section 2 Membership

Membership in the committees and subgroups shall generally follow the requirements and procedures of Article V of these Bylaws; membership of the committees and subgroups should be inclusive, rather than exclusive, in nature; the interests identified in the initial coordinating body will be invited to participate, as well as other interests that have been identified. Appointment to committees or subgroups shall be made by the Chair. The terms of office for all members of committees and subgroups shall be either upon the expiration of the term, if any, specified by the SCTRWPG in the establishing motion for the committee or subgroup, or upon the expiration of the persons' membership in the SCTRWPG.

Section 3 Officers

The Chair, Vice-Chair and Secretary of a committee or subgroup established by the SCTRWPG shall be elected from the members of the committee or subgroup. The Chair, Vice-Chair and Secretary of the committee or subgroup established by the SCTRWPG shall be elected to their respective offices by a majority affirmative vote of the members of the committee or subgroup. Additional committee or subgroup officers with associated responsibilities may be created as necessary by a majority affirmative vote of the members of the committee or subgroup. The additional officers shall be elected by a majority affirmative vote of the members of the committee or subgroup.

Section 4 Meetings

Requirements and procedures for committee or subgroup meetings shall follow those established in Article IX of these Bylaws, including requirements for notice. Committees or subgroups may adopt their own rules of procedure, if authorized by the SCTRWPG and the rules are not in conflict with state law, TWDB rules or these Bylaws.

Section 5 Books and Records

Requirements and procedures for committee or subgroup books and records shall follow those established for the SCTRWPG in Article XI of these Bylaws.

Section 6 Code of Conduct

Members of a committee or subgroup are subject to the requirements of Article V, Section 6 of these Bylaws.

ARTICLE XIII COMPENSATION AND REIMBURSEMENT

Section 1 Compensation

Members of the SCTRWPG are not to be compensated for their time.

Section 2 Reimbursement

Reimbursement of a SCTRWPG member's expenses will be issued from the local agency funds made available through interlocal funding agreements. Requests for reimbursement of travel and other expenses must meet the following requirements to be eligible:

a. The member must submit a completed Expense Report and appropriate receipts.
b. Requested reimbursement for travel expenses must be in conformance with the State rate that is in effect at the time the travel was conducted.
c. The Administrative Agency will issue a check to the member after the completed expense report has been approved by the Chair or Vice-Chair of the SCTRWPG and the mileage and rates have been verified.

All expenses, except those specifically listed below, are eligible for reimbursement under this policy:

a. Cost incurred by a SCTRWPG member eligible for reimbursement by the member's employer.

ARTICLE XIV CONTRACTUAL SERVICES

The voting members of the SCTRWPG shall make all decisions related to final approval of persons or entities selected to provide contractual services for the SCTRWPG, including all services related to preparation, development or revisions of the regional water plan for the South Central Texas RWPA. However, the voting members may delegate to the Executive Committee the authority to make all administrative decisions concerning amendments to TWDB Research and Planning Fund grant contracts for services related to regional water planning, except those decisions concerning amendments related to scopes of work and budgets.

ARTICLE XV ADOPTING AND AMENDING THE BYLAWS

These Bylaws shall have full force and effect upon approval and adoption by the voting members of the SCTRWPG, acting on behalf of the interests comprising the South Central Texas RWPA, and upon submission to the TWDB in compliance with 31 TAC § 357.4. The voting members shall adopt these Bylaws and any amendment thereto by consensus or by affirmative vote of not less than two-thirds of the voting membership. The Secretary shall ensure that proposed amendments to the Bylaws are provided to the full membership no later than ten calendar days prior to the next regular meeting of the SCTRWPG when such amendments are to be considered.

November 7, 2019

Chair, SCTRWPG Date

SCTRWPG GUIDING PRINCIPLES

PRINCIPLE I — APPROPRIATENESS ANDADEQUACY OF HOW DEMAND AND NEED ARE DETERMINED

Adopted: August 4, 2016; Amended: February 17, 2022

The SCTRWPG generally defers to the TWDB on matters related to population and water demand projections. However, the SCTRWPG retains the duty to review TWDB projections on a case by case basis. Where the SCTRWPG finds a discrepancy in TWDB's projections, and can adequately justify its findings by verifying one or more of the "criteria for adjustment*,"* TWDB – in consultation with TDA, TCEQ, and TPWD – may adjust population and/or water demand projections accordingly (see *generally General Guidelines for Development of the 2026 Regional Water Plan*). Consistent with Chapter 8 of the 2021 Regional Water Plan for Region L, the SCTRWPG supports greater TWDB flexibility through relaxation of current methodological assumptions holding regional and state population projection totals fixed (see Chapter 8.9.3 *Population and Water Demand Projections)*. Water demand projections used in developing the Regional Water Plan should be consensus figures arrived at by using TWDB data along with local input from the cities, counties, and groundwater districts.

PRINCIPLE II — ROLE OF REGIONAL WATER PLANNING GROUPS IN INFLUENCING POPULATION GROWTH AND LAND USE

Adopted August 4, 2016

Where the concepts of population growth and land use necessarily interrelate with the Regional Water Plan, the SCTRWPG shall, to the greatest extent possible, develop strategies to meet future projected demands. However, it is neither the role, nor the responsibility of the SCTRWPG to influence population growth or land use. While the SCTRWPG has a duty to remain cognizant of the sensitive relationship between the Regional Water Plan, population growth and land use, decisions concerning permitting and influencing population growth are inherently local, and remain wholly independent from the regional water planning process.

PRINCIPLE III CONFLICTS OF INTERESTS WITH RESPECT TO PLANNING GROUP MEMBERS

Adopted August 4, 2016

a) Active Planning Group Members

All disclosures pursuant to Article V, Section 6 of the SCTRWPG Bylaws, are the responsibility of the planning group member or designated alternate who has the potential conflict of interest. Therefore, disclosures are the responsibility of the planning group member or designated alternate. If the voting member choses to abstain from participation in deliberations, decisions, or voting, pursuant to Article V, Section 6 of the SCTRWPG Bylaws, the reason for abstention shall be noted in the minutes.

> *SCTRWPG Bylaw Excerpt*
>
> *Potential conflicts of interest shall be clearly stated by the voting member or designated alternate prior to any deliberation or action on an agenda item with which the joint member or designated alternate may be in conflict. Where the potential conflict is restricted to a divisible portion of an agenda item, the Chair may divide the agenda item into parts for deliberation and voting purpose. An abstention from participation in deliberations, decisions or voting and the reason therefore shall be noted in the minutes.* (see *SCTRWPG Bylaws*, Article V, Section 6, (b))

b) Nomination Process

Where the SCTRWPG is soliciting nominations to fill vacancies on the planning group, nominators shall provide information regarding the nominee's current employer, and provide a description of the nominee's experience that qualifies him/her for the position in the interest group being sought to represent.

Additionally, nominees shall agree to abide by the Code of Conduct, which is incorporated in the SCTRWPG Bylaws (see *SCTRWPG Bylaws*, Article V, Section 6). As per the Bylaws, the Executive Committee will conduct an interview process whereby nominees will be evaluated. Prior to the interview, nominees will be provided a copy of the Bylaws. During the interview process, nominees will be asked if they are willing to agree to the Bylaws, and specifically, if they are willing to comply with the Code of Conduct.

PRINCIPLE IV THE ROLE OF THE PLANNING GROUP IN INFLUENCING WATER DEVELOPMENT PLANS OF WATER SUPPLIERS

Adopted: November 3, 2016

The role of the SCTRWPG is to ensure water needs are met with identified potentially feasible water management strategies. It is not the role of the SCTRWPG to influence or interfere with local water planning decisions. In the absence of a planning group recommended potentially feasible water management strategy to meet an identified need, the SCTRWPG may evaluate and report, as required, the social, environmental and economic impacts of not meeting the identified need.

PRINCIPLE V THE ROLE OF THE PLANNINGGROUP IN INFLUENCING PERMITTING ENTITIES

Adopted: November 3, 2016

Decisions made at the planning group level are non-regulatory, and are intended for planning purposes only. While some decisions made by the SCTRWPG could inevitably affect some decisions made by the governing boards of permitting entities, it is neither the responsibility, nor the role of the SCTRWPG to influence or interfere with the regulatory decisions made by the governing boards of permitting entities.

PRINCIPLE VI **THE ADEQUACY OF EVALUATING THE PLAN'S EFFECTS ON FRESHWATER INFLOWS TO SAN ANTONIO BAY, AND THE ADEQUACY OF ENVIRONMENTAL ASSESSMENTS OF INDIVIDUAL WATER MANAGEMENT STRATEGIES**

Adopted: November 2, 2017

The SCTRWPG's evaluation of the Plan's effect on instream flows and freshwater inflows to the San Antonio Bay, and Plan's environmental assessments of individual water management strategies are currently meeting the regulations and statutes for regional water planning. The SCTRWPG believes a structural reorganization of the data presented will benefit the understanding of the Plan's environmental assessments. The SCTRWPG will:

a) Initiate environmental assessments earlier into the regional planning process;
b) Eliminate environmental assessment comparisons of current plan to past plans;
c) Consolidate threatened and endangered species information into the appendix rather than repeating in each water management strategy write-up;
d) Update baseline year data to most current for potential impacts to vegetation and terrestrial habitat;
e) Adjust distances for cultural resource sites;
f) Include current conditions and streamflow protected by environmental flow standards in updated tabular form improving the way in which the data is presented;
g) Include target flow regimes based on environmental freshwater inflow standards in updated tabular form improving the way in which the data is presented; and
h) Include high level narrative of climate variability.

The SCTRWPG believes this environmental assessment structural reorganization will reflect realistic environmental impacts of the recommended water management strategies for both the public and planning group members.

PRINCIPLE VII MINIMUM STANDARDS FORWATER MANAGEMENTSTRATEGIES

Adopted: November 2, 2017

For a proposed strategy to be designated by the SCTRWPG as a water management strategy in the regional water plan, the proposed strategy must:

a) supply water, reduce water demands, or otherwise satisfy one or more identified needs;
b) include an evaluation and description consistent with standards used by the SCTRWPG and its technical consultants as required by TWDB Rules;
c) satisfy all relevant requirements established by the TWDB, including environmental flow standards;
d) identify one or more entities, with sufficient ability and willingness to implement the strategy, as being the strategy's sponsor(s);
e) identify all entities, as reasonably possible, who own any existing or planned infrastructure or existing permit that could be affected by the proposed strategy as being strategy participants; and
f) identify groundwater conservation districts or TCEQ with jurisdiction over the proposed strategy.

PRINCIPLE VIII RECOMMENDED WATER MANAGEMENT STRATEGIES

Adopted: November 2, 2017

The SCTRWPG strives to develop a regional water plan that recommends water management strategies sufficient to supply water to all identified needs projected in the planning horizon for the region.

The SCTRWPG prefers designating water management strategies as recommended or alternative using a consensus approach while respecting the strategy sponsor(s)' wishes.

Prior to designating any water management strategies as recommended, the SCTRWPG will review the water management strategies to evaluate costs and environmental sensitivity of eachwater management strategy per TWDB Rules.

PRINCIPLE IX MANAGEMENT SUPPLY

Adopted: November 2, 2017

The cumulative supply of the recommended water management strategies may include an amount of supply in excess of the amount needed to meet regional needs as considered necessary by the SCTRWPG to allow for such things as uncertainty associated with long-term planning, problems with project implementation, changing weather conditions, flexibility of sponsors in choosing projects to implement, and changes in project viability.

Identified Needs without a Recommended Water Management Strategy

For water needs that are not satisfied by recommended water management strategies, the SCTRWPG will provide a narrative explaining why the need is not satisfied.

Alternative Strategies in the Regional Water Plan

The SCTRWPG will include alternative water management strategies that sponsors wish to have identified as alternatives to one or more of their recommended water management strategies.

Conceptual Approaches (Water Management StrategiesNeeding Further Study) in the Regional Water Plan

The SCTRWPG will acknowledge conceptual and innovative approaches to developing water supplies, reducing water demand, and increasing efficiency of supplying water as may be proposed by others, but need further study.

PRINCIPLE X THE ROLE OF REUSE WITHIN THE REGIONAL WATER PLAN

Adopted: November 2, 2017

The SCTRWPG generally defers to the TWDB rules for regional water planning as contained in the TAC on matters related to surface water supply analysis. For surface water supply analysis, the SCTRWPG will use the most current Water Availability Models from the TCEQ to evaluate supplies, as required by section

357.32 (c) of the TAC. As per section 357.32 of the TAC, the SCTRWPG will assume full utilization of existing water rights and no return flows when using Water Availability Models.

The SCTRWPG agrees that effluent will be depicted in the Regional Water Plan only in cases of direct and/ or indirect reuse water management strategies, or where a preexisting contract for the supply of reuse is in place. Additionally, the SCTRWPG will not use effluent in the estimates of cumulative effects absent a direct and/or indirect reuse water management strategy or a preexisting contract

PRINCIPLE XI IDENTIFYING SPECIAL STUDIES OR EVALUATIONS DEEMED IMPORTANT TO ENHANCE THE 2026 PLAN, THE IDENTIFICATION OF OUTSIDE FUNDING SOURCES, AND THE EXTENT TO WHICH INNOVATIVE STRATEGIES SHOULD BE USED

Adopted: November 2, 2017;
Amended: February 17, 2022

The SCTRWPG recognizes that there are no identifiable outside funding sources for special studies or evaluations. However, the SCTRWPG remains willing to consider evaluating any proposed water management strategies and special studies allowable under section 357.34 of the TAC.

Notes

Notes

Region L

South Central Texas Regional Water Planning Group

South Central Texas Regional Water Planning Group
c/o San Antonio River Authority
100 East Guenther Street
San Antonio, Texas 78204

Appendix 5B: Water Management Strategies Considered and Evaluated to Meet Identified Needs

Appendix 5B: Water Management Strategies Considered and Evaluated to Meet Identified Needs

Every WUG Entity with an Identified Need			WMSs to be considered by statute[1]												Additional WMSs to be considered by rule							
No.	WUG Name	Maximum Need 2030-2080 (af/yr)	conservation - water use reduction	conservation - water loss mitigation	drought management	reuse	management of existing supplies	development of large-scale marine seawater or brackish groundwater	conjunctive use	acquisition of available existing supplies	development of new supplies	development of regional water supply or regional management of water supply facilities	voluntary transfer of water (including regional water banks, sales, leases, options, subordination agreements, and financing agreements)	emergency transfer of water under Section 11.139	system optimization, reallocation of reservoir storage to new uses, contracts, water marketing, enhancement of yield, improvement of water quality	new surface water supply	new groundwater supply	brush management; precipitation enhancement	interbasin transfers of surface water	aquifer storage and recovery	cancellation of water rights	rainwater harvesting
1	Alamo Heights	488	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
2	Aqua WSC	67	PF	PF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
3	Atascosa Rural WSC	2,436	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
4	Benton City WSC	716	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF
5	Bexar County WCID 10	1,154	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
6	Boerne	13,812	PF	PF	PF	PF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF
7	C Willow Water	61	PF	PF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
8	Canyon Lake Water Service	18,245	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	PF	PF	nPF	nPF	nPF	nPF	nPF
9	Carrizo Hill WSC	67	PF	PF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
10	Castroville	1,322	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF
11	Cibolo	2,321	PF	PF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
12	Clear Water Estates Water System	3,596	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
13	Converse	552	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
14	County Line SUD	11,808	PF	PF	PF	PF	PF	PF	nPF	PF	PF	nPF	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF
15	County-Other, Comal	17,204	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	PF
16	County-Other, Guadalupe	584	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF
17	County-Other, Hays	22,488	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF
18	County-Other, Kendall	926	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF
19	County-Other, Victoria	297	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	PF
20	Creedmoor-Maha WSC	2,466	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
21	Crystal Clear SUD	17,211	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PR	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
22	East Central SUD	7,269	PF	PF	PF	PF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
23	East Medina County SUD	58	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF

Every WUG Entity with an Identified Need			WMSs to be considered by statute[1]												Additional WMSs to be considered by rule							
No.	WUG Name	Maximum Need 2030-2080 (af/yr)	conservation - water use reduction	conservation - water loss mitigation	drought management	reuse	management of existing supplies	development of large-scale marine seawater or brackish groundwater	conjunctive use	acquisition of available existing supplies	development of new supplies	development of regional water supply or regional management of water supply facilities	voluntary transfer of water (including regional water banks, sales, leases, options, subordination agreements, and financing agreements)	emergency transfer of water under Section 11.139	system optimization, reallocation of reservoir storage to new uses, contracts, water marketing, enhancement of yield, improvement of water quality	new surface water supply	new groundwater supply	brush management; precipitation enhancement	interbasin transfers of surface water	aquifer storage and recovery	cancellation of water rights	rainwater harvesting
24	El Oso WSC	6	PF	PF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
25	Elmendorf	1,016	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
26	Fair Oaks Ranch	689	PF	PF	PF	PF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
27	Fort Sam Houston	14,151	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
28	Garden Ridge	4,081	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
29	Goforth SUD	15,528	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
30	Green Valley SUD	3,381	PF	PF	PF	PF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
31	Hondo	288	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF
32	Irrigation, Calhoun	9,173	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
33	Irrigation, Dimmit	4,336	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
34	Irrigation, Goliad	184	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
35	Irrigation, Guadalupe	20	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
36	Irrigation, Karnes	744	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF
37	Irrigation, La Salle	413	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
38	Irrigation, Medina	23,948	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF
39	Irrigation, Uvalde	18,625	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF
40	Irrigation, Victoria	200	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
41	Irrigation, Wilson	331	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF
42	Irrigation, Zavala	14,189	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
43	Kendall West Utility	490	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
44	Kirby	270	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	PF
45	KT Water Development	4,471	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
46	Kyle	2,287	PF	PF	PF	PF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	PF
47	La Coste	5	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF

Every WUG Entity with an Identified Need			WMSs to be considered by statute[1]												Additional WMSs to be considered by rule							
No.	WUG Name	Maximum Need 2030-2080 (af/yr)	conservation - water use reduction	conservation - water loss mitigation	drought management	reuse	management of existing supplies	development of large-scale marine seawater or brackish groundwater	conjunctive use	acquisition of available existing supplies	development of new supplies	development of regional water supply or regional management of water supply facilities	voluntary transfer of water (including regional water banks, sales, leases, options, subordination agreements, and financing agreements)	emergency transfer of water under Section 11.139	system optimization, reallocation of reservoir storage to new uses, contracts, water marketing, enhancement of yield, improvement of water quality	new surface water supply	new groundwater supply	brush management; precipitation enhancement	interbasin transfers of surface water	aquifer storage and recovery	cancellation of water rights	rainwater harvesting
48	Leon Valley	1,129	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	PF
49	Live Oak	228	PF	PF	PF	PF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
50	Livestock, Hays	12	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
51	Lockhart	908	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
52	Lytle	447	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF
53	Manufacturing, Bexar	1,755	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
54	Manufacturing, Caldwell	14	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
55	Manufacturing, Calhoun	8,741	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
56	Manufacturing, Kendall	53	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
57	Manufacturing, Victoria	46,815	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
58	Manufacturing, Wilson	17	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
59	Manufacturing, Zavala	877	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
60	Martindale WSC	434	PF	PF	PF	nPF	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF
61	Maxwell SUD	3,838	PF	PF	PF	nPF	PF	PF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF
62	McCoy WSC	185	PF	PF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
63	Mining, Atascosa	4,478	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
64	Mining, Comal	13,268	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
65	Mining, Dimmit	5,451	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
66	Mining, Frio	4,036	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
67	Mining, Gonzales	3,779	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
68	Mining, Guadalupe	428	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
69	Mining, Karnes	1,440	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
70	Mining, La Salle	4,867	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
71	Mining, Medina	4,604	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF

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72	**Mining, Uvalde**	**2,676**	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
73	**Mining, Victoria**	**408**	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
74	**Mining, Zavala**	**3,664**	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
75	**Natalia**	**13**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF
76	**New Braunfels**	**88,362**	PF	PF	PF	PF	PF	nPF	PF	PF	PF	PF	nPF	nPF	PF	nPF	PF	nPF	nPF	PF	nPF	nPF
77	**Oak Hills WSC**	**1,568**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
78	**Pearsall**	**745**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
79	**Picosa WSC**	**273**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
80	**Runge**	**7**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
81	**San Antonio Water System**	**40,390**	PF	PF	PF	PF	PF	PF	nPF	PF	PF	PF	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF
82	**San Marcos**	**15,788**	PF	PF	PF	PF	PF	nPF	nPF	nPF	PF	PF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF
83	**Schertz**	**9,676**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	PF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
84	**Seguin**	**234**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	PF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
85	**Selma**	**3,680**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
86	**Shavano Park**	**389**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
87	**South Buda WCID 1**	**3,119**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
88	**Springs Hill WSC**	**7,115**	PF	PF	PF	nPF	PF	nPF	nPF	PF	PF	nPF	PF	nPF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF
89	**Steam-Electric Power, Victoria**	**666**	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
90	**Texas State University**	**619**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
91	**The Oaks WSC**	**178**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF
92	**Uvalde**	**717**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
93	**Victoria**	**8,510**	PF	PF	PF	nPF	PF	nPF	PF	nPF	PF	nPF	PF	nPF	nPF	PF	PF	nPF	nPF	PF	nPF	nPF
94	**Ville Dalsace Water Supply**	**113**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF
95	**Wimberley WSC**	**2,056**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF

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96	**Wingert Water Systems**	**175**	PF	PF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF

[1] Texas Water Code §16.053(e)(5)

nPF = considered but determined 'not potentially feasible' (may include WMSs that were initially identified as potentially feasible)

PF = considered 'potentially feasible' and therefore evaluated

Appendix 5C: Implementation Status of Certain Water Management Strategies

Appendix 5C: Implementation Status of Certain WMSs

REGIONAL WATER PLAN WMS/PROJECT DATA							ANTICIPATED/ESTIMATED (OR ACTUAL[1]) IMPLEMENTATION ACTIVITIES AND DATES																	
							SPONSOR AUTHORIZATION	PERMITTING STATUS (as applicable)									PLANNING, DESIGN, AND CONSTRUCTION STATUS						TOTAL FUNDS EXPENDED TO DATE	Other significant activities completed (summary)
								STATE WATER RIGHT STATUS				FEDERAL 404 PERMIT STATUS (if applicable)		DESALINATION PERMIT STATUS		OTHER KEY PERMITS	GEOTECH/DESIGN	LAND ACQUISITION		CONSTRUCTION				
Figure No.	Water Management Strategy/Project Name	Project Sponsor	WMS Project Sponsor Region	Online Decade	Capital Cost	Anticipated Footprint Acreage (acres)	Date(s) that the sponsor took an affirmative vote or other action to make expenditures necessary to construct or file applications for state or federal permits (date(s))	Anticipated (or actual) TCEQ application filed (date)	Anticipated (or actual) State Water Right Permit Administratively Complete (date)	Anticipated (or actual) Draft State Water Right Permit Issued (date)	Anticipated (or actual) Date Final State Water Right Permit Issued (date)	Anticipated (or actual) application for permit filed (date)	Anticipated (or actual) permit issuance (date)	Anticipated (or actual) diversion permit issued (date)	Anticipated (or actual) Discharge/ Disposal Permit Issued (date)	Summary of other permits and status (summary)	Generally describe the types and amount (as %s) of geotechnical/ reconnaissance/ engineering feasibility or other technical, testing, and/or design work etc. performed to date (summary)	Percent Land Acquisition Completed (%)	Anticiptated land acquisition completion (date)	Anticipated start of construction (Date)	Percent construction completed (%)	Anticipated construction completion (date)	Rough approximation of the total expenditures, to date, on ALL activities related to project implementation to date (millions of $s)	
5C-1	ARWA DPR (Phase 3) Project	Alliance Regional Water Authority (ARWA)	L	2060	$ 119,879,000	188	N/A	N/A	N/A	N/A	N/A	2055	2056	N/A	TPDES Discharge Permit Amendment for RO concentrate disposal, anticipated issuance in 2055	N/A	A Feasibility Study has been conducted, reflecting 0.5% of the effort.	0%	2056	2056	0%	2060	$0.05M	N/A - None
5C-2	Caldwell Brackish Partnership Project	BVRT, County Line SUD, Maxwell SUD	L	2040	$ 292,793,000	~135 (includes pipeline ROW, storage tank(s), WTP, wells, collection lines, and pump station(s))	Contract for feasibility report was executed on October 20, 2023	N/A	N/A	N/A	N/A	2028	2031	GCD permits anticipated by 2030	N/A	Class I Injection Well permit anticipated by 2030	Feasibility report with preliminary hydrogeology has been completed.	0%	Groundwater leases anticipated by 2027, ROW anticipated by 2031	2030	0%	2033	$0.25M split between the three utilities	Presentations to key stakeholders
5C-3	CRWA Expanded Brackish Carrizo-Wilcox Project	Canyon Regional Water Authority (CRWA)	L	2040	$ 236,210,000	368	No board action has been taken	N/A	N/A	N/A	N/A	2036	2037	N/A	2038	Building, Environmental Assessment, Pretreatment	Geotechnical-0%; feasibility-0%; design-0%	0%	2034	2038	0%	2040	$0M	As of January 2025, CRWA is pursuing a feasibility study for this project
5C-4	GBRA Lower Basin New Appropriation Project	Guadalupe-Blanco River Authority (GBRA)	L	2040	$ 249,823,000	2,037	No board action has been taken	8/5/2009	10/18/2017	2026	2030	2033	2037	N/A	N/A	N/A	Water rights feasibility study in 2008	0%	2035	2037	0%	2039	$1M	N/A - None
5C-5	GBRA WaterSECURE	Guadalupe-Blanco River Authority (GBRA)	L	2040	$ 6,093,657,000	12,000	No board action has been taken	Varies - Eight WRs obtained between 1940 to 2008	Varies - Eight WRs obtained between 1940 to 2008	Varies - Eight WRs obtained between 1940 to 2008	Varies - Eight WRs obtained between 1940 to 2008	2027	2030	N/A	N/A	Class I Injection Well permit anticipated by 2028	Finishing the feasibility study in Spring 2025	0%	2028	2028	0%	2033	$5M	N/A - None
5C-6	Gonzales & Guadalupe Brackish Partnership Project	BVRT, County Line SUD, Maxwell SUD	L	2040	$ 421,443,000	~225 (includes pipeline ROW, storage tank(s), WTP, wells, collection lines, and pump station(s))	Contract for feasibility report was executed on October 20, 2023	N/A	N/A	N/A	N/A	2028	2031	GCD permits anticipated by 2030	N/A	Class I Injection Well permit anticipated by 2030	Feasibility report with preliminary hydrogeology has been completed.	0%	Groundwater leases anticipated by 2027, ROW anticipated by 2031	2030	0%	2033	$0.25M split between the three utilities	Presentations to key stakeholders
5C-7	Medina County Regional ASR Project	East Medina County SUD and Yancey WSC	L	2040	$ 319,445,000	95	Medina County took action on Interlocal Agreement and authorized prelminary funding of $92,000 for the Medina County Regional Water Alliance. Funds covered administrative, legal, and technical assistance to complete a pre-feasibility study for ASR.	N/A	N/A	N/A	N/A	2036	2037	N/A	N/A	Class V Injection Well permit anticipated by 2037; Transfer of Edwards Aquifer Authority Permits anticipated in 2035	Feasibility report with preliminary hydrogeology has been completed.	0%	2035	2035	0%	2040	$0.092M	Pre-feasibility report for ASR completed. Monthly meetings underway.
5C-8	NBU Potable Reuse Project	New Braunfels	L	2040	$ 38,220,000	73	N/A - Anticipated in 2030	2033	N/A	N/A	N/A	N/A	N/A	N/A	TPDES Discharge Permit Amendment for RO concentrate disposal, anticipated issuance in 2035	N/A	Project has been identified in NBU's 2024 WRP	100%	1957	2035	0%	2038	$0M	Project has been identified in NBU's 2024 WRP
5C-9	SAWS Expanded Brackish Groundwater Project	San Antonio Water System (SAWS)	L	2040	$ 319,181,000	361	2014	N/A	N/A	N/A	N/A	To Be Determined (TBD)	TBD	N/A	N/A	Varies – Five Class I Injection Well permits obtained between 2008 and 2011	5%. Concept study was completed end of 2013 prepared by B&V which included pipeline routing, requirements, well construction and well locations and integration conveyance.	0%	2035	2035	0%	2040	$209M	N/A - None
5C-10	SAWS Regional Wilcox Project	San Antonio Water System (SAWS)	L	2050	$ 1,267,722,000	1,597	No action has been taken.	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**0%**	**2045**	**2045**	**0%**	**2050**	$0M	N/A - None

FOOTNOTE 1 : ANY DATE ENTERED THAT IS PRIOR TO ADOPTION OF THE REGIONAL WATER PLAN IS ASSUMED TO BE AN 'ACTUAL' DATE

Figure 5C-1 Anticipated Implementation Timeline for the ARWA DPR (Phase 3) WMS

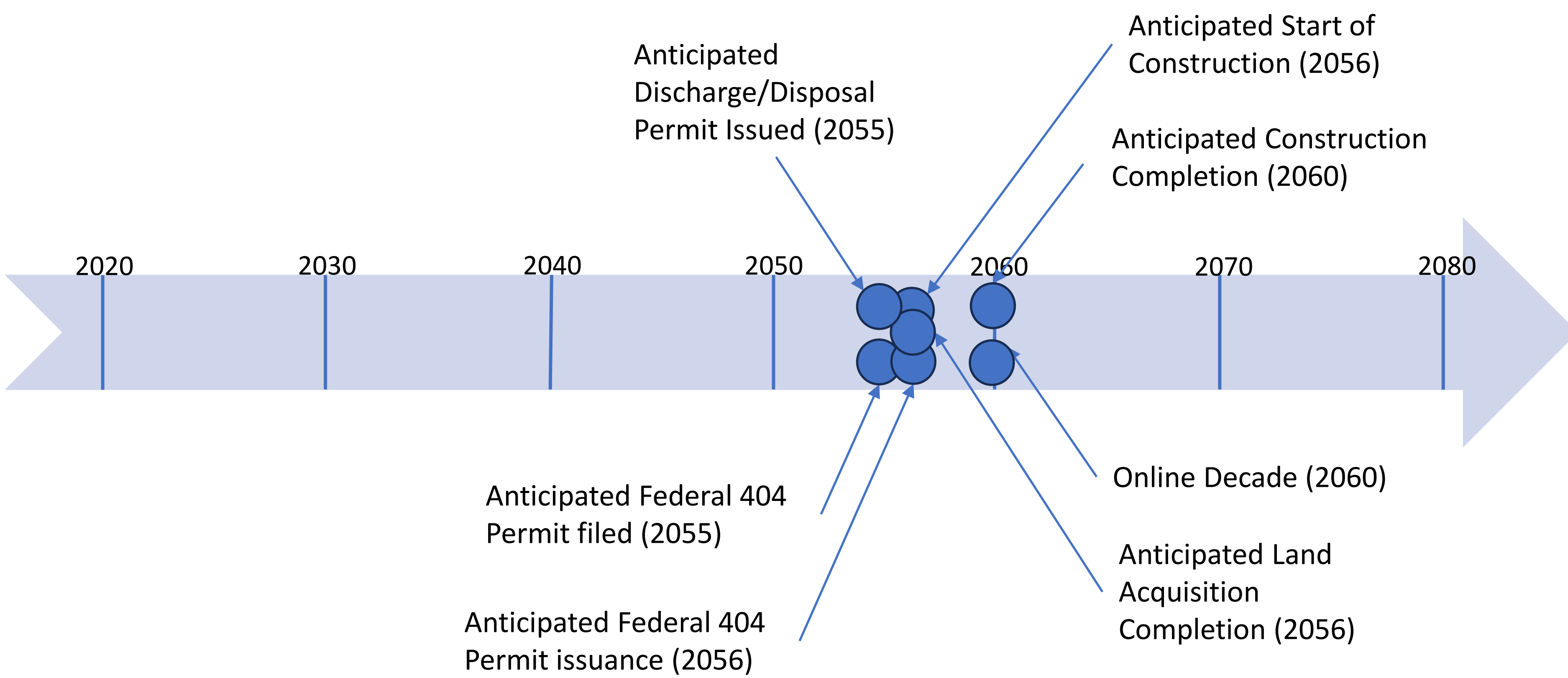


Figure 5C-2 Anticipated Implementation Timeline for the Caldwell Brackish Partnership Project

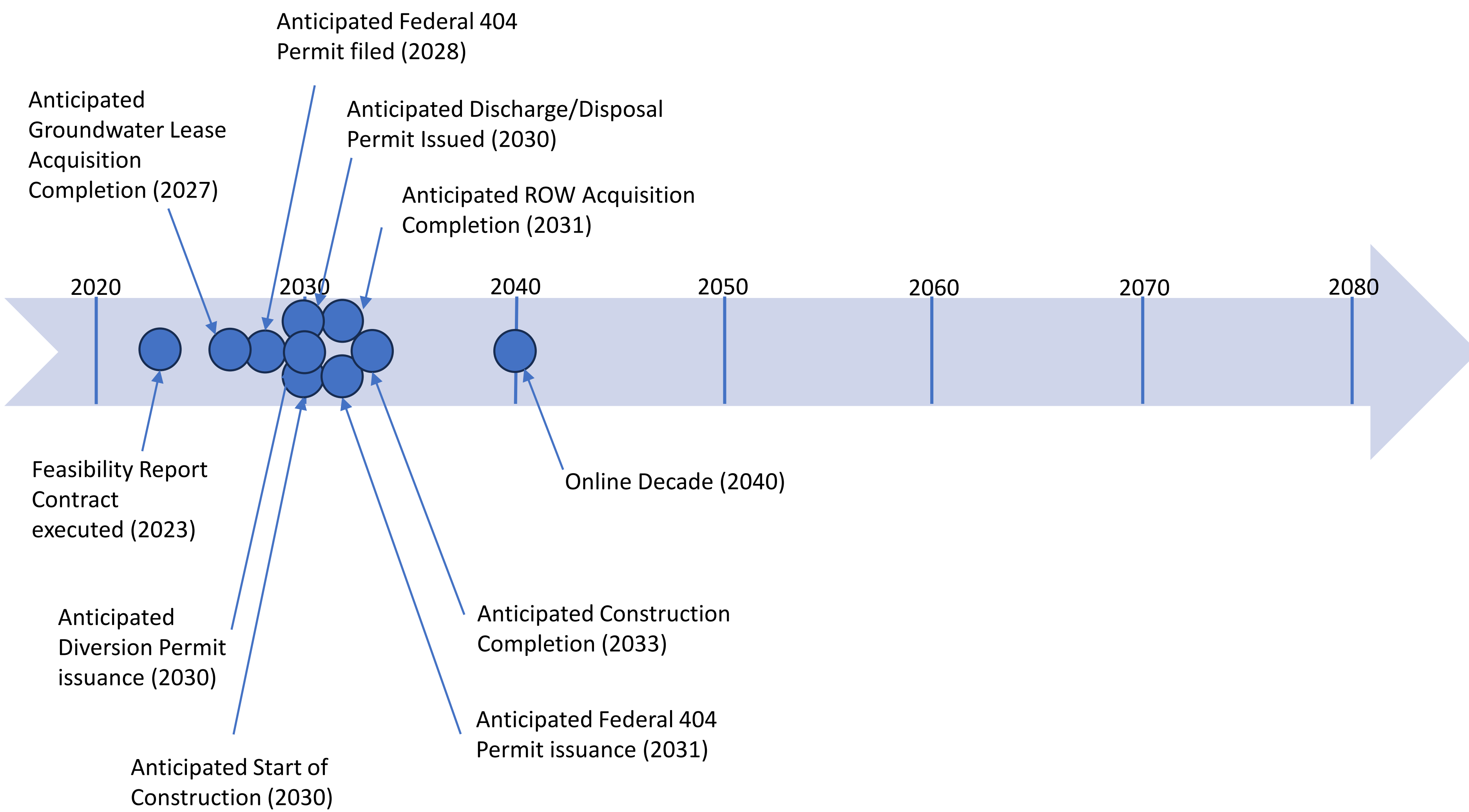


Figure 5C-3 Anticipated Implementation Timeline for the CRWA Expanded Brackish Carrizo-Wilcox Project

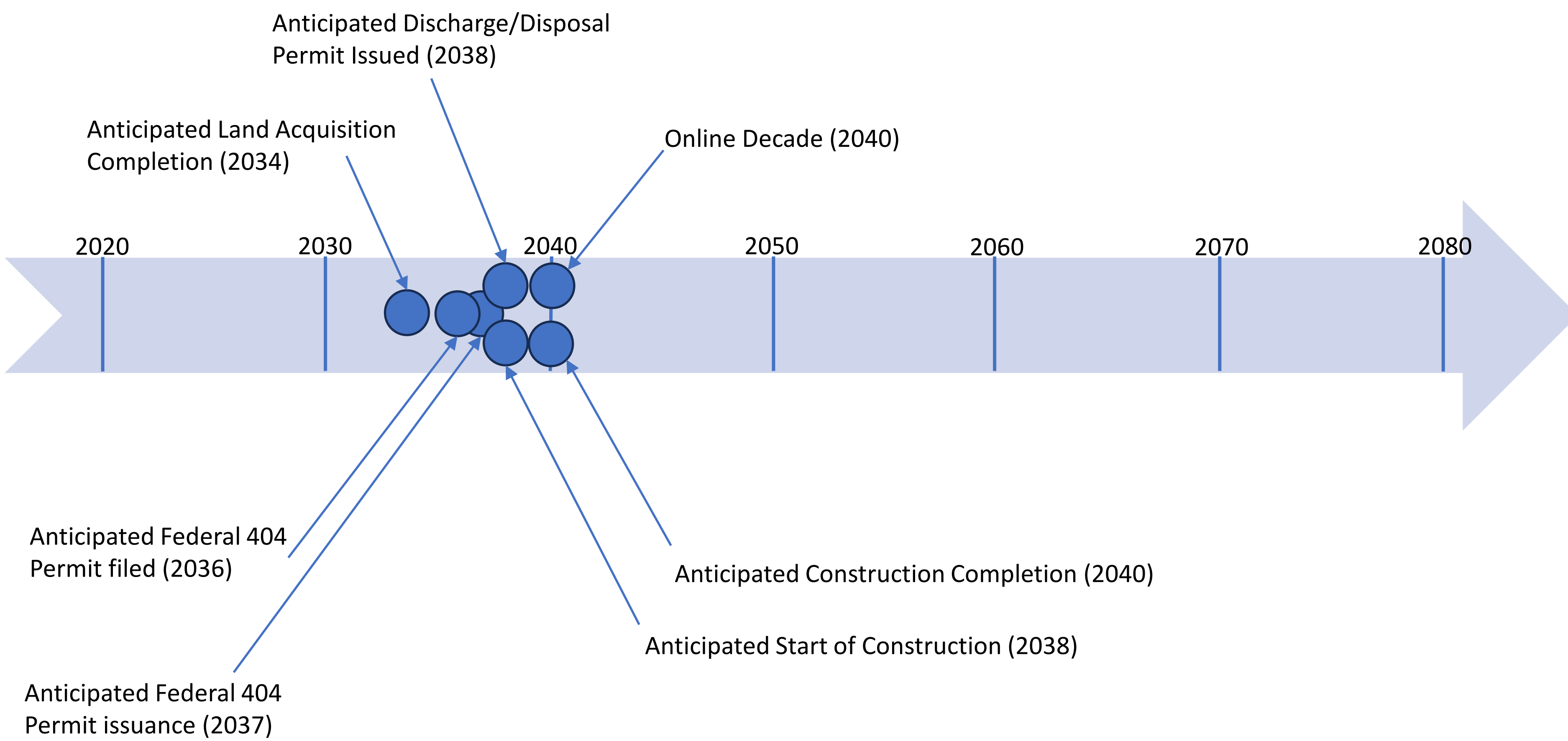


Figure 5C-4 Anticipated Implementation Timeline for GBRA Lower Basin New Appropriation Project

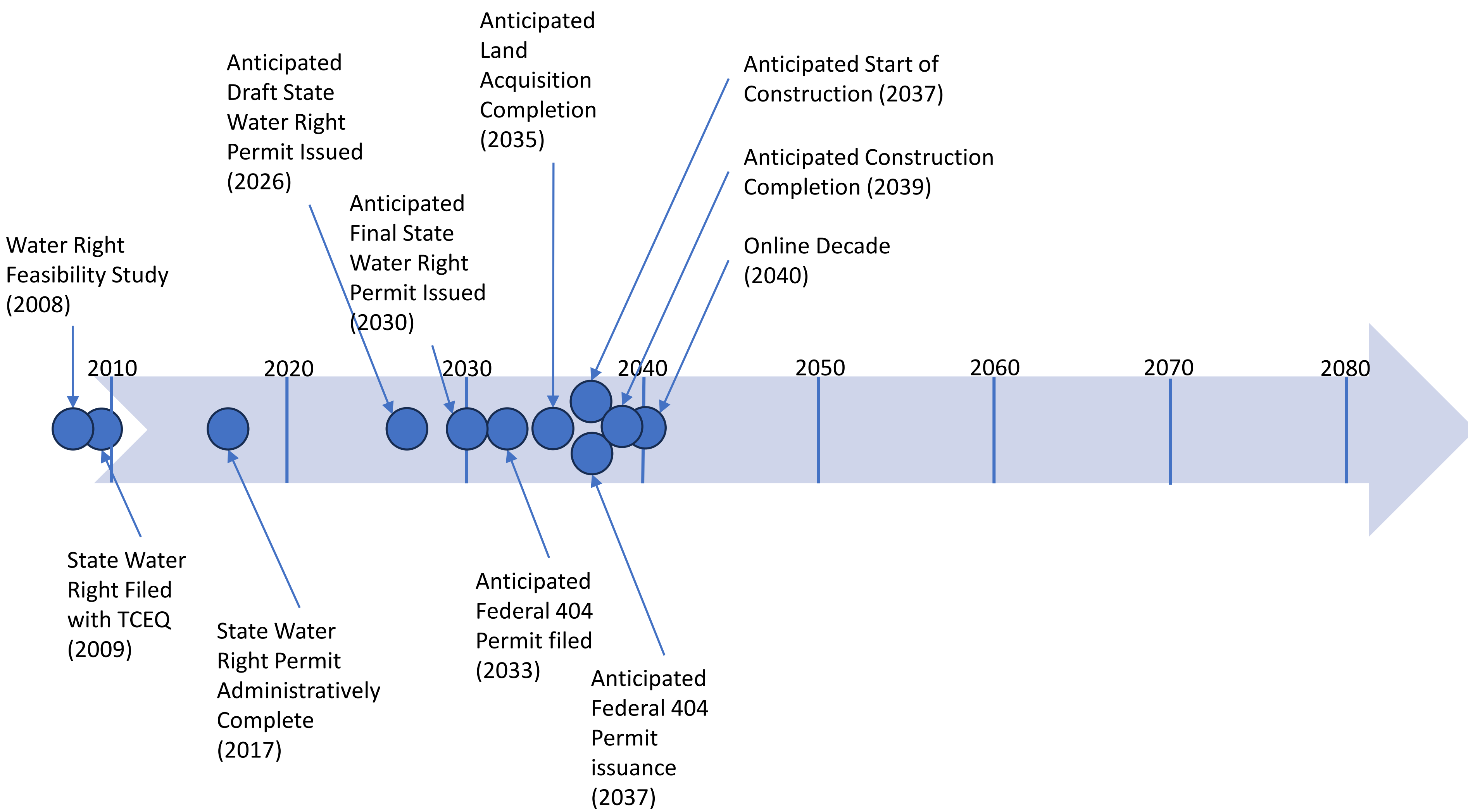


Figure 5C-5 Anticipated Implementation Timeline for the GBRA WaterSECURE WMS

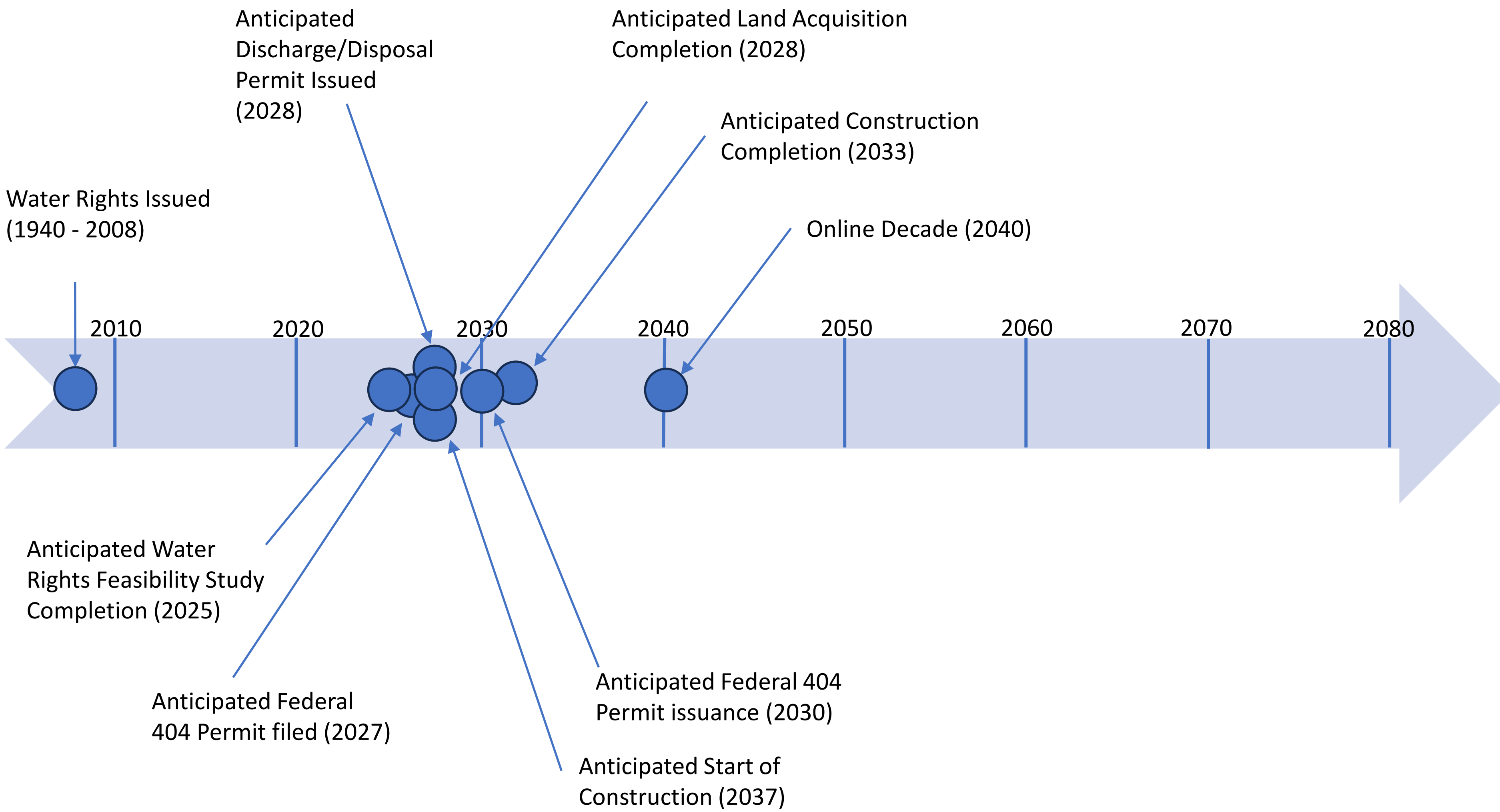


Figure 5C-6 Anticipated Implementation Timeline for the Gonzales & Guadalupe Brackish Partnership Project

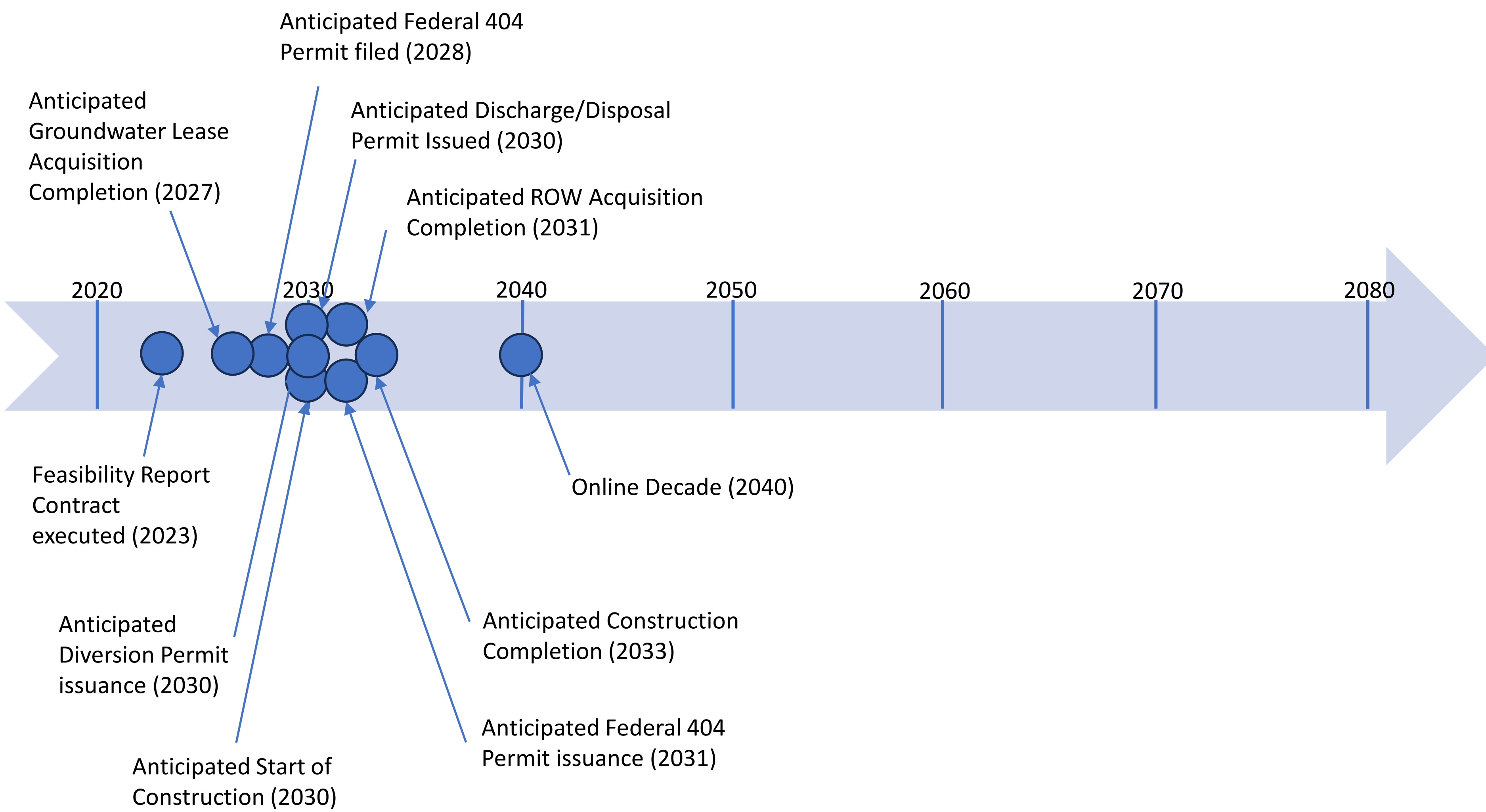


Figure 5C-7 Anticipated Implementation Timeline for the Medina County Regional ASR

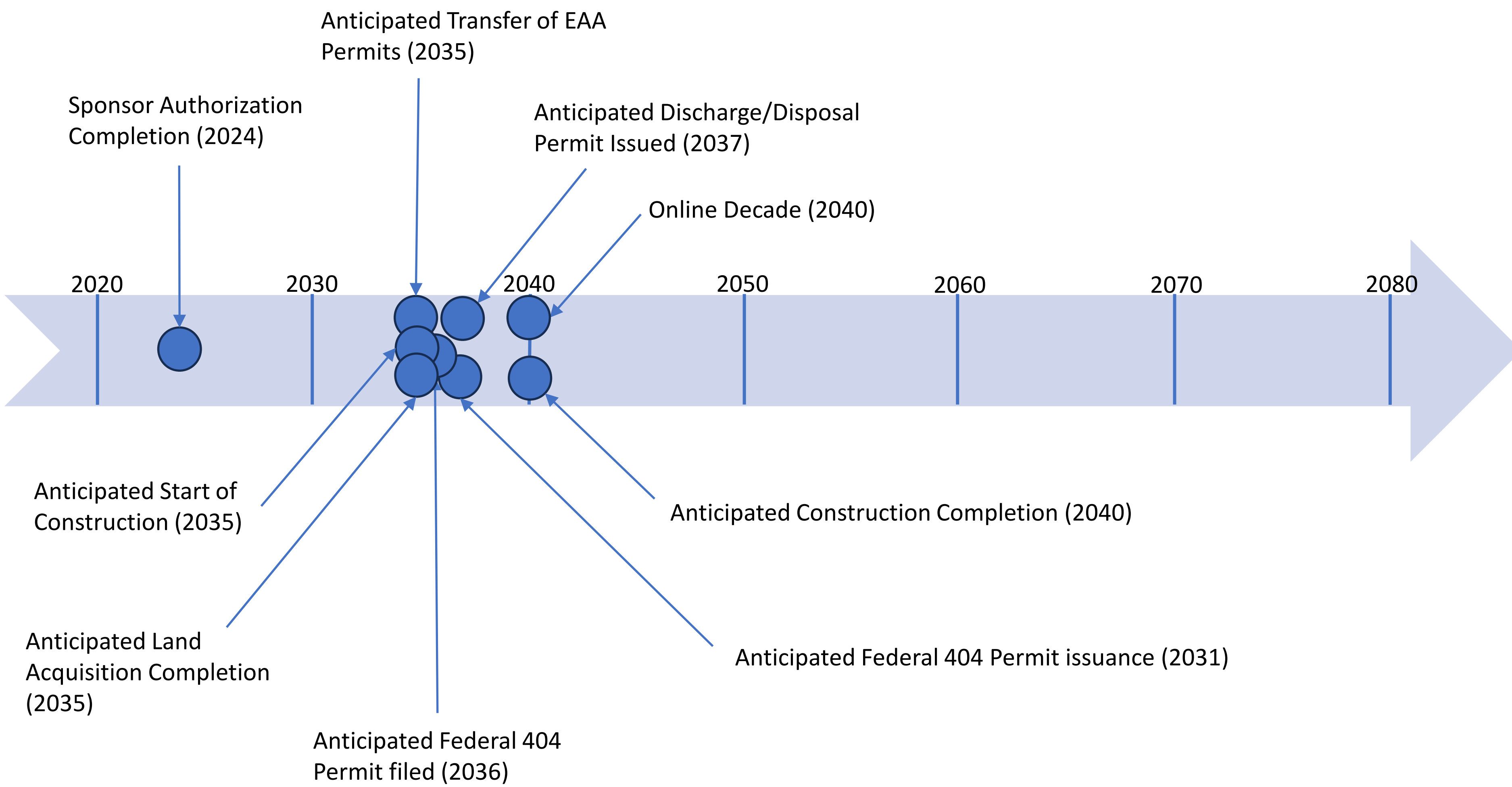


Figure 5C-8 Anticipated Implementation Timeline for the NBU Potable Reuse Project

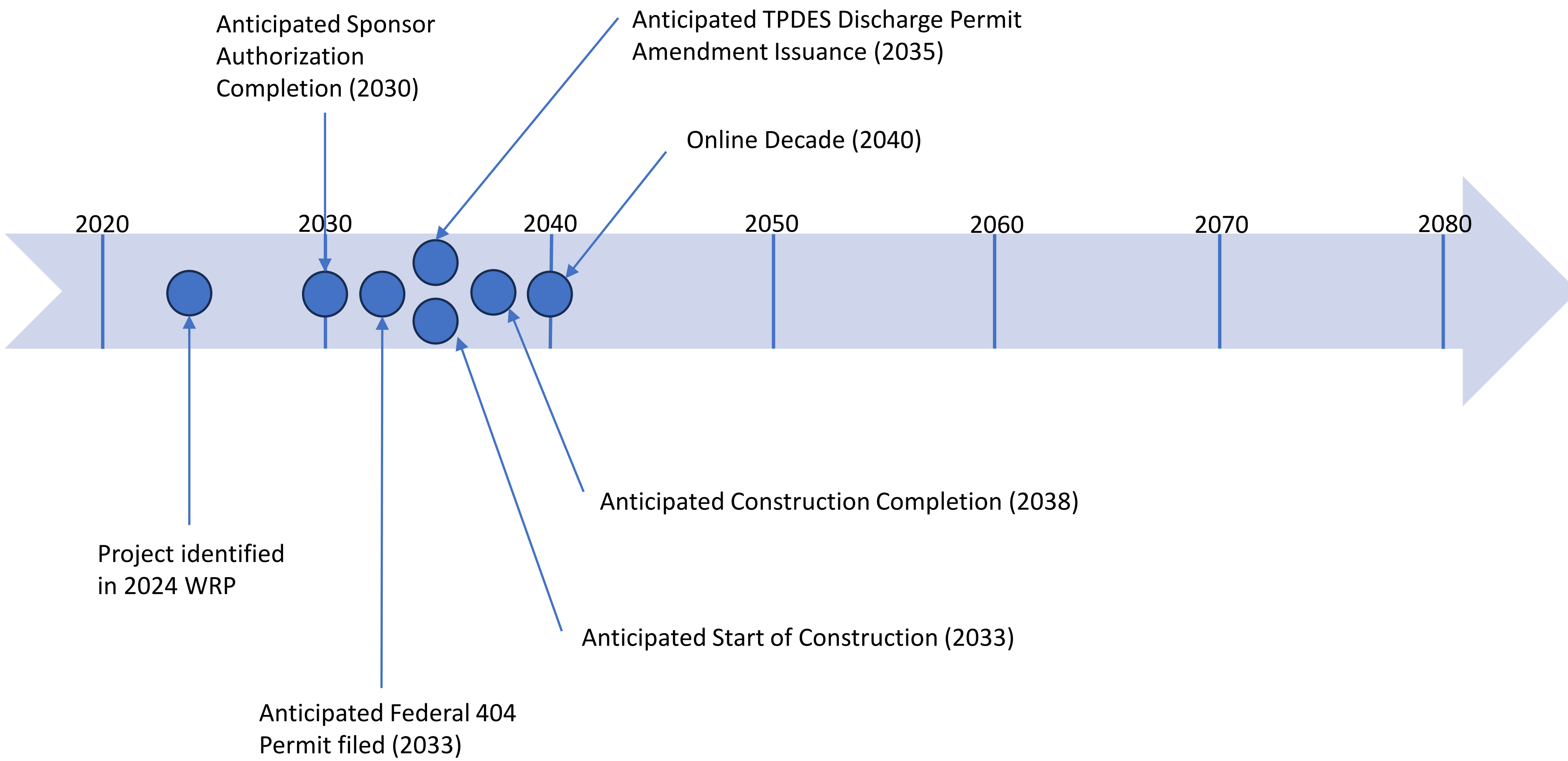


Figure 5C-9 Anticipated Implementation Timeline for the SAWS Expanded Brackish Groundwater Project

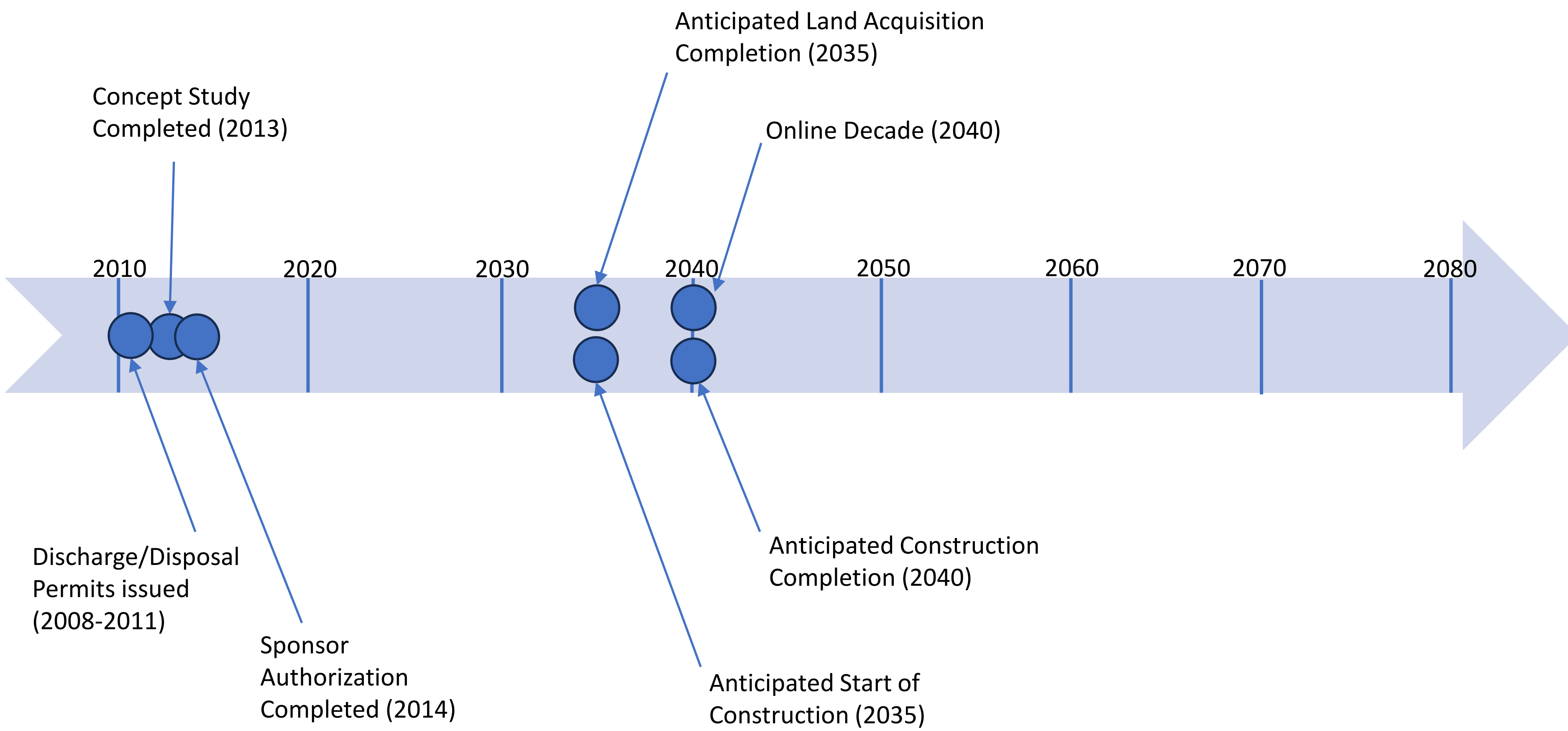
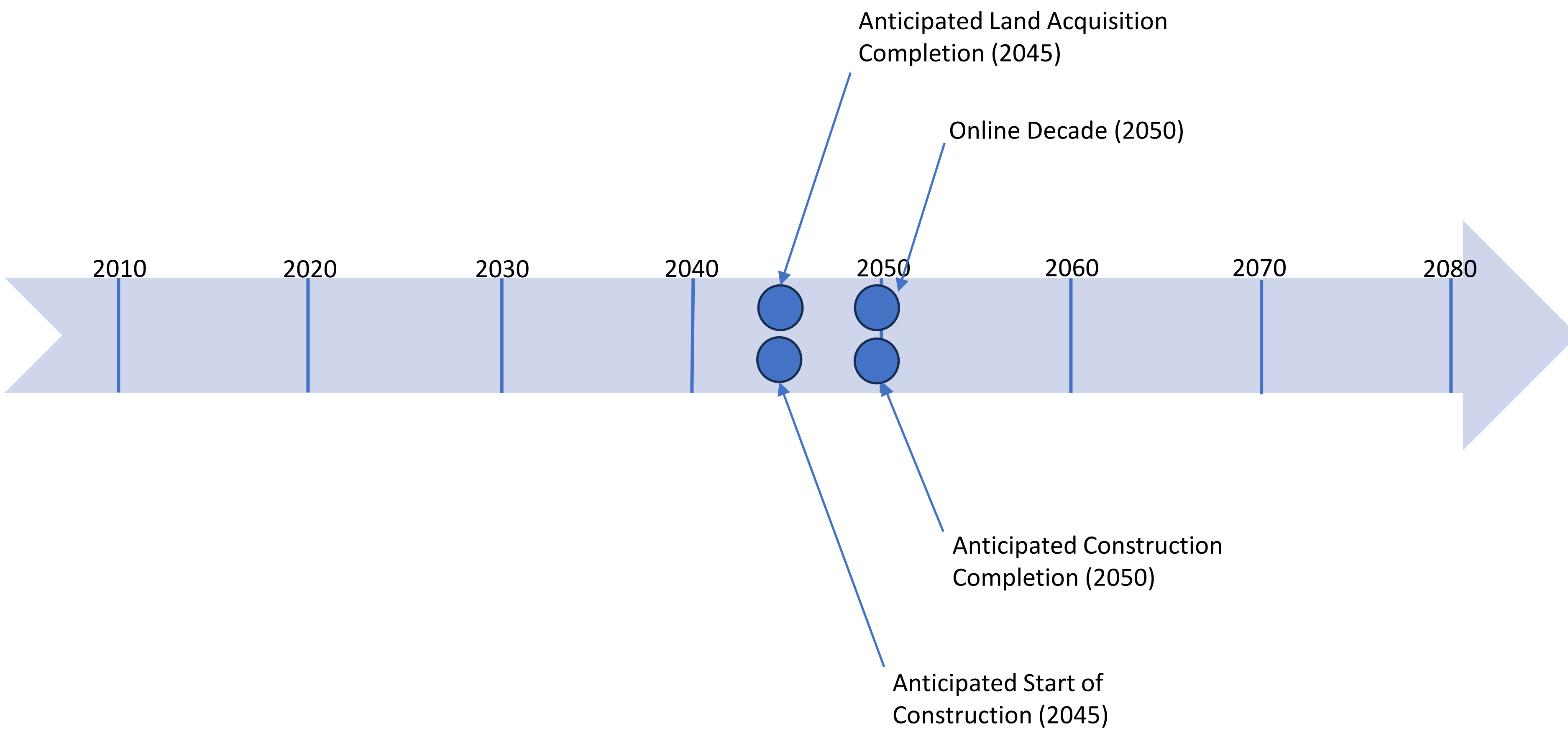


Figure 5C-10 Anticipated Implementation Timeline for the SAWS Regional Wilcox Project



Appendix 5D: Threatened and Endangered Species and Species of Greatest Conservation Need by County

APPENDIX 5D: THREATENED AND ENDANGERED SPECIES AND SPECIES OF GREATEST CONSERVATION NEED BY COUNTY

This appendix provides summaries of threatened and endangered species and species of greatest conservation need (SGCN) for certain counties in the South Central Texas (Region L) Regional Water Planning Area (SCTRWPA). These tables support the water management strategy (WMS) evaluations that are summarized in Subchapter 5.2. The methodology to evaluate WMSs is described at the beginning of Subchapter 5.2.

Evaluations of WMS impacts to threatened and endangered species and species of greatest conservation need (SGCN) included in this regional water plan used information and data sources that were current as of the time of writing. The Texas Parks and Wildlife Department (TPWD) county species lists used for the evaluation of environmental factors were published on August 22, 2024. The TPWD's county species lists were subsequently updated on January 15, 2025, which was after the South Central Texas Regional Water Planning Group (SCTRWPG) performed the WMS evaluations. Most of the updates included in the January 15, 2025, version of the TPWD county species lists reflect additions, deletions, or revisions of SGCN, and the monarch butterfly (migratory) was added as a federal candidate species for each project county evaluated in this plan. Project implementation would require independent review of impacts to threatened and endangered species and SGCN as part of the regulatory permitting for the project.

This appendix includes tables with columns showing the Federal Status and State Status for threatened and endangered species and SGCN. The following provides a list of acronyms used in the Federal Status and State Status columns of the tables.

- DL: Federally Delisted
- E: Federally Listed or State Listed Endangered
- N/A: Not Applicable
- PE: Federally Proposed Endangered
- SAT: Federally Listed Threatened by Similarity of Appearance
- SGCN: Species of Greatest Conservation Need
- T: Federally Listed or State Listed Threatened

Table 5D-1 Atascosa County - Threatened and Endangered Species and Species of Greatest Conservation Need Summary

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Amphibians				
Strecker's Chorus Frog	*Pseudacris streckeri*	N/A	SGCN	Terrestrial and aquatic: wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates
Woodhouse's Toad	*Anaxyrus woodhousii*	N/A	SGCN	Terrestrial and aquatic: a wide variety of terrestrial habitats are used by this species, including forests, grasslands, and barrier island sand dunes. Aquatic habitats are equally varied.
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	DL	N/A	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds
Bank Swallow	*Riparia riparia*	N/A	SGCN	Bank Swallows live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies of 10 to 2,000 nests. Though in the past Bank Swallows were most commonly found around natural bluffs or eroding streamside banks, they now often nest in human-made sites, such as sand and gravel quarries or road cuts. They forage in open areas and avoid places with tree cover.
Brewer's Blackbird	*Euphagus cyanocephalus*	N/A	SGCN	Shrubby and bushy areas (especially near water), riparian woodland, aspen parklands, cultivated lands, marshes, and around human habitation; in migration and winter also in pastures and fields (AOU 1983).
Cactus Wren	*Campylorhynchus brunneicapillus*	N/A	SGCN	Desert (especially with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and in trees in towns in arid regions (Tropical to Subtropical zones) (AOU 1983). Nests in Opuntia cactus, or in twiggy, thorny, trees and shrubs, sometimes in buildings. Nest may be relined and used as a winter roost.
Common Nighthawk	*Chordeiles minor*	N/A	SGCN	Common Nighthawks nest in both rural and urban habitats including coastal sand dunes and beaches, logged forest, recently burned forest, woodland clearings, prairies, plains, sagebrush, grasslands, open forests, and rock outcrops. They also nest on flat gravel rooftops, though less often as gravel roofs are being replaced by smooth, rubberized roofs that provide an unsuitable surface.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Franklin's Gull	*Leucophaeus pipixcan*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. This species is only a spring and fall migrant throughout Texas. It does not breed in or near Texas. Winter records are unusual consisting of one or a few individuals at a given site (especially along the Gulf coastline). During migration, these gulls fly during daylight hours but often come down to wetlands, lake shore, or islands to roost for the night.
Interior Least Tern	*Sternula antillarum athalassos*	DL	E	Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony
Lark Bunting	*Calamospiza melanocorys*	N/A	SGCN	Overall, it's a generalist in most short grassland settings including ones with some brushy component plus certain agricultural lands that include grain sorghum. Short grasses include sideoats and blue gramas, sand dropseed, prairie junegrass (Koeleria), buffalograss also with patches of bluestem and other mid-grass species. This bunting will frequent smaller patches of grasses or disturbed patches of grasses including rural yards. It also uses weedy fields surrounding playas. This species avoids urban areas and cotton fields.
Least Tern	*Sternula antillarum*	DL	SGCN	Sand beaches, flats, bays, inlets, lagoons, islands, river sandbars and flat gravel rooftops in urban areas.
Loggerhead Shrike	*Lanius ludovicianus*	N/A	SGCN	Loggerhead Shrikes inhabit open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead Shrikes are often seen along mowed roadsides with access to fence lines and utility poles
Mottled Duck	*Anas fulvigula*	N/A	SGCN	Estuaries, ponds, lakes, secondary bays.
Mountain Plover	*Charadrius montanus*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Northern Bobwhite	*Colinus virginianus*	N/A	SGCN	Inhabits a wide variety of vegetation types, particularly early successional stages. Occurs in croplands, grasslands, pastures, fallow fields, grassbrush rangelands, open pinelands, open mixed pine-hardwood forests, and habitat mosaics (Brennan 1999).
Piping Plover	*Charadrius melodus*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.
Pyrrhuloxia	*Cardinalis sinuatus*	N/A	SGCN	Pyrrhuloxias live in upland deserts, mesquite savannas, riparian (streamside) woodlands, desert scrublands, farm fields with hedgerows, and residential areas with nearby mesquite. When not breeding, some Pyrrhuloxias wander into urban habitats, mesquite-hackberry habitats, and riparian habitats with Arizona sycamore and cottonwood.
Sanderling	*Calidris alba*	N/A	SGCN	Nonbreeding: primarily sandy beaches, less frequently on mud flats and shores of lakes or rivers (AOU 1983) also on exposed reefs (Pratt et al. 1987). Sleeps/loafs on upper beach or on salt pond dike.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Scaled Quail	*Callipepla squamata*	N/A	SGCN	In general, preferred habitat is arid-semiarid, mixed shrub-grassland. Common shrubs of preferred habitat include acacia (Acacia spp.), sand sagebrush (Artemesia filifolia), four-winged saltbush (Atriplex canescens), cacti (Opuntia spp.), honey mesquite (Prosopis glandulosa), sumacs (Rhus aromatica, R. microphylla, R. trilobata), yucca (Yucca spp.), and snakeweed (Xanthocephalum sarothrae).
Snowy Plover	*Charadrius nivosus*	N/A	SGCN	Algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. An optimal site characteristic would be large in size. The size of populations appear to be roughly proportional to the total area of suitable habitat used. Formerly an uncommon breeder in the Panhandle; potential migrant; winter along coast.
Sprague's Pipit	*Anthus spragueii*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat during migration and in winter consists of pastures and weedy fields (AOU 1983), including grasslands with dense herbaceous vegetation or grassy agricultural fields.
Western Burrowing Owl	*Athene cunicularia hypugaea*	N/A	N/A	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows.
White-Faced Ibis	*Plegadis chihi*	N/A	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.
White-Tailed Hawk	*Buteo albicaudatus*	N/A	T	Near coast on prairies, cordgrass flats, and scrub-live oak; further inland on prairies, mesquite and oak savannas, and mixed savanna-chaparral; breeding March-May.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Whooping Crane	*Grus americana*	E	E, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.
Willet	*Tringa semipalmata*	N/A	SGCN	Marshes, tidal mudflats, beaches, lake margins, mangroves, tidal channels, river mouths, coastal lagoons, sandy or rocky shores, and, less frequently, open grassland (AOU 1983, Stiles and Skutch 1989).
Wilson's Warbler	*Cardellina pusilla*	N/A	SGCN	Wilson's warblers key in on forests and scrubby areas along streams to fatten up during migration. During the nonbreeding season they use many types of habitats from lowland thickets near streams to high-elevation cloud forests in Mexico and Central America.
Wood Stork	*Mycteria americana*	N/A	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.
Yellow-Billed Cuckoo	*Coccyzus americanus*	T	SGCN	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Crustaceans				
Nueces Crayfish	*Procambarus nueces*	N/A	SGCN	Known only from one small sluggish stream tributary to the Nueces River; slightly sinuous channel with natural debris impeding flow; substrate of sand and gravel, also silt covered in deeper pooled areas; riparian edges of grasses, sedges, and herbaceous plants in mostly unshaded area.
Insects				
American Bumblebee	*Bombus pensylvanicus*	N/A	SGCN	Habitat description is not available at this time.
Mammals				
Big Free-Tailed Bat	*Nyctinomops macrotis*	N/A	SGCN	Habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore.
Cave Myotis Bat	*Myotis velifer*	N/A	SGCN	Colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore.
Eastern Spotted Skunk	*Spilogale putorius*	N/A	SGCN	Generalist; open fields prairies, croplands, fence rows, farmyards, forest edges & woodlands. Prefer wooded, brushy areas & tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.
Ghost-Faced Bat	*Mormoops megalophylla*	N/A	SGCN	Winter roosts are in large limestone caves. Buildings and rock crevasses provide roosts, as well.
Hoary Bat	*Lasiurus cinereus*	N/A	SGCN	Hoary bats are highly migratory, high-flying bats that have been noted throughout the state. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage roosting species) but are found in unforested parts of the state and lowland deserts. Tend to be captured over water and large, open flyways.
Mountain Lion	*Puma concolor*	N/A	SGCN	Generalist; found in a wide range of habitats statewide. Found most frequently in rugged mountains; riparian zones.
Ocelot	*Leopardus pardalis*	E	E, SGCN	Restricted to mesquite-thorn scrub and live-oak mottes; avoids open areas. Dense mixed brush below four feet; thorny shrublands; dense chaparral thickets; breeds and raises young June-November.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Plains Spotted Skunk	*Spilogale interrupta*	N/A	SGCN	Generalist; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie
Tricolored Bat	*Perimyotis subflavus*	PE	SGCN	Forest, woodland and riparian areas are important. Caves are very important to this species.
White-Nosed Coati	*Nasua narica*	N/A	T, SGCN	Woodlands, riparian corridors and canyons. Most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees; omnivorous; may be susceptible to hunting, trapping, and pet trade
Mollusks				
Mapleleaf	*Quadrula quadrula*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs. In riverine habitats, it may be found in main-channel habitats such as riffles or runs in sand, gravel, and cobble substrates with moderate to swift currents. May also be found in nearshore habitats such as banks and backwaters to include pools in sand or mud substrates with little to no flow. (Williams et al. 2008; Howells 2016; Haag and Cicerello 2016).
Reptiles				
American Alligator	*Alligator mississippiensis*	SAT	N/A	Aquatic: Coastal marshes; inland natural rivers, swamps and marshes; manmade impoundments.
Keeled Earless Lizard	*Holbrookia propinqua*	N/A	SGCN	Terrestrial: Habitats include coastal dunes, barrier islands, and other sandy areas (Axtell 1983). Although it occurs well inland, this species is most abundant on coastal dunes, were it seeks shelter in the burrows of small mammals or crabs (Bartlett and Bartlett 1999).
Prairie Skink	*Plestiodon septentrionalis*	N/A	SGCN	The prairie skink can occur in any native grassland habitat across the Rolling Plains, Blackland Prairie, Post Oak Savanna and Pineywoods ecoregions.
Tamaulipan Spot-Tailed Earless	*Holbrookia subcaudalis*	N/A	SGCN	Terrestrial: Habitats include moderately open prairie-brushland regions, particularly fairly flat areas free of vegetation or other obstructions (e.g., open meadows, old and new fields, graded roadways, cleared and disturbed areas, prairie savanna, and active agriculture including row crops); also, oak-juniper woodlands and mesquite-prickly pear associations (Axtell 1968, Bartlett and Bartlett 1999).
Texas Horned Lizard	*Phrynosoma cornutum*	N/A	T, SGCN	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Texas Tortoise	*Gopherus berlandieri*	N/A	T, SGCN	Terrestrial: Open scrub woods, arid brush, lomas, grass-cactus association; often in areas with sandy well-drained soils. When inactive occupies shallow depressions dug at base of bush or cactus; sometimes in underground burrow or under object. Eggs are laid in nests dug in soil near or under bushes.
Western Box Turtle	*Terrapene ornata*	N/A	SGCN	Terrestrial: ornate or western box turtles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species.
Plants				
Awnless Leastdaisy	*Chaetopappa imberbis*	N/A	SGCN	In woodlands on loams of Carrizo sand (TEX-LL specimens Carr 23875, 12507). Flowering and fruiting during Mar - May.
Bristle Nailwort	*Paronychia setacea*	N/A	SGCN	Flowering vascular plant endemic to eastern southcentral Texas, occurring in sandy soils.
Burridge Greenthread	*Thelesperma burridgeanum*	N/A	SGCN	Sandy open areas; annual; flowering March-Nov; fruiting March-June.
Drummond's Rushpea	*Hoffmannseggia drummondii*	N/A	SGCN	Open areas on sandy clay; perennial.
Elmendorf's Onion	*Allium elmendorfii*	N/A	SGCN	Grassland openings in oak woodlands on deep, loose, well-drained sands; in Coastal Bend, on Pleistocene barrier island ridges and Holocene Sand Sheet that support live oak woodlands; to the north it occurs in post oak-black hickory-live oak woodlands over Queen City and similar Eocene formations; one anomalous specimen found on Llano Uplift in wet pockets of granitic loam; perennial; flowering March-April, May.
Greenman's Bluet	*Houstonia parviflora*	N/A	SGCN	Grass pastures. Feb- Apr. (Correll and Johnston 1970).
Low Spurge	*Euphorbia peplidion*	N/A	SGCN	Occurs in a variety of vernally-moist situations in a number of natural regions; annual; flowering Feb-April; fruiting March-April.
Parks' Jointweed	*Polygonella parksii*	N/A	SGCN	Mostly found on deep, loose, whitish sand blowouts (unstable, deep, xeric, sandhill barrens) in Post Oak Savanna landscapes over the Carrizo and Sparta formations; also occurs in early successional grasslands, along rights-of-way, and on mechanically disturbed areas; flowering June late October or September-November.
Sandhill Woolywhite	*Hymenopappus carrizoanus*	N/A	SGCN	Disturbed or open areas in grasslands and post oak woodlands on deep sands derived from the Carrizo Sand and similar Eocene formations; flowering April-June.
South Texas Spikesedge	*Eleocharis austrotexana*	N/A	SGCN	Occurring in miscellaneous wetlands at scattered locations on the coastal plain; perennial; flowering/fruiting Sept.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Texas Beebalm	*Monarda viridissima*	N/A	SGCN	Endemic perennial herb of the Carrizo Sands; deep, well-drained sandy soils in openings of post oak woodlands; flowers white.
Texas Peachbush	*Prunus texana*	N/A	SGCN	Occurs at scattered sites in various well drained sandy situations; deep sand, plains and sand hills, grasslands, oak woods, 0-200 m elevation; perennial; flowering Feb-Mar; Fruiting Apr-Jun.

Table 5D-2 Bexar County - Threatened and Endangered Species and Species of Greatest Conservation Need Summary

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Amphibians				
Cascade Caverns Salamander	*Eurycea latitans*	N/A	T, SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
Eastern Tiger Salamander	*Ambystoma tigrinum*	N/A	SGCN	Terrestrial adults occur under cover objects or in burrows around lentic freshwater habitats, such as ponds, lakes, bottomland wetlands, or upland ephemeral pools, closely associated with sandy or loamy soils that are easy to burrow. Need fishless pools to breed.
Strecker's Chorus Frog	*Pseudacris streckeri*	N/A	SGCN	Terrestrial and aquatic: Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates.
Texas Salamander	*Eurycea neotenes*	N/A	T, SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
Valdina Farms Sinkhole	*Eurycea troglodytes*	N/A	SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
Woodhouse's Toad	*Anaxyrus woodhousii*	N/A	SGCN	Terrestrial and aquatic: A wide variety of terrestrial habitats are used by this species, including forests, grasslands, and barrier island sand dunes. Aquatic habitats are equally varied.
Arachnids				
Cokendolpher Cave Harvestman	*Texella cokendolpheri*	E	SGCN	Small, eyeless harvestman; karst features in north and northwest Bexar County
Government Canyon Bat Cave Meshweaver	*Cicurina vespera*	E	SGCN	Small, eyeless, or essentially eyeless spider; karst features in north and northwest Bexar County
Government Canyon Bat Cave Spider	*Neoleptoneta microps*	E	SGCN	Small, eyeless, or essentially eyeless spider; karst features in north and northwest Bexar County
Madla Cave Meshweaver	*Cicurina madla*	E	SGCN	Small, eyeless, or essentially eyeless spider; karst features in north and northwest Bexar County
No Accepted Common Name	*Tartarocreagris amblyopa*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Tartarocreagris reyesi*	N/A	SGCN	Habitat description is not available at this time.
Reddell's Cave Millipede	*Speodesmus reddelli*	N/A	SGCN	Habitat description is not available at this time.
Robber Baron Cave Meshweaver	*Cicurina baronia*	E	SGCN	Small, eyeless, or essentially eyeless spider; karst features in north and northwest Bexar County
Arthropods				
Ivy's Cave Millipede	*Speodesmus ivyi*	N/A	SGCN	Habitat description is not available at this time.
Sickled Cave Millipede	*Speodesmus falcatus*	N/A	SGCN	Habitat description is not available at this time.
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	DL	N/A	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Bank Swallow	*Riparia riparia*	N/A	SGCN	Bank Swallows live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies of 10 to 2,000 nests. Though in the past Bank Swallows were most commonly found around natural bluffs or eroding streamside banks, they now often nest in human-made sites, such as sand and gravel quarries or road cuts. They forage in open areas and avoid places with tree cover.
Black-Capped Vireo	*Vireo atricapilla*	DL	SGCN	Oak-juniper woodlands with distinctive patchy, two-layered aspect; shrub and tree layer with open, grassy spaces; requires foliage reaching to ground level for nesting cover; return to same territory, or one nearby, year after year; deciduous and broad-leaved shrubs and trees provide insects for feeding; species composition less important than presence of adequate broad-leaved shrubs, foliage to ground level, and required structure; nesting season March-late summer
Brewer's Blackbird	*Euphagus cyanocephalus*	N/A	SGCN	Shrubby and bushy areas (especially near water), riparian woodland, aspen parklands, cultivated lands, marshes, and around human habitation; in migration and winter also in pastures and fields (AOU 1983).
Cactus Wren	*Campylorhynchus brunneicapillus*	N/A	SGCN	Desert (especially with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and in trees in towns in arid regions (Tropical to Subtropical zones) (AOU 1983). Nests in OPUNTIA cactus, or in twiggy, thorny, trees and shrubs, sometimes in buildings. Nest may be relined and used as a winter roost.
Chestnut-Collared Longspur	*Calcarius ornatus*	N/A	SGCN	Occurs in open shortgrass settings especially in patches with some bare ground. Also occurs in grain sorghum fields and Conservation Reserve Program lands
Common Nighthawk	*Chordeiles minor*	N/A	SGCN	Common Nighthawks nest in both rural and urban habitats including coastal sand dunes and beaches, logged forest, recently burned forest, woodland clearings, prairies, plains, sagebrush, grasslands, open forests, and rock outcrops. They also nest on flat gravel rooftops, though less often as gravel roofs are being replaced by smooth, rubberized roofs that provide an unsuitable

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Franklin's Gull	*Leucophaeus pipixcan*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. This species is only a spring and fall migrant throughout Texas. It does not breed in or near Texas. Winter records are unusual consisting of one or a few individuals at a given site (especially along the Gulf coastline). During migration, these gulls fly during daylight hours but often come down to wetlands, lake shore, or islands to roost for the night.
Golden-Cheeked Warbler	*Setophaga chrysoparia*	E	E, SGCN	Ashe juniper in mixed stands with various oaks (Quercus spp.). Edges of cedar brakes. Dependent on Ashe juniper (also known as cedar) for long fine bark strips, only available from mature trees, used in nest construction; nests are placed in various trees other than Ashe juniper; only a few mature junipers or nearby cedar brakes can provide the necessary nest material; forage for insects in broad-leaved trees and shrubs; nesting late March-early summer.
Interior Least Tern	*Sternula antillarum athalassos*	DL	E	Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony
Lark Bunting	*Calamospiza melanocorys*	N/A	SGCN	Overall, it's a generalist in most short grassland settings including ones with some brushy component plus certain agricultural lands that include grain sorghum. Short grasses include sideoats and blue gramas, sand dropseed, prairie junegrass (Koeleria), buffalograss also with patches of bluestem and other mid-grass species. This bunting will frequent smaller patches of grasses or disturbed patches of grasses including rural yards. It also uses weedy fields surrounding playas. This species avoids urban areas and cotton fields.
Least Tern	*Sternula antillarum*	DL	SGCN	Sand beaches, flats, bays, inlets, lagoons, islands, river sandbars and flat gravel rooftops in urban areas.
Loggerhead Shrike	*Lanius ludovicianus*	N/A	SGCN	Loggerhead Shrikes inhabit open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead Shrikes are often seen along mowed roadsides with access to fence lines and utility
Mottled Duck	*Anas fulvigula*	N/A	SGCN	Estuaries, ponds, lakes, secondary bays.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Mountain Plover	*Charadrius montanus*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed)
Northern Bobwhite	*Colinus virginianus*	N/A	SGCN	Inhabits a wide variety of vegetation types, particularly early successional stages. Occurs in croplands, grasslands, pastures, fallow fields, grassbrush rangelands, open pinelands, open mixed pine-hardwood forests, and habitat mosaics (Brennan 1999).
Piping Plover	*Charadrius melodus*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.
Pyrrhuloxia	*Cardinalis sinuatus*	N/A	SGCN	Pyrrhuloxias live in upland deserts, mesquite savannas, riparian (streamside) woodlands, desert scrublands, farm fields with hedgerows, and residential areas with nearby mesquite. When not breeding, some Pyrrhuloxias wander into urban habitats, mesquite-hackberry habitats, and riparian habitats with Arizona sycamore and cottonwood.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Sanderling	*Calidris alba*	N/A	SGCN	Nonbreeding: primarily sandy beaches, less frequently on mud flats and shores of lakes or rivers (AOU 1983) also on exposed reefs (Pratt et al. 1987). Sleeps/loafs on upper beach or on salt pond dike
Snowy Plover	*Charadrius nivosus*	N/A	SGCN	Algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. An optimal site characteristic would be large in size. The size of populations appear to be roughly proportional to the total area of suitable habitat used. Formerly an uncommon breeder in the Panhandle; potential migrant;
Sprague's Pipit	*Anthus spragueii*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat during migration and in winter consists of pastures and weedy fields (AOU 1983), including grasslands with dense herbaceous vegetation or grassy agricultural fields.
Western Burrowing Owl	*Athene cunicularia hypugaea*	N/A	N/A	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows
White-Faced Ibis	*Plegadis chihi*	N/A	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.
Whooping Crane	*Grus americana*	E	E, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and
Willet	*Tringa semipalmata*	N/A	SGCN	Marshes, tidal mudflats, beaches, lake margins, mangroves, tidal channels, river mouths, coastal lagoons, sandy or rocky shores, and, less frequently, open grassland (AOU 1983, Stiles and Skutch 1989)

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Wilson's Warbler	*Cardellina pusilla*	N/A	SGCN	Wilson's warblers key in on forests and scrubby areas along streams to fatten up during migration. During the nonbreeding season they use many types of habitats from lowland thickets near streams to high-elevation cloud forests in Mexico and Central America.
Wood Stork	*Mycteria americana*	N/A	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.
Yellow-Billed Cuckoo	*Coccyzus americanus*	T	SGCN	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Crustaceans				
Cascade Cave Amphipod	*Stygobromus dejectus*	N/A	SGCN	Subaquatic crustacean; subterranean obligate; in pools
Ezell's Cave Amphipod	*Stygobromus flagellatus*	N/A	SGCN	Known only from artesian wells
No Accepted Common Name	*Mexiweckelia hardeni*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Speocirolana hardeni*	N/A	SGCN	Habitat description is not available at this time.
Fish				

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Guadalupe Bass	*Micropterus treculii*	N/A	SGCN	Endemic to the streams of the northern and eastern Edwards Plateau including portions of the Brazos, Colorado, Guadalupe, and San Antonio basins; species also found outside of the Edwards Plateau streams in decreased abundance, primarily in the lower Colorado River; two introduced populations have been established in the Nueces River system. A pure population was re-established in a portion of the Blanco River in 2014. Species prefers lentic environments but commonly taken in flowing water; numerous smaller fish occur in rapids, many times near eddies; large individuals found mainly in riffle tail races; usually found in spring-fed streams having clear water and relatively consistent temperatures.
River Darter	*Percina shumardi*	N/A	SGCN	In Texas limited to eastern streams including Red River southward to the Neches River, and a disjunct population in the Guadalupe and San Antonio river systems east of the Balcones Escarpment. Confined to large rivers and lower parts of major tributaries; usually found in deep chutes and riffles where current is swift and bottom composed of coarse gravel or rock.
Texas Shiner	*Notropis amabilis*	N/A	SGCN	In Texas, it is found primarily in Edwards Plateau streams from the San Gabriel River in the east to the Pecos River in the west. Typical habitat includes rocky or sandy runs, as well as pools
Toothless Blindcat	*Trogloglanis pattersoni*	PE	T, SGCN	Restricted to five artesian wells penetrating the San Antonio Pool of the Edwards Aquifer; found at depths of 305-582 m.
Widemouth Blindcat	*Satan eurystomus*	PE	T, SGCN	Restricted to five artesian wells penetrating the San Antonio Pool of the Edwards Aquifer; found at depths of 305-582 m.
Insects				
American Bumblebee	*Bombus pensylvanicus*	N/A	SGCN	Habitat description is not available at this time.
Helotes Mold Beetle	*Batrisodes venyivi*	E	SGCN	Small, eyeless mold beetle; karst features in northwestern Bexar County and northeastern Medina County
Manfreda Giant-Skipper	*Stallingsia maculosus*	N/A	SGCN	Most skippers are small and stout-bodied; name derives from fast, erratic flight; at rest most skippers hold front and hind wings at different angles; skipper larvae are smooth, with the head and neck constricted; skipper larvae usually feed inside a leaf shelter and pupate in a cocoon made of leaves fastened together with silk
No Accepted Common Name	*Pygarctia lorula*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Nectopsyche texana*	N/A	SGCN	Riparian, Riverine
No Accepted Common Name	*Batrisodes shadeae*	N/A	SGCN	This species was recently described from a single cave in Bexar Co., Texas (Chandler et al., 2009).
No Accepted Common Name	*Lymantes nadineae*	N/A	SGCN	Habitat description is not available at this time.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
No Accepted Common Name	*Bombus variabilis*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Megachile parksi*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Rhadine exilis*	N/A	SGCN	Small, essentially eyeless ground beetle; karst features in north and northwest Bexar County
No Accepted Common Name	*Rhadine infernalis*	N/A	SGCN	Small, essentially eyeless ground beetle; karst features in north and northwest Bexar County
Mammals				
Big Free-Tailed Bat	*Nyctinomops macrotis*	N/A	SGCN	Habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore
Black Bear	*Ursus americanus*	N/A	T, SGCN	Generalist. Historically found throughout Texas. In Chisos, prefers higher elevations where pinyon-oaks predominate; also occasionally sighted in desert scrub of Trans-Pecos (Black Gap Wildlife Management Area) and Edwards Plateau in juniper-oak habitat. For ssp. luteolus, bottomland hardwoods, floodplain forests, upland hardwoods with mixed pine; marsh. Bottomland hardwoods and large tracts of inaccessible forested areas.
Black-Tailed Prairie Dog	*Cynomys ludovicianus*	N/A	SGCN	Dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups
Cave Myotis Bat	*Myotis velifer*	N/A	SGCN	Colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore
Eastern Spotted Skunk	*Spilogale putorius*	N/A	SGCN	Generalist; open fields prairies, croplands, fence rows, farmyards, forest edges & woodlands. Prefer wooded, brushy areas & tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available
Ghost-Faced Bat	*Mormoops megalophylla*	N/A	SGCN	Winter roosts are in large limestone caves. Buildings and rock crevasses provide roosts, as well.
Hoary Bat	*Lasiurus cinereus*	N/A	SGCN	Hoary bats are highly migratory, high-flying bats that have been noted throughout the state. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage roosting species) but are found in unforested parts of the state and lowland deserts. Tend to be captured over water and large, open flyways.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Mountain Lion	*Puma concolor*	N/A	SGCN	Generalist; found in a wide range of habitats statewide. Found most frequently in rugged mountains & riparian zones.
Plains Spotted Skunk	*Spilogale interrupta*	N/A	SGCN	Generalist; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie
Tricolored Bat	*Perimyotis subflavus*	PE	SGCN	Forest, woodland and riparian areas are important. Caves are very important to this species.
White-Nosed Coati	*Nasua narica*	N/A	T, SGCN	Woodlands, riparian corridors and canyons.Most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees; omnivorous; may be susceptible to hunting, trapping, and pet trade.
Mollusks				
False Spike	*Fusconaia mitchelli*	E	E, SGCN	Occurs in small streams to medium-size rivers in habitats such as riffles and runs with flowing water. Is often found in stable substrates of sand, gravel, and cobble (Howells 2010; Randklev et al. 2012; Sowards et al. 2013; Tsakiris and Randklev 2016). [Mussels of Texas 2019]
Lilliput	*Toxolasma parvum*	N/A	SGCN	Reported from small streams, where it may penetrate into the headwaters, to large rivers, oxbows, sloughs, lakes, ponds, canals, borrow pits, and reservoirs. Primarily occurs in still to slow currents in mud and sand substrates (Coker et al. 1921; Read 1954; Neck and Metcalf 1988; Williams et al. 2008; Watters et al. 2009).
Mapleleaf	*Quadrula quadrula*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs. In riverine habitats, it may be found in main-channel habitats such as riffles or runs in sand, gravel, and cobble substrates with moderate to swift currents. May also be found in nearshore habitats such as banks and backwaters to include pools in sand or mud substrates with little to no flow. (Williams et al. 2008; Howells 2016; Haag and Cicerello 2016).
Mimic Cavesnail	*Phreatodrobia imitata*	N/A	SGCN	Subaquatic; only known from two wells penetrating the Edwards Aquifer
No Accepted Common Name	*Phreatodrobia conica*	N/A	SGCN	Habitat description is not available at this time.
Pimpleback	*Cyclonaias pustulosa*	N/A	SGCN	Occurs in small streams to large rivers in habitats including riffles and runs with flowing water, also found in nearshore habitats such as banks and backwaters or pools. Can occur in reservoirs but varies based by population. Is often found in substrates comprising of sand, gravel, and cobble but also mud and silt (Howells et al. 1996; Williams et al. 2008; Watters et al. 2009).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Pistolgrip	*Tritogonia verrucosa*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs, but considered less tolerant of impoundment (Haag and Cicerello 2016). Can occur in a variety of habitat types but most often found in main channel habitats such as riffles and runs with moderate current and sand, gravel, or cobble substrates (Howells et al. 1996; Williams et al. 2008).
Tampico Pearlymussel	*Cyrtonaias tampicoensis*	N/A	SGCN	Reported from streams to rivers, reservoirs, and canals. In riverine habitats often found in nearshore habitats such as banks and backwaters, to include pools and oxbows, in mud or sand or among cobble and boulders with still to moderate currents (Howells et al. 1996).
Tapered Pondhorn	*Uniomerus declivis*	N/A	SGCN	It likely occurs in streams, rivers, oxbows, marshes, swamps, lakes, canals, ponds, and reservoirs in still to moderate currents in mud, sand, or gravel substrates. Also probably occurs in woody debris such as logjams and exposed roots of riparian trees (Williams et al. 2008).
Reptiles				
American Alligator	*Alligator mississippiensis*	SAT	N/A	Aquatic: Coastal marshes; inland natural rivers, swamps and marshes; manmade impoundments.
Cagle's Map Turtle	*Graptemys caglei*	N/A	T, SGCN	Aquatic: shallow water with swift to moderate flow and gravel or cobble bottom, connected by deeper pools with a slower flow rate and a silt or mud bottom; gravel bar riffles and transition areas between riffles and pools especially important in providing insect prey items; nests on gently sloping sand banks within ca. 30 feet of waters edge
Eastern Box Turtle	*Terrapene carolina*	N/A	SGCN	Terrestrial: Eastern box turtles inhabit forests, fields, forest-brush, and forest-field ecotones. In some areas they move seasonally from fields in spring to forest in summer. They commonly enters pools of shallow water in summer. For shelter, they burrow into loose soil, debris, mud, old stump holes, or under leaf litter. They can successfully hibernate in sites that may experience subfreezing temperatures.
Keeled Earless Lizard	*Holbrookia propinqua*	N/A	SGCN	Terrestrial: Habitats include coastal dunes, barrier islands, and other sandy areas (Axtell 1983). Although it occurs well inland, this species is most abundant on coastal dunes, were it seeks shelter in the burrows of small mammals or crabs (Bartlett and Bartlett 1999).
Plateau Spot-Tailed Earless Lizard	*Holbrookia lacerata*	N/A	SGCN	Terrestrial: Habitats include moderately open prairie-brushland regions, particularly fairly flat areas free of vegetation or other obstructions (e.g., open meadows, old and new fields, graded roadways, cleared and disturbed areas, prairie savanna, and active agriculture including row crops); also, oak-juniper woodlands and mesquite-prickly pear associations (Axtell 1968, Bartlett and Bartlett 1999).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Prairie Skink	*Plestiodon septentrionalis*	N/A	SGCN	The prairie skink can occur in any native grassland habitat across the Rolling Plains, Blackland Prairie, Post Oak Savanna and Pineywoods ecoregions.
Slender Glass Lizard	*Ophisaurus attenuatus*	N/A	SGCN	Terrestrial: Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil.
Tamaulipan Spot-Tailed Earless Lizard	*Holbrookia subcaudalis*	N/A	SGCN	Terrestrial: Habitats include moderately open prairie-brushland regions, particularly fairly flat areas free of vegetation or other obstructions (e.g., open meadows, old and new fields, graded roadways, cleared and disturbed areas, prairie savanna, and active agriculture including row crops); also, oak-juniper woodlands and mesquite-prickly pear associations (Axtell 1968, Bartlett and Bartlett 1999).
Texas Horned Lizard	*Phrynosoma cornutum*	N/A	T, SGCN	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.
Texas Tortoise	*Gopherus berlandieri*	N/A	T, SGCN	Terrestrial: Open scrub woods, arid brush, lomas, grass-cactus association; often in areas with sandy well-drained soils. When inactive occupies shallow depressions dug at base of bush or cactus; sometimes in underground burrow or under object. Eggs are laid in nests dug in soil near or under bushes.
Western Box Turtle	*Terrapene ornata*	N/A	SGCN	Terrestrial: Ornate or western box turtles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species.
Plants				
Awnless Leastdaisy	*Chaetopappa imberbis*	N/A	SGCN	In woodlands on loams of Carrizo sand (TEX-LL specimens Carr 23875, 12507). Flowering and fruiting during Mar - May.
Big Red Sage	*Salvia pentstemonoides*	N/A	SGCN	Moist to seasonally wet, steep limestone outcrops on seeps within canyons or along creek banks; occasionally on clayey to silty soils of creek banks and terraces, in partial shade to full sun; basal leaves conspicuous for much of the year; flowering June-October
Bigflower Cornsalad	*Valerianella stenocarpa*	N/A	SGCN	Usually along creekbeds or in vernally moist grassy open areas (Carr 2015).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Bracted Twistflower	*Streptanthus bracteatus*	T	SGCN	Shallow, well-drained gravelly clays and clay loams over limestone in oak juniper woodlands and associated openings, on steep to moderate slopes and in canyon bottoms; several known soils include Tarrant, Brackett, or Speck over Edwards, Glen Rose, and Walnut geologic formations; populations fluctuate widely from year to year, depending on winter rainfall; flowering mid April-late May, fruit matures and foliage withers by early
Bristle Nailwort	*Paronychia setacea*	N/A	SGCN	Flowering vascular plant endemic to eastern southcentral Texas, occurring in sandy soils
Buckley Tridens	*Tridens buckleyanus*	N/A	SGCN	Occurs in juniper-oak woodlands on rocky limestone slopes; Perennial; Flowering/Fruiting April-Nov
Burridge Greenthread	*Thelesperma burridgeanum*	N/A	SGCN	Sandy open areas; Annual; Flowering March-Nov; Fruiting March-June
Correll's False Dragon-Head	*Physostegia correllii*	N/A	SGCN	Wet, silty clay loams on streamsides, in creek beds, irrigation channels and roadside drainage ditches; or seepy, mucky, sometimes gravelly soils along riverbanks or small islands in the Rio Grande; or underlain by Austin Chalk limestone along gently flowing spring-fed creek in central Texas; flowering May-September
Elmendorf's Onion	*Allium elmendorfii*	N/A	SGCN	Grassland openings in oak woodlands on deep, loose, well-drained sands; in Coastal Bend, on Pleistocene barrier island ridges and Holocene Sand Sheet that support live oak woodlands; to the north it occurs in post oak-black hickory-live oak woodlands over Queen City and similar Eocene formations; one anomalous specimen found on Llano Uplift in wet pockets of granitic loam; Perennial; Flowering March-April, May
Glass Mountains Coral-Root	*Hexalectris nitida*	N/A	SGCN	Apparently rare in mixed woodlands in canyons in the mountains of the Brewster County, but encountered with regularity, albeit in small numbers, under Juniperus ashei in woodlands over limestone on the Edwards Plateau, Callahan Divide and Lampasas Cutplain; Perennial; Flowering June-Sept; Fruiting July-Sept
Gravelbar Brickellbush	*Brickellia dentata*	N/A	SGCN	Essentially restricted to frequently-scoured gravelly alluvial beds in creek and river bottoms; Perennial; Flowering June-Nov; Fruiting June-Oct
Greenman's Bluet	*Houstonia parviflora*	N/A	SGCN	Grass pastures. Feb- Apr. (Correll and Johnston 1970).
Hairy Sycamore-Leaf Snowbell	*Styrax platanifolius ssp. stellatus*	N/A	SGCN	Rare throughout range, in habitats similar to those of var. platanifolius - usually in oak-juniper woodlands on steep rocky banks and ledges along intermittent or perennial streams, rarely far from some reliable source of moisture; Perennial; Flowering April-Oct; Fruiting May-Sept
Heller's Marbleseed	*Onosmodium helleri*	N/A	SGCN	Occurs in loamy calcareous soils in oak-juniper woodlands on rocky limestone slopes, often in more mesic portions of canyons; Perennial; Flowering March-May

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Hill Country Wild-Mercury	*Argythamnia aphoroides*	N/A	SGCN	Mostly in bluestem-grama grasslands associated with plateau live oak woodlands on shallow to moderately deep clays and clay loams over limestone on rolling uplands, also in partial shade of oak-juniper woodlands in gravelly soils on rocky limestone slopes; Perennial; Flowering April-May with fruit persisting until midsummer
Low Spurge	*Euphorbia peplidion*	N/A	SGCN	Occurs in a variety of vernally-moist situations in a number of natural regions; Annual; Flowering Feb-April; Fruiting March-April
Narrowleaf Brickellbush	*Brickellia eupatorioides var. gracillima*	N/A	SGCN	Moist to dry gravelly alluvial soils along riverbanks but also on limestone slopes; Perennial; Flowering/Fruiting April-Nov
Net-Leaf Bundleflower	*Desmanthus reticulatus*	N/A	SGCN	Mostly on clay prairies of the coastal plain of central and south Texas; Perennial; Flowering April-July; Fruiting April-Oct
Osage Plains False Foxglove	*Agalinis densiflora*	N/A	SGCN	Most records are from grasslands on shallow, gravelly, well drained, calcareous soils; Prairies, dry limestone soils; Annual; Flowering Aug-Oct
Parks' Jointweed	*Polygonella parksii*	N/A	SGCN	Mostly found on deep, loose, whitish sand blowouts (unstable, deep, xeric, sandhill barrens) in Post Oak Savanna landscapes over the Carrizo and Sparta formations; also occurs in early successional grasslands, along right-of-ways, and on mechanically disturbed areas; flowering Junelate October or September-November
Plateau Loosestrife	*Lythrum ovalifolium*	N/A	SGCN	Banks and gravelly beds of perennial (or strong intermittent) streams on the Edwards Plateau, Llano Uplift and Lampasas Cutplain; Perennial; Flowering/Fruiting April-Nov
Sandhill Woolywhite	*Hymenopappus carrizoanus*	N/A	SGCN	Disturbed or open areas in grasslands and post oak woodlands on deep sands derived from the Carrizo Sand and similar Eocene formations; flowering April-June
Siler's Huaco	*Manfreda sileri*	N/A	SGCN	Rare in a variety of grasslands and shrublands on dry sites; Perennial; Flowering April-July; Fruiting June-July
South Texas Rushpea	*Caesalpinia phyllanthoides*	N/A	SGCN	Tamaulipan thorn shrublands or grasslands on very shallow sandy to clayey soils over calcareous sandstone and caliche; flowering in spring, sometimes later in growing season, perhaps in response to rainfall
Sycamore-Leaf Snowbell	*Styrax platanifolius ssp. Platanifolius*	N/A	SGCN	Rare throughout range, usually in oak-juniper woodlands on steep rocky banks and ledges along intermittent or perennial streams, rarely far from some reliable source of moisture; Perennial; Flowering April-May; Fruiting May-Aug
Texas Almond	*Prunus minutiflora*	N/A	SGCN	Wide-ranging but scarce, in a variety of grassland and shrubland situations, mostly on calcareous soils underlain by limestone but occasionally in sandier neutral soils underlain by granite; Perennial; Flowering Feb-May and Oct; Fruiting Feb-Sept

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Texas Amorpha	*Amorpha roemeriana*	N/A	SGCN	Juniper-oak woodlands or shrublands on rocky limestone slopes, sometimes on dry shelves above creeks; Perennial; Flowering May-June; Fruiting June-Oct
Texas Fescue	*Festuca versuta*	N/A	SGCN	Occurs in mesic woodlands on limestone-derived soils on stream terraces and canyon slopes; Perennial; Flowering/Fruiting April-June
Texas Peachbush	*Prunus texana*	N/A	SGCN	Occurs at scattered sites in various well drained sandy situations; deep sand, plains and sand hills, grasslands, oak woods, 0-200 m elevation; Perennial; Flowering Feb-Mar; Fruiting Apr-Jun
Texas Seymeria	*Seymeria texana*	N/A	SGCN	Found primarily in grassy openings in juniper-oak woodlands on dry rocky slopes but sometimes on rock outcrops in shaded canyons; Annual; Flowering May-Nov; Fruiting July-Nov
Threeflower Penstemon	*Penstemon triflorus var. triflorus*	N/A	SGCN	Occurs sparingly on rock outcrops and in grasslands associated with juniper-oak woodlands (Carr 2015).
Tree Dodder	*Cuscuta exaltata*	N/A	SGCN	Parasitic on various Quercus, Juglans, Rhus, Vitis, Ulmus, and Diospyros species as well as Acacia berlandieri and other woody plants; Annual; Flowering May-Oct; Fruiting July-Oct
Turnip-Root Scurfpea	*Pediomelum cyphocalyx*	N/A	SGCN	Grasslands and openings in juniper-oak woodlands on limestone substrates on the Edwards Plateau and in north-central Texas (Carr 2015).
Woolly Butterfly-Weed	*Oenothera cinerea ssp. parksii*	N/A	SGCN	Flats and hills of red sand of Rio Grande Plains (Raven and Gregory 1972). April-Oct.
Wright's Milkvetch	*Astragalus wrightii*	N/A	SGCN	On sandy or gravelly soils; Flowering/fruiting: April and May

Table 5D-3 Caldwell County - Threatened and Endangered Species and Species of Greatest Conservation Need Summary

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Amphibians				
Houston Toad	*Anaxyrus houstonensis*	E	E, SGCN	Terrestrial and aquatic: Primary terrestrial habitat is forests with deep sandy soils. Juveniles and adults are presumed to move through areas of less suitable soils using riparian corridors. Aquatic habitats can include any water body from a tire rut to a large lake.
San Marcos Salamander	*Eurycea nana*	T	T, SGCN	Aquatic; springs and associated water.
Strecker's Chorus Frog	*Pseudacris streckeri*	N/A	SGCN	Terrestrial and aquatic: Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates.
Texas Blind Salamander	*Eurycea rathbuni*	E	E, SGCN	Aquatic and subterranean; streams and caves.
Woodhouse's Toad	*Anaxyrus woodhousii*	N/A	SGCN	Terrestrial and aquatic: A wide variety of terrestrial habitats are used by this species, including forests, grasslands, and barrier island sand dunes. Aquatic habitats are equally varied.
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	DL	N/A	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds.
Bank Swallow	*Riparia riparia*	N/A	SGCN	Bank Swallows live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies of 10 to 2,000 nests. Though in the past Bank Swallows were most commonly found around natural bluffs or eroding streamside banks, they now often nest in human-made sites, such as sand and gravel quarries or road cuts. They forage in open areas and avoid places with tree cover.
Black Rail	*Laterallus jamaicensis*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia.
Brewer's Blackbird	*Euphagus cyanocephalus*	N/A	SGCN	Shrubby and bushy areas (especially near water), riparian woodland, aspen parklands, cultivated lands, marshes, and around human habitation; in migration and winter also in pastures and fields (AOU 1983).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Cactus Wren	*Campylorhynchus brunneicapillus*	N/A	SGCN	Desert (especially with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and in trees in towns in arid regions (Tropical to Subtropical zones) (AOU 1983). Nests in Opuntia cactus, or in twiggy, thorny, trees and shrubs, sometimes in buildings. Nest may be relined and used as a winter roost.
Chestnut-Collared Longspur	*Calcarius ornatus*	N/A	SGCN	Occurs in open shortgrass settings especially in patches with some bare ground. Also occurs in grain sorghum fields and Conservation Reserve Program lands.
Common Nighthawk	*Chordeiles minor*	N/A	SGCN	Common Nighthawks nest in both rural and urban habitats including coastal sand dunes and beaches, logged forest, recently burned forest, woodland clearings, prairies, plains, sagebrush, grasslands, open forests, and rock outcrops. They also nest on flat gravel rooftops, though less often as gravel roofs are being replaced by smooth, rubberized roofs that provide an unsuitable surface.
Franklin's Gull	*Leucophaeus pipixcan*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. This species is only a spring and fall migrant throughout Texas. It does not breed in or near Texas. Winter records are unusual consisting of one or a few individuals at a given site (especially along the Gulf coastline). During migration, these gulls fly during daylight hours but often come down to wetlands, lake shore, or islands to roost for the night.
Interior Least Tern	*Sternula antillarum athalassos*	DL	E	Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony.
Least Tern	*Sternula antillarum*	DL	SGCN	Sand beaches, flats, bays, inlets, lagoons, islands, river sandbars and flat gravel rooftops in urban areas.
Loggerhead Shrike	*Lanius ludovicianus*	N/A	SGCN	Loggerhead Shrikes inhabit open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead Shrikes are often seen along mowed roadsides with access to fence lines and utility poles.
Mottled Duck	*Anas fulvigula*	N/A	SGCN	Estuaries, ponds, lakes, secondary bays.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Mountain Plover	*Charadrius montanus*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous
Northern Bobwhite	*Colinus virginianus*	N/A	SGCN	Inhabits a wide variety of vegetation types, particularly early successional stages. Occurs in croplands, grasslands, pastures, fallow fields, grassbrush rangelands, open pinelands, open mixed pine-hardwood forests, and habitat mosaics (Brennan 1999).
Piping Plover	*Charadrius melodus*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.
Pyrrhuloxia	*Cardinalis sinuatus*	N/A	SGCN	Pyrrhuloxias live in upland deserts, mesquite savannas, riparian (streamside) woodlands, desert scrublands, farm fields with hedgerows, and residential areas with nearby mesquite. When not breeding, some Pyrrhuloxias wander into urban habitats, mesquite-hackberry habitats, and riparian habitats with Arizona sycamore and cottonwood.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Rufa Red Knot	*Calidris canutus rufa*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore. Bolivar Flats in Galveston County, sandy beaches Mustang Island, few on outer coastal and barrier beaches, tidal mudflats and salt marshes.
Sanderling	*Calidris alba*	N/A	SGCN	Nonbreeding: primarily sandy beaches, less frequently on mud flats and shores of lakes or rivers (AOU 1983) also on exposed reefs (Pratt et al. 1987). Sleeps/loafs on upper beach or on salt pond dike.
Snowy Plover	*Charadrius nivosus*	N/A	SGCN	Algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. An optimal site characteristic would be large in size. The size of populations appear to be roughly proportional to the total area of suitable habitat used. Formerly an uncommon breeder in the Panhandle; potential migrant; winter along coast.
Sprague's Pipit	*Anthus spragueii*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat during migration and in winter consists of pastures and weedy fields (AOU 1983), including grasslands with dense herbaceous vegetation or grassy agricultural fields.
Swallow-Tailed Kite	*Elanoides forficatus*	N/A	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Lowland forested regions, especially swampy areas, ranging into open woodland; marshes, along rivers, lakes, and ponds; nests high in tall tree in clearing or on forest woodland edge, usually in pine, cypress, or various deciduous trees.
Western Burrowing Owl	*Athene cunicularia hypugaea*	N/A	N/A	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
White-Faced Ibis	*Plegadis chihi*	N/A	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.
Whooping Crane	*Grus americana*	E	E, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.
Willet	*Tringa semipalmata*	N/A	SGCN	Marshes, tidal mudflats, beaches, lake margins, mangroves, tidal channels, river mouths, coastal lagoons, sandy or rocky shores, and, less frequently, open grassland (AOU 1983, Stiles and Skutch 1989).
Wilson's Warbler	*Cardellina pusilla*	N/A	SGCN	Wilson’s warblers key in on forests and scrubby areas along streams to fatten up during migration. During the nonbreeding season they use many types of habitats from lowland thickets near streams to high-elevation cloud forests in Mexico and Central America.
Wood Stork	*Mycteria americana*	N/A	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Yellow Rail	*Coturnicops noveboracensis*	N/A	SGCN	Breeding: Emergent wetlands, grass or sedge marshes and wet meadows in freshwater situations. Some breeding territories in these wet meadows contain firm footing and only a few remnant pools of water (Berkey 1991). These areas can range from damp to 38 cm (15 inches) of water but the average depth used for nesting is 8 to 15 cm (3 to 6 inches) (Savaloja 1981). Non-breeding: Grain fields in winter and when migrating. Winters in both freshwater and brackish marshes, as well as in dense, deep grass. During fall migration, will use many open habitats, from rice paddies to dry hayfields.
Yellow-Billed Cuckoo	*Coccyzus americanus*	T	SGCN	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Fish				
Fountain Darter	*Etheostoma fonticola*	E	E, SGCN	Known only from the spring-fed San Marcos and Comal rivers in dense beds of aquatic plants growing close to bottom; may be found in slowand fast-flowing habitats.
Guadalupe Bass	*Micropterus treculii*	N/A	SGCN	Endemic to the streams of the northern and eastern Edwards Plateau including portions of the Brazos, Colorado, Guadalupe, and San Antonio basins; species also found outside of the Edwards Plateau streams in decreased abundance, primarily in the lower Colorado River; two introduced populations have been established in the Nueces River system. A pure population was re-established in a portion of the Blanco River in 2014. Species prefers lentic environments but commonly taken in flowing water; numerous smaller fish occur in rapids, many times near eddies; large individuals found mainly in riffle tail races; usually found in spring-fed streams having clear water and relatively consistent temperatures.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Guadalupe Darter	*Percina apristis*	N/A	T, SGCN	Endemic to the Guadalupe River Basin; Found in riffles; most common under or around 25-30 cm boulders in the main current; seems to prefer moderately turbid water.
Guadalupe Roundnose Minnow	*Dionda flavipinnis*	N/A	SGCN	Endemic to Guadalupe and southern Colorado drainages; primarily restricted to clear spring-fed waters that have slight temperature variations.
Headwater Catfish	*Ictalurus lupus*	N/A	T, SGCN	Originally throughout streams of the Edwards Plateau and the Rio Grande basin, currently limited to Rio Grande drainage, including Pecos River basin; springs, and sandy and rocky riffles, runs, and pools of clear creeks and small rivers.
River Darter	*Percina shumardi*	N/A	SGCN	In Texas limited to eastern streams including Red River southward to the Neches River, and a disjunct population in the Guadalupe and San Antonio river systems east of the Balcones Escarpment. Confined to large rivers and lower parts of major tributaries; usually found in deep chutes and riffles where current is swift and bottom composed of coarse gravel or rock.
Texas Shiner	*Notropis amabilis*	N/A	SGCN	In Texas, it is found primarily in Edwards Plateau streams from the San Gabriel River in the east to the Pecos River in the west. Typical habitat includes rocky or sandy runs, as well as pools.
Insects				
American Bumblebee	*Bombus pensylvanicus*	N/A	SGCN	Habitat description is not available at this time.
Comanche Harvester Ant	*Pogonomyrmex comanche*	N/A	SGCN	Habitat description is not available at this time.
Mammals				
Aransas Short-Tailed Shrew	*Blarina hylophaga plumbea*	N/A	SGCN	Excavates burrows in sandy soils underlying mottes of live oak trees or in areas with little to no ground cover.
Big Free-Tailed Bat	*Nyctinomops macrotis*	N/A	SGCN	Habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore.
Cave Myotis Bat	*Myotis velifer*	N/A	SGCN	Colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Eastern Spotted Skunk	*Spilogale putorius*	N/A	SGCN	Generalist; open fields prairies, croplands, fence rows, farmyards, forest edges; woodlands. Prefer wooded, brushy areas; tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.
Hoary Bat	*Lasiurus cinereus*	N/A	SGCN	Hoary bats are highly migratory, high-flying bats that have been noted throughout the state. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage roosting species) but are found in unforested parts of the state and lowland deserts. Tend to be captured over water and large, open flyways.
Mountain Lion	*Puma concolor*	N/A	SGCN	Generalist; found in a wide range of habitats statewide. Found most frequently in rugged mountains; riparian zones.
Plains Spotted Skunk	*Spilogale interrupta*	N/A	SGCN	Generalist; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie.
Seminole Bat	*Lasiurus seminolus*	N/A	SGCN	Pine-oak and long-leaf pine in east Texas. Habitats include pine, mixed pine-hardwood, and hardwood forests of uplands and bottomlands, particularly pine-dominated forests, including mature pine and pine-hardwood corridors in managed pine forest landscapes (Menzel et al. 1998, 1999, 2000; Carter et al. 2004; Marks and Marks 2006; Perry and Thill 2007; Perry et al. 2007; Hein et al. 2008; Ammerman et al. 2012).
Tricolored Bat	*Perimyotis subflavus*	PE	SGCN	Forest, woodland and riparian areas are important. Caves are very important to this species.
Mollusks				
Edwards Plateau Liptooth	*Millerelix gracilis*	N/A	SGCN	Habitat description is not available at this time.
False Spike	*Fusconaia mitchelli*	E	E, SGCN	Occurs in small streams to medium-size rivers in habitats such as riffles and runs with flowing water. Is often found in stable substrates of sand, gravel, and cobble (Howells 2010; Randklev et al. 2012; Sowards et al. 2013; Tsakiris and Randklev 2016). [Mussels of Texas 2019].
Guadalupe Orb	*Cyclonaias necki*	E	E, SGCN	Species' distribution is limited to the Guadalupe River basin. Occurs in both mainstem and tributary habitats. Often found in substrates composed of sand, gravel, and cobble, including mud-silt or gravel-filled cracks in bedrock slabs. Considered intolerant of reservoirs, but are known to occur in them (Howells 2010m; Randklev et al. 2017b). [Mussels of Texas 2020].

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Pimpleback	*Cyclonaias pustulosa*	N/A	SGCN	Occurs in small streams to large rivers in habitats including riffles and runs with flowing water, also found in nearshore habitats such as banks and backwaters or pools. Can occur in reservoirs but varies based by population. Is often found in substrates comprising of sand, gravel, and cobble but also mud and silt (Howells et al. 1996; Williams et al. 2008; Watters et al. 2009).
Pistolgrip	*Tritogonia verrucosa*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs, but considered less tolerant of impoundment (Haag and Cicerello 2016). Can occur in a variety of habitat types but most often found in main channel habitats such as riffles and runs with moderate current and sand, gravel, or cobble substrates (Howells et al. 1996; Williams et al. 2008).
Reptiles				
American Alligator	*Alligator mississippiensis*	SAT	N/A	Aquatic: Coastal marshes; inland natural rivers, swamps and marshes; manmade impoundments.
Cagle's Map Turtle	*Graptemys caglei*	N/A	T, SGCN	Aquatic: shallow water with swift to moderate flow and gravel or cobble bottom, connected by deeper pools with a slower flow rate and a silt or mud bottom; gravel bar riffles and transition areas between riffles and pools especially important in providing insect prey items; nests on gently sloping sand banks within ca. 30 feet of waters edge.
Eastern Box Turtle	*Terrapene carolina*	N/A	SGCN	Terrestrial: Eastern box turtles inhabit forests, fields, forest-brush, and forest-field ecotones. In some areas they move seasonally from fields in spring to forest in summer. They commonly enters pools of shallow water in summer. For shelter, they burrow into loose soil, debris, mud, old stump holes, or under leaf litter. They can successfully hibernate in sites that may experience subfreezing temperatures.
Slender Glass Lizard	*Ophisaurus attenuatus*	N/A	SGCN	Terrestrial: Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil.
Texas Horned Lizard	*Phrynosoma cornutum*	N/A	T, SGCN	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Western Box Turtle	*Terrapene ornata*	N/A	SGCN	Terrestrial: Ornate or western box turtles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species.
Plants				
Awnless Leastdaisy	*Chaetopappa imberbis*	N/A	SGCN	In woodlands on loams of Carrizo sand (TEX-LL specimens Carr 23875, 12507). Flowering and fruiting during Mar - May.
Green Hawthorn	*Crataegus viridis var. glabriuscula*	N/A	SGCN	In mesic soils of woods or on edge of woods, treeline/fenceline, or thicket. Above/near creeks and draws, in river bottoms. Flowering Mar-Apr; fruiting May-Oct.
Heller's Marbleseed	*Onosmodium helleri*	N/A	SGCN	Occurs in loamy calcareous soils in oak-juniper woodlands on rocky limestone slopes, often in more mesic portions of canyons; perennial; flowering March-May.
Hill Country Wild-Mercury	*Argythamnia aphoroides*	N/A	SGCN	Mostly in bluestem-grama grasslands associated with plateau live oak woodlands on shallow to moderately deep clays and clay loams over limestone on rolling uplands, also in partial shade of oak-juniper woodlands in gravelly soils on rocky limestone slopes; perennial; flowering April-May with fruit persisting until midsummer.
Sandhill Woolywhite	*Hymenopappus carrizoanus*	N/A	SGCN	Disturbed or open areas in grasslands and post oak woodlands on deep sands derived from the Carrizo Sand and similar Eocene formations; flowering April-June.
Sycamore-Leaf Snowbell	*Styrax platanifolius ssp. Platanifolius*	N/A	SGCN	Rare throughout range, usually in oak-juniper woodlands on steep rocky banks and ledges along intermittent or perennial streams, rarely far from some reliable source of moisture; perennial; flowering April-May; fruiting May-Aug.
Texas Beebalm	*Monarda viridissima*	N/A	SGCN	Endemic perennial herb of the Carrizo Sands; deep, well-drained sandy soils in openings of post oak woodlands; flowers white.
Texas Sandmint	*Rhododon ciliatus*	N/A	SGCN	Open sandy areas in the Post Oak Belt of east-central Texas; annual; flowering April-Aug; fruiting May-Aug.
Texas Tauschia	*Tauschia texana*	N/A	SGCN	Occurs in loamy soils in deciduous forests or woodlands on river and stream terraces; perennial; flowering/fruiting Feb-April.

Table 5D-4 Calhoun County - Threatened and Endangered Species and Species of Greatest Conservation Need Summary

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Amphibians				
Black-Spotted Newt	*Notophthalmus meridionalis*	N/A	T, SGCN	Terrestrial and aquatic: Terrestrial habitats used by adults are typically poorly drained clay soils that allow for the formation of ephemeral wetlands. A wide variety of vegetation associations are known to be used, such as thorn scrub and pasture. Aquatic habitats used for reprodution are a variety of ephemeral and permanent water bodies.
Southern Crawfish Frog	*Lithobates areolatus areolatus*	N/A	SGCN	Terrestrial and aquatic: The terestial habitat is primarily grassland and can vary from pasture to intact prairie; it can also include small prairies in the middle of large forested areas. Aquatic habitat is any body of water but preferred habitat is ephemeral wetlands.
Strecker's Chorus Frog	*Pseudacris streckeri*	N/A	SGCN	Terrestrial and aquatic: Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates.
Woodhouse's Toad	*Anaxyrus woodhousii*	N/A	SGCN	Terrestrial and aquatic: A wide variety of terrestrial habitats are used by this species, including forests, grasslands, and barrier island sand dunes. Aquatic habitats are equally varied.
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	DL	N/A	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds.
Bank Swallow	*Riparia riparia*	N/A	SGCN	Bank Swallows live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies of 10 to 2,000 nests. Though in the past Bank Swallows were most commonly found around natural bluffs or eroding streamside banks, they now often nest in human-made sites, such as sand and gravel quarries or road cuts. They forage in open areas and avoid places with tree cover.
Black Rail	*Laterallus jamaicensis*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Black Skimmer	*Rynchops niger*	N/A	SGCN	Primarily coastal waters, including bays, estuaries, lagoons and mudflats in migration and winter (AOU 1983); also quiet waters of rivers and lakes (Stiles and Skutch 1989). Rest on mudflats, sandbars, beaches.
Brewer's Blackbird	*Euphagus cyanocephalus*	N/A	SGCN	Shrubby and bushy areas (especially near water), riparian woodland, aspen parklands, cultivated lands, marshes, and around human habitation; in migration and winter also in pastures and fields (AOU 1983).
Common Nighthawk	*Chordeiles minor*	N/A	SGCN	Common Nighthawks nest in both rural and urban habitats including coastal sand dunes and beaches, logged forest, recently burned forest, woodland clearings, prairies, plains, sagebrush, grasslands, open forests, and rock outcrops. They also nest on flat gravel rooftops, though less often as gravel roofs are being replaced by smooth, rubberized roofs that provide an unsuitable surface.
Franklin's Gull	*Leucophaeus pipixcan*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. This species is only a spring and fall migrant throughout Texas. It does not breed in or near Texas. Winter records are unusual consisting of one or a few individuals at a given site (especially along the Gulf coastline). During migration, these gulls fly during daylight hours but often come down to wetlands, lake shore, or islands to roost for the night.
Henslow's Sparrow	*Centronyx henslowii*	N/A	SGCN	Wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking.
Least Tern	*Sternula antillarum*	DL	SGCN	Sand beaches, flats, bays, inlets, lagoons, islands, river sandbars and flat gravel rooftops in urban areas.
Loggerhead Shrike	*Lanius ludovicianus*	N/A	SGCN	Loggerhead Shrikes inhabit open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead Shrikes are often seen along mowed roadsides with access to fence lines and utility poles.
Mottled Duck	*Anas fulvigula*	N/A	SGCN	Estuaries, ponds, lakes, secondary bays.
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	E	E, SGCN	Open country, especially savanna and open woodland, and sometimes in very barren areas; grassy plains and valleys with scattered mesquite, yucca, and cactus; nests in old stick nests of other bird species.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Northern Bobwhite	*Colinus virginianus*	N/A	SGCN	Inhabits a wide variety of vegetation types, particularly early successional stages. Occurs in croplands, grasslands, pastures, fallow fields, grassbrush rangelands, open pinelands, open mixed pine-hardwood forests, and habitat mosaics (Brennan 1999).
Piping Plover	*Charadrius melodus*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.
Pyrrhuloxia	*Cardinalis sinuatus*	N/A	SGCN	Pyrrhuloxias live in upland deserts, mesquite savannas, riparian (streamside) woodlands, desert scrublands, farm fields with hedgerows, and residential areas with nearby mesquite. When not breeding, some Pyrrhuloxias wander into urban habitats, mesquite-hackberry habitats, and riparian habitats with Arizona sycamore and cottonwood.
Reddish Egret	*Egretta rufescens*	N/A	T, SGCN	Resident of the Texas Gulf Coast; brackish marshes and shallow salt ponds and tidal flats; nests on ground or in trees or bushes, on dry coastal islands in brushy thickets of yucca and prickly pear.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Rufa Red Knot	*Calidris canutus rufa*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore. Bolivar Flats in Galveston County, sandy beaches Mustang Island, few on outer coastal and barrier beaches, tidal mudflats and salt marshes.
Sanderling	*Calidris alba*	N/A	SGCN	Nonbreeding: primarily sandy beaches, less frequently on mud flats and shores of lakes or rivers (AOU 1983) also on exposed reefs (Pratt et al. 1987). Sleeps/loafs on upper beach or on salt pond dike.
Snowy Plover	*Charadrius nivosus*	N/A	SGCN	Algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. An optimal site characteristic would be large in size. The size of populations appear to be roughly proportional to the total area of suitable habitat used. Formerly an uncommon breeder in the Panhandle; potential migrant; winter along coast.
Sprague's Pipit	*Anthus spragueii*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat during migration and in winter consists of pastures and weedy fields (AOU 1983), including grasslands with dense herbaceous vegetation or grassy agricultural fields.
Swallow-Tailed Kite	*Elanoides forficatus*	N/A	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Lowland forested regions, especially swampy areas, ranging into open woodland; marshes, along rivers, lakes, and ponds; nests high in tall tree in clearing or on forest woodland edge, usually in pine, cypress, or various deciduous trees.
Western Burrowing Owl	*Athene cunicularia hypugaea*	N/A	N/A	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
White-Faced Ibis	*Plegadis chihi*	N/A	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.
White-Tailed Hawk	*Buteo albicaudatus*	N/A	T	Near coast on prairies, cordgrass flats, and scrub-live oak; further inland on prairies, mesquite and oak savannas, and mixed savanna-chaparral; breeding March-May.
Whooping Crane	*Grus americana*	E	E, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.
Willet	*Tringa semipalmata*	N/A	SGCN	Marshes, tidal mudflats, beaches, lake margins, mangroves, tidal channels, river mouths, coastal lagoons, sandy or rocky shores, and, less frequently, open grassland (AOU 1983, Stiles and Skutch 1989).
Wilson's Warbler	*Cardellina pusilla*	N/A	SGCN	Wilson's warblers key in on forests and scrubby areas along streams to fatten up during migration. During the nonbreeding season they use many types of habitats from lowland thickets near streams to high-elevation cloud forests in Mexico and Central America.
Wood Stork	*Mycteria americana*	N/A	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Yellow Rail	*Coturnicops noveboracensis*	N/A	SGCN	Breeding: Emergent wetlands, grass or sedge marshes and wet meadows in freshwater situations. Some breeding territories in these wet meadows contain firm footing and only a few remnant pools of water (Berkey 1991). These areas can range from damp to 38 cm (15 inches) of water but the average depth used for nesting is 8 to 15 cm (3 to 6 inches) (Savaloja 1981). Non-breeding: Grain fields in winter and when migrating. Winters in both freshwater and brackish marshes, as well as in dense, deep grass. During fall migration, will use many open habitats, from rice paddies to dry hayfields.
Yellow-Billed Cuckoo	*Coccyzus americanus*	T	SGCN	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Fish				
Alligator Gar	*Atractosteus spatula*	N/A	SGCN	From the Red River to the Rio Grande (Hubbs et al. 2008); occurs in the Trinity River upstream of Lake Livingston. Found in rivers, streams, lakes, swamps, bayous, bays and estuaries typically in pools and backwater habitats. Floodplains inundated with flood waters provide spawning and nursery habitats.
Atlantic Guitarfish	*Rhinobatos lentiginosus*	N/A	SGCN	Gulf of Mexico.
Atlantic Tarpon	*Megalops atlanticus*	N/A	SGCN	Gulf of Mexico.
Black Grouper	*Mycteroperca bonaci*	N/A	SGCN	Gulf of Mexico.
Blacknose Shark	*Carcharhinus acronotus*	N/A	SGCN	Gulf of Mexico.
Blue Marlin	*Makaira nigricans*	N/A	SGCN	Gulf of Mexico.
Bull Shark	*Carcharhinus leucas*	N/A	SGCN	Gulf of Mexico.
Caribbean Sharpnose Shark	*Rhizoprionodon porosus*	N/A	SGCN	Gulf of Mexico.
Cobia	*Rachycentron canadum*	N/A	SGCN	Gulf of Mexico.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Dusky Shark	*Carcharhinus obscurus*	N/A	SGCN	Gulf of Mexico.
Finetooth Shark	*Carcharhinus isodon*	N/A	SGCN	Gulf of Mexico.
Giant Manta Ray	*Manta birostris*	T	SGCN	Gulf of Mexico.
Great Hammerhead	*Sphyrna mokarran*	N/A	T, SGCN	Gulf of Mexico.
Greater Amberjack	*Seriola dumerili*	N/A	SGCN	Gulf of Mexico.
Lemon Shark	*Negaprion brevirostris*	N/A	SGCN	Gulf of Mexico.
Oceanic Whitetip Shark	*Carcharhinus longimanus*	T	T, SGCN	Gulf of Mexico.
Opossum Pipefish	*Microphis brachyurus*	N/A	SGCN	Adults are only found in low salinity waters of estuaries or freshwater tributaries within 30 miles of the coast (Gilmore 1992), where they also give birth. Young move or are carried into more saline waters off the coast after birth. Newly released larvae must have conditions near 18 ppt salinity for at least two weeks after birth to survive, indicating a physiology adapted for downstream transport to estuarine and marine environments (Frias-Torres 2002). Juvenile migration toward the ocean depends on water flow regimes, salinity, and vegetation for cover and capturing prey (Frias-Torres 2002). Seawalls, docks, and riprap construction destroy habitat and poor water quality and alteration of flow regimes may prevent migration (NMFS 2009).
Sailfish	*Istiophorus platypterus*	N/A	SGCN	Gulf of Mexico.
Saltmarsh Topminnow	*Fundulus jenkinsi*	N/A	SGCN	Occupies estuaries and the edges of saltmarsh habitats along the Gulf coast in salinities of 4-20 ppt in Spartina dominated tidal creeks and wetlands (Peterson & Ross 1991; Peterson & Turner 1994; Lopez et al. 2010; and Griffith 1974). Requires access to small interconnected tidal creeks for feeding and reproduction. Spawning occurs from March to August during high tide events (Robertson Thesis, 2016). Non-migratory.
Sandbar Shark	*Carcharhinus plumbeus*	N/A	SGCN	Gulf of Mexico.
Scalloped Hammerhead Shark	*Sphyrna lewini*	N/A	SGCN	Gulf of Mexico.
Scamp	*Mycteroperca phenax*	N/A	SGCN	Gulf of Mexico.
Shortfin Mako Shark	*Isurus oxyrinchus*	N/A	SGCN	Habitat description is not available at this time.
Silky Shark	*Carcharhinus falciformis*	N/A	SGCN	Gulf of Mexico.
Smalltail Shark	*Carcharhinus porosus*	N/A	SGCN	Gulf of Mexico.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Southern Flounder	*Paralichthys lethostigma*	N/A	SGCN	This is an estuarine-dependent species that inhabits riverine, estuarine and coastal waters, and prefers muddy, sandy, or silty substrates (Reagan and Wingo 1985). Individuals can tolerate wide temperature (~5-35°C) and salinity ranges (0-60 ppt). Southern Flounder spawn in offshore waters of the Gulf of Mexico from October to February (Reagan and Wingo 1985). The oceanic larval stage is pelagic and lasts 30–60 days. Metamorphosing individuals enter estuaries and migrate towards low-salinity headwaters, where settlement occurs (Burke et al. 1991, Walsh et al. 1999). The young fish enter the bays during late winter and early spring, occupying seagrass; some may move further into coastal rivers and bayous. Juveniles remain in estuaries until the onset of sexual maturation (approximately two years), at which time they migrate out of estuaries to join adults on the inner continental shelf. Adult southern flounder leave the bays during the fall for spawning in the Gulf of Mexico. They spawn for the first time when two years old at depths of 50 to 100 feet. Although most of the adults leave the bays and enter the Gulf for spawning during the winter, some remain behind and spend winter in the bays. Those in the Gulf will reenter the bays in the spring. The spring influx is gradual and does not occur with large concentrations that characterize the fall emigration.
Speckled Hind	*Epinephelus drummondhayi*	N/A	SGCN	Gulf of Mexico.
Spinner Shark	*Carcharhinus brevipinna*	N/A	SGCN	Gulf of Mexico.
Swordfish	*Xiphias gladius*	N/A	SGCN	Gulf of Mexico.
Texas Silverside	*Menidia clarkhubbsi*	N/A	SGCN	This coastal species inhabits ponds, shallow bays, and estuaries. It is an all-female species that relies on fertilization from males of Menidia beryllina or M. peninsulae. Identification is near impossible unless using genetic techniques (Chernoff 2002)
White Marlin	*Kajikia albida*	N/A	SGCN	Gulf of Mexico.
Insects				
American Bumblebee	*Bombus pensylvanicus*	N/A	SGCN	Habitat description is not available at this time.
Mammals				
Atlantic Spotted Dolphin	*Stenella frontalis*	N/A	T, SGCN	Inhabit warm tropical, subtropical, and temperate waters throughout the Atlantic Ocean, including the Gulf of Mexico. Commonly found along the continental shelf and coastal waters that are 65-820 feet deep, usually inside or near 185 m contour (within 250-350 km of coast); occassionally found in deeper waters. Often dive to 30-200 feet preying upon fish, invertebrates, and cephalopods.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Blainville's Beaked Whale	*Mesoplodon densirostris*	N/A	SGCN	Not applicable.
Blue Whale	*Balaenoptera musculus*	E	E, SGCN	Inhabits tropical, subtropical, temperate, and subpolar waters worldwide, but are infrequently sighted in the Gulf of Mexico. They migrate seasonally between summer feeding grounds and winter breeeding grounds, but specifics vary. Commonly observed at the surface in open ocean
Bottlenosed Dolphin	*Tursiops truncatus*	N/A	SGCN	Habitat description is not available at this time.
Bryde's Whale	*Balaenoptera edeni brydei*	N/A	E, SGCN	Gulf of Mexico.
Clymene Dolphin	*Stenella clymene*	N/A	SGCN	Habitat description is not available at this time.
Cuvier's Beaked Whale	*Ziphius cavirostris*	N/A	T, SGCN	Inhabit tropical, subtropical, and temperate waters world wide, including the Gulf of Mexico. Commonly found in water over 3,300 feet deep near the continetal shelf near steep slopes or canyons, avoiding coastal areas. Mostly pelagic apparently confined by the 1,000 meter bathymetric contour. Frequently make deep dives to capture prey (squids and fishes).
Dwarf Sperm Whale	*Kogia simus*	N/A	T, SGCN	Inhabits tropical and temperate waters world wide, Commonly found in deep waters near the continental shelf and rarely seen at the surface, but may be more coastal than the pygmy sperm whale (Kogia breviceps). Dives to great depths (1,000 feet) to hunt for squid, fish, and crustaceans. Migration patterns are unknown.
Eastern Spotted Skunk	*Spilogale putorius*	N/A	SGCN	Generalist; open fields prairies, croplands, fence rows, farmyards, forest edges; woodlands. Prefer wooded, brushy areas; tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.
False Killer Whale	*Pseudorca crassidens*	N/A	T, SGCN	Inhabit tropical, subtropical, and temperate waters world wide, including the Gulf of Mexico. Commonly found in deep, offshore waters deeper than 3,300 feet, making dives of up to 2,000 meters to catch their prey (fishes and squids). Gulf of Mexico distinct population segment is not well studied
Finback Whale	*Balaenoptera physalus*	E	E, SGCN	Inhabit tropical, subtropical, temperate, and subpolar waters worldwide, but are less common in the tropics preferring cooler water. Commonly found in deep, offshore waters and migrate in the open ocean from the poles (feeding grounds) to warmer waters in the winter to give birth. They feed on krill, squid, and small schooling fish sometimes with other baleen whale species. They are very rare in the Gulf of Mexico and reported sightings are likely vagrants (Witt et al. 2011).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Gervais's Beaked Whale	*Mesoplodon europaeus*	N/A	T, SGCN	Inhabit tropical, subtropical, and temperate waters of the northern Atlantic Ocean, Gulf of Mexico, and Caribbean. Commonly found in deep water and open ocean where they prey upon squids. They are difficult to distinguish from others in their family (Mesoplodon) and are cryptic and skittish, but the most commonly stranded species on the US southeastern coast. Migration patterns are unknown.
Hoary Bat	*Lasiurus cinereus*	N/A	SGCN	Hoary bats are highly migratory, high-flying bats that have been noted throughout the state. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage roosting species) but are found in unforested parts of the state and lowland deserts. Tend to be captured over water and large, open flyways.
Humpback Whale	*Megaptera novaeangliae*	E	SGCN	Inhabits tropical, subtropical, temperate, and subpolar waters world wide. Migrate up to 5,000 miles between colder water (feeding grounds) and warmer water (calving grounds) each year. They will use both open ocean and coastal waters, sometimes including inshore areas such as bays, and are often found near the surface; however, this species is rare in the Gulf of Mexico. The northwest Atlantic/Gulf of Mexico distinct population segment is not considered at risk of extinction and is not listed as Endangered under the Endangered Species Act.
Killer Whale	*Orcinus orca*	N/A	T, SGCN	Inhabits tropical, subtropical, temperate, and polar waters world wide. In the Gulf of Mexico, they are commonly found in oceanic waters ranging from 256-2,652 meters deep beyond the 1,000 meter isobath and a very rarely found over the continental shelf and may be entirely absent from nearshore waters. May come in contact with pelagic longline fisheries targeting tunas and billfishes.
Minke Whale	*Balaenoptera acutorostrata*	N/A	SGCN	Gulf of Mexico.
Mountain Lion	*Puma concolor*			Generalist; found in a wide range of habitats statewide. Found most frequently in rugged mountains; riparian zones.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
North Atlantic Right Whale	*Eubalaena glacialis*	N/A	SGCN	Inhabits subtropical and temperate waters in the northern Atlantic. Commonly found in coastal waters or clsoe to the continental shelf near the surface. They migrate from feeding grounds in cooler waters (Canada and New England) to warmer waters of the southeast US (South Carolina, Georgia, and Florida) to give birth in the fall/winter - both areas are identified as critical habitat by NOAA-NMFS. Nursery areas are in shallow, coastal waters. This species is very rare in the Gulf of Mexico and the few reported sightings are likely vagrants (Ward-Geiger etal 2011).
Padre Island Kangaroo Rat	*Dipodomys compactus compactus*	N/A	SGCN	Dunes and open sandy areas near the coast.
Plains Spotted Skunk	*Spilogale interrupta*	N/A	SGCN	Generalist; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie.
Pygmy Killer Whale	*Feresa attenuata*	N/A	T, SGCN	Inhabit tropical and subtropical waters worldwide, including the Gulf of Mexico. Commonly found in deeper, offshore waters where they dive for their prey (squids and fishes), but may occassionally occur close to shore. They are very rare and migration patterns are unknown.
Pygmy Sperm Whale	*Kogia breviceps*	N/A	T, SGCN	Inhabits tropical, subtropical, and temperate waters world wide. Commonly found in deep water over the continental slope and rarely seen at the surface. Dives to great depths (over 1,000 feet) to hunt for squid, fish, and crustaceans.Migration patterns are unknown.
Rice's Whale	*Balaenoptera ricei*	E	E, SGCN	Gulf of Mexico.
Roughtoothed Dolphin	*Steno bredanensis*	N/A	T, SGCN	Inhabits tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. Records in Texas are only known from strandings. Commonly found in deep, oceanic water over 1,500-2,000 meters deep and ranging in temperature from 17-25 degrees Celsius. May associate with other cetaceans. Prey on squids and fish. No known migration patterns.
Sei Whale	*Balaenoptera borealis*	E	E, SGCN	Gulf of Mexico.
Short-Finned Pilot Whale	*Globicephala macrorhynchus*	N/A	T, SGCN	Inhabit tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. Commonly found in deeper waters (>1,000 feet) and continental shelf where they make deep dives to capture squid, but may come closer to shore. Migration patterns unknown.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Sperm Whale	*Physeter macrocephalus*	E	E, SGCN	Inhabits tropical, subtropical, and temperate waters world wide, avoiding icey waters. Distribution is highly dependent on their food source (squids, sharks, skates, and fish), breeding, and composition of the pod. In general, this species migrates from north to south in the winter and south to north in the summer; however, individuals in tropical and temperate waters don't seem to migrate at all. Routinely dive to catch their prey (2,000-10,000 feet) and generally occupies water at least 3,300 feet deep near ocean trenches.
Spinner Dolphin	*Stenella longirostris*	N/A	SGCN	Habitat description is not available at this time.
Tricolored Bat	*Perimyotis subflavus*	PE	SGCN	Forest, woodland and riparian areas are important. Caves are very important to this species.
West Indian Manatee	*Trichechus manatus*	T	T, SGCN	Large rivers, brackish water bays, coastal waters. Warm waters of the tropics, in rivers and brackish bays but may also survive in salt water habitats. Very sensitive to cold water temperatures. Rarely occurring as far north as Texas. Gulf and bay system; opportunistic, aquatic herbivore.
White-Nosed Coati	*Nasua narica*	N/A	T, SGCN	Woodlands, riparian corridors and canyons.Most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees; omnivorous; may be susceptible to hunting, trapping, and pet trade
Mollusks				
Live Oak Glass	*Nesovitrea suzannae*	N/A	SGCN	Habitat description is not available at this time.
Mapleleaf	*Quadrula quadrula*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs. In riverine habitats, it may be found in main-channel habitats such as riffles or runs in sand, gravel, and cobble substrates with moderate to swift currents. May also be found in nearshore habitats such as banks and backwaters to include pools in sand or mud substrates with little to no flow. (Williams et al. 2008; Howells 2016; Haag and Cicerello 2016).
Reptiles				
American Alligator	*Alligator mississippiensis*	SAT	N/A	Aquatic: Coastal marshes; inland natural rivers, swamps and marshes; manmade impoundments.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Atlantic Hawksbill Sea Turtle	*Eretmochelys imbricata*	E	E, SGCN	Inhabit tropical and subtropical waters worldwide, in the Gulf of Mexico, especially Texas. Hatchling and juveniles are found in open, pelagic ocean and closely associated with floating lgae/seagrass mats. Juveniles then migrate to shallower, coastal areas, mainly coral reefs and rocky areas, but also in bays and estuaries near mangroves when reefs are absent; seldom in water lmore than 65 feet deep. They feed on sponges, jellyfish, sea urchins, molluscs, and crustaceans. Nesting occurs from April to November high up on the beach where there is vegetation for cover and little or no sand. Some migrate, but others stay close to foraging areas - females are philopatric.
Common Garter Snake	*Thamnophis sirtalis*	N/A	SGCN	Terrestrial and aquatic: Habitats used include the grasslands and modified open areas in the vicinity of aquatic features, such as ponds, streams or marshes. Damp soils and debris for cover are thought to be critical.
Eastern Box Turtle	*Terrapene carolina*	N/A	SGCN	Terrestrial: Eastern box turtles inhabit forests, fields, forest-brush, and forest-field ecotones. In some areas they move seasonally from fields in spring to forest in summer. They commonly enters pools of shallow water in summer. For shelter, they burrow into loose soil, debris, mud, old stump holes, or under leaf litter. They can successfully hibernate in sites that may experience subfreezing temperatures.
Green Sea Turtle	*Chelonia mydas*	T	T, SGCN	Inhabits tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. Adults and juveniles occupy inshore and nearshore areas, including bays and lagoons with reefs and seagrass. They migrate from feeding grounds (open ocean) to nesting grounds (beaches/barrier islands) and some nesting does occur in Texas (April to September). Adults are herbivorous feeding on sea grass and seaweed; juveniles are omnivorous feeding initially on marine invertebrates, then increasingly on sea grasses and seaweeds.
Keeled Earless Lizard	*Holbrookia propinqua*	N/A	SGCN	Terrestrial: Habitats include coastal dunes, barrier islands, and other sandy areas (Axtell 1983). Although it occurs well inland, this species is most abundant on coastal dunes, were it seeks shelter in the burrows of small mammals or crabs (Bartlett and Bartlett 1999).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	E	E, SGCN	Inhabits tropical, subtropical, and temperate waters of the northwestern Atlantic Ocean and Gulf of Mexico. Adults are found in coastal waters with muddy or sandy bottoms. Some males migrate between feeding grounds and breeeding grounds, but some don't. Females migrate between feeding and nesting areas, often returning to the same destinations. Nesting in Texas occurs on a smaller scale compared to other areas (i.e. Mexico). Hatchlings are quickly swept out to open water and are rarely found nearshore. Similarly, juveniles often congregate near floating algae/seagrass mats offshore, and move into nearshore, coastal, neritic areas after 1-2 years and remain until they reach maturity. They feed primarily on crabs, but also snails, clams, other crustaceans and plants, juveniles feed on sargassum and its associated fauna; nests April through August.
Leatherback Sea Turtle	*Dermochelys coriacea*	E	E, SGCN	Inhabit tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. Nesting is not common in Texas (March to July). Most pelagic of the seaturtles with the longest migration (>10,000 miles) between nesting and foraging sites. Are able to dive to depths of 4,000 feet. They are omnivorous, showing a preference for jellyfish.
Loggerhead Sea Turtle	*Caretta caretta*	T	T, SGCN	Inhabits tropical, subtropical, and temperate waters worldwide, including the Gulf of Mexico. They migrate from feeding grounds to nesting beaches/barrier islands and some nesting does occur in Texas (April to September). Beaches that are narrow, steeply sloped, with coarse-grains and are preffered for nesting. Newly hatched individuals depend on floating alage/seaweed for protection and foraging, which eventually transport them offshore and into open ocean. Juveniles and young adults spend their lives in open ocean, offshore before migrating to coastal areas to breed and nest. Foraging areas for adults include shallow continental shelf waters.
Prairie Skink	*Plestiodon septentrionalis*	N/A	SGCN	The prairie skink can occur in any native grassland habitat across the Rolling Plains, Blackland Prairie, Post Oak Savanna and Pineywoods ecoregions.
Salt Marsh Snake	*Nerodia clarkii*	N/A	SGCN	This species is generally restricted to the brackish marshes and islands of the mid and upper coastline. It can be found further inland in shallow freshwater marshes.
Slender Glass Lizard	*Ophisaurus attenuatus*	N/A	SGCN	Terrestrial: Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Texas Diamondback Terrapin	*Malaclemys terrapin littoralis*	N/A	SGCN	Coastal marshes, tidal flats, coves, estuaries, and lagoons behind barrier beaches; brackish and salt water; burrows into mud when inactive. Bay islands are important habitats. Nests on oyster shell beaches.
Texas Horned Lizard	*Phrynosoma cornutum*	N/A	T, SGCN	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.
Texas Scarlet Snake	*Cemophora lineri*	N/A	T, SGCN	Terrestrial: Prefers well drained soils with a variety of forest, grassland, and scrub habitats.
Western Box Turtle	*Terrapene ornata*	N/A	SGCN	Terrestrial: Ornate or western box turtles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species.
Western Massasauga	*Sistrurus tergeminus*	N/A	SGCN	Terrestrial: Shortgrass or mixed grass prairie, with gravel or sandy soils. Often found associated with draws, floodplains, and more mesic habitats within the arid landscape. Frequently occurs in shrub encroached grasslands.
Plants				
Coastal Gay-Feather	*Liatris bracteata*	N/A	SGCN	Coastal prairie grasslands of various types, from salty prairie on low- lying somewhat saline clay loams to upland prairie on nonsaline clayey to sandy loams; flowering in fall.
Indianola Beakrush	*Rhynchospora indianolensis*	N/A	SGCN	Locally abundant in cattle pastures in some areas (at least during wet years), possibly becoming a management problem in such sites; perennial; flowering/fruiting April-Nov.
Marsh-Elder Dodder	*Cuscuta attenuata*	N/A	SGCN	Parasitizes a particular sumpweed (Iva annua) almost exclusively as well as ragweed and heath aster. Host plants typically found in open, disturbed habitats like fallow fields and creek bottomlands; annual; flowering late summer through October.
Sand Brazos Mint	*Brazoria arenaria*	N/A	SGCN	Sandy areas in South Texas; annual; flowering/fruiting March-April.
Seaside Beebalm	*Monarda maritima*	N/A	SGCN	Occurs in grasslands and pastures on sandy soil near the coast (Carr 2015).
Texas Peachbush	*Prunus texana*	N/A	SGCN	Occurs at scattered sites in various well drained sandy situations; deep sand, plains and sand hills, grasslands, oak woods, 0-200 m elevation; perennial; flowering Feb-Mar; fruiting Apr-Jun.
Texas Willkommia	*Willkommia texana var. texana*	N/A	SGCN	Mostly in sparsely vegetated shortgrass patches within taller prairies on alkaline or saline soils on the Coastal Plain (Carr 2015).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Threeflower Broomweed	*Thurovia triflora*	N/A	SGCN	Near coast in sparse, low vegetation on a veneer of light colored silt or fine sand over saline clay along drier upper margins of ecotone between between salty prairies and tidal flats; further inland associated with vegetated slick spots on prairie mima mounds; flowering September-November
Velvet Spurge	*Euphorbia innocua*	N/A	SGCN	Open or brushy areas on coastal sands and the South Texas Sand Sheet; perennial; flowering Sept-April; fruiting Nov-July.

Table 5D-5 Comal County - Threatened and Endangered Species and Species of Greatest Conservation Need Summary

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Amphibians				
Blanco River Springs Salamander	*Eurycea pterophila*	N/A	SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
Cascade Caverns Salamander	*Eurycea latitans*	N/A	T, SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
San Marcos Salamander	*Eurycea nana*	T	T, SGCN	Aquatic; springs and associated water.
Strecker's Chorus Frog	*Pseudacris streckeri*	N/A	SGCN	Terrestrial and aquatic: Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates.
Texas Blind Salamander	*Eurycea rathbuni*	E	E, SGCN	Aquatic and subterranean; streams and caves.
Texas Salamander	*Eurycea neotenes*	N/A	T, SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
Woodhouse's Toad	*Anaxyrus woodhousii*	N/A	SGCN	Terrestrial and aquatic: A wide variety of terrestrial habitats are used by this species, including forests, grasslands, and barrier island sand dunes. Aquatic habitats are equally varied.
Arachnids				
No Accepted Common Name	*Texella brevidenta*	N/A	SGCN	Habitat description is not available at this time
No Accepted Common Name	*Cicurina puentecilla*	N/A	SGCN	Habitat description is not available at this time
No Accepted Common Name	*Cicurina reclusa*	N/A	SGCN	Habitat description is not available at this time
No Accepted Common Name	*Almuerzothyas comalensis*	N/A	SGCN	Spring obligate. Known only from Comal Springs, Comal County. Fine scale habitat requirements unknown.
Arthropods				
Ivy's Cave Millipede	*Speodesmus ivyi*	N/A	SGCN	Habitat description is not available at this time.
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	DL	N/A	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds.
Bank Swallow	*Riparia riparia*	N/A	SGCN	Bank Swallows live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies of 10 to 2,000 nests. Though in the past Bank Swallows were most commonly found around natural bluffs or eroding streamside banks, they now often nest in human-made sites, such as sand and gravel quarries or road cuts. They forage in open areas and avoid places with tree cover.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Black-Capped Vireo	*Vireo atricapilla*	DL	SGCN	Oak-juniper woodlands with distinctive patchy, two-layered aspect; shrub and tree layer with open, grassy spaces; requires foliage reaching to ground level for nesting cover; return to same territory, or one nearby, year after year; deciduous and broad-leaved shrubs and trees provide insects for feeding; species composition less important than presence of adequate broad-leaved shrubs, foliage to ground level, and required structure; nesting season March-late summer
Brewer's Blackbird	*Euphagus cyanocephalus*	N/A	SGCN	Shrubby and bushy areas (especially near water), riparian woodland, aspen parklands, cultivated lands, marshes, and around human habitation; in migration and winter also in pastures and fields (AOU 1983).
Cactus Wren	*Campylorhynchus brunneicapillus*	N/A	SGCN	Desert (especially with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and in trees in towns in arid regions (Tropical to Subtropical zones) (AOU 1983). Nests in OPUNTIA cactus, or in twiggy, thorny, trees and shrubs, sometimes in buildings. Nest may be relined and used as a winter roost.
Chestnut-Collared Longspur	*Calcarius ornatus*	N/A	SGCN	Occurs in open shortgrass settings especially in patches with some bare ground. Also occurs in grain sorghum fields and Conservation Reserve Program lands
Common Nighthawk	*Chordeiles minor*	N/A	SGCN	Common Nighthawks nest in both rural and urban habitats including coastal sand dunes and beaches, logged forest, recently burned forest, woodland clearings, prairies, plains, sagebrush, grasslands, open forests, and rock outcrops. They also nest on flat gravel rooftops, though less often as gravel roofs are being replaced by smooth, rubberized roofs that provide an unsuitable surface.
Franklin's Gull	*Leucophaeus pipixcan*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. This species is only a spring and fall migrant throughout Texas. It does not breed in or near Texas. Winter records are unusual consisting of one or a few individuals at a given site (especially along the Gulf coastline). During migration, these gulls fly during daylight hours but often come down to wetlands, lake shore, or islands to roost for the night.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Golden-Cheeked Warbler	*Setophaga chrysoparia*	E	E, SGCN	Ashe juniper in mixed stands with various oaks (Quercus spp.). Edges of cedar brakes. Dependent on Ashe juniper (also known as cedar) for long fine bark strips, only available from mature trees, used in nest construction; nests are placed in various trees other than Ashe juniper; only a few mature junipers or nearby cedar brakes can provide the necessary nest material; forage for insects in broad-leaved trees and shrubs; nesting late March-early summer.
Interior Least Tern	*Sternula antillarum athalassos*	DL	E	Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony
Lark Bunting	*Calamospiza melanocorys*	N/A	SGCN	Overall, it's a generalist in most short grassland settings including ones with some brushy component plus certain agricultural lands that include grain sorghum. Short grasses include sideoats and blue gramas, sand dropseed, prairie junegrass (Koeleria), buffalograss also with patches of bluestem and other mid-grass species. This bunting will frequent smaller patches of grasses or disturbed patches of grasses including rural yards. It also uses weedy fields surrounding playas. This species avoids urban areas and cotton fields.
Least Tern	*Sternula antillarum*	DL	SGCN	Sand beaches, flats, bays, inlets, lagoons, islands, river sandbars and flat gravel rooftops in urban areas.
Loggerhead Shrike	*Lanius ludovicianus*	N/A	SGCN	Loggerhead Shrikes inhabit open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead Shrikes are often seen along mowed roadsides with access to fence lines and utility poles.
Mottled Duck	*Anas fulvigula*	N/A	SGCN	Estuaries, ponds, lakes, secondary bays.
Mountain Plover	*Charadrius montanus*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Northern Bobwhite	*Colinus virginianus*	N/A	SGCN	Inhabits a wide variety of vegetation types, particularly early successional stages. Occurs in croplands, grasslands, pastures, fallow fields, grassbrush rangelands, open pinelands, open mixed pine-hardwood forests, and habitat mosaics (Brennan 1999).
Piping Plover	*Charadrius melodus*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.
Pyrrhuloxia	*Cardinalis sinuatus*	N/A	SGCN	Pyrrhuloxias live in upland deserts, mesquite savannas, riparian (streamside) woodlands, desert scrublands, farm fields with hedgerows, and residential areas with nearby mesquite. When not breeding, some Pyrrhuloxias wander into urban habitats, mesquite-hackberry habitats, and riparian habitats with Arizona sycamore and cottonwood.
Sanderling	*Calidris alba*	N/A	SGCN	Nonbreeding: primarily sandy beaches, less frequently on mud flats and shores of lakes or rivers (AOU 1983) also on exposed reefs (Pratt et al. 1987). Sleeps/loafs on upper beach or on salt pond dike.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Snowy Plover	*Charadrius nivosus*	N/A	SGCN	Algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. An optimal site characteristic would be large in size. The size of populations appear to be roughly proportional to the total area of suitable habitat used. Formerly an uncommon breeder in the Panhandle; potential migrant; winter along coast.
Sprague's Pipit	*Anthus spragueii*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat during migration and in winter consists of pastures and weedy fields (AOU 1983), including grasslands with dense herbaceous vegetation or grassy agricultural fields.
Western Burrowing Owl	*Athene cunicularia hypugaea*	N/A	N/A	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows
White-Faced Ibis	*Plegadis chihi*	N/A	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.
Whooping Crane	*Grus americana*	E	E, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio
Willet	*Tringa semipalmata*	N/A	SGCN	Marshes, tidal mudflats, beaches, lake margins, mangroves, tidal channels, river mouths, coastal lagoons, sandy or rocky shores, and, less frequently, open grassland (AOU 1983, Stiles and Skutch 1989).
Wilson's Warbler	*Cardellina pusilla*	N/A	SGCN	Wilson's warblers key in on forests and scrubby areas along streams to fatten up during migration. During the nonbreeding season they use many types of habitats from lowland thickets near streams to high-elevation cloud forests in Mexico and Central America.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Wood Stork	*Mycteria americana*	N/A	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.
Yellow-Billed Cuckoo	*Coccyzus americanus*	T	SGCN	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Crustaceans				
Ezell's Cave Amphipod	*Stygobromus flagellatus*	N/A	SGCN	Known only from artesian wells
No Accepted Common Name	*Palaemonetes texanus*	N/A	SGCN	Collected in Comal and Hays counties (Middel Guadalupe and San Marcos watersheds).
No Accepted Common Name	*Artesia subterranea*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Mexiweckelia hardeni*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Texanobathynella bowmani*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Nitocrellopsis texana*	N/A	SGCN	Habitat description is not available at this time.
Peck's Cave Amphipod	*Stygobromus pecki*	E	E, SGCN	Small, aquatic crustacean; lives underground in the Edwards Aquifer; collected at Comal Springs and Hueco Springs
Fish				

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
American Eel	*Anguilla rostrata*	N/A	SGCN	Originally found in all river systems from the Red River to the Rio Grande. Aquatic habtiats include large rivers, streams, tributaries, coastal watersheds, estuaries, bays, and oceans. Spawns in Sargasso Sea, larva move to coastal waters, metamorphose, and begin upstream movements. Females tend to move further upstream than males (who are often found in brackish estuaries). American Eel are habitat generalists and may be found in a broad range of habitat conditions including slow- and fast-flowing waters over many substrate types. Extirpation in upstream drainages attributed to reservoirs that impede upstream migration.
Burrhead Chub	*Macrhybopsis marconis*	N/A	SGCN	Occurs in the San Antonio and Guadalupe rivers; remnant populations may exist in the Edwards Plateau portion of the Colorado River. Occupies flowing water over coarse sand and fine gravel substrates in medium to large streams; found to be most abundant in riffles over large gravel and cobble.
Fountain Darter	*Etheostoma fonticola*	E	E, SGCN	Known only from the spring-fed San Marcos and Comal rivers in dense beds of aquatic plants growing close to bottom; may be found in slow- and fast-flowing habitats.
Guadalupe Bass	*Micropterus treculii*	N/A	SGCN	Endemic to the streams of the northern and eastern Edwards Plateau including portions of the Brazos, Colorado, Guadalupe, and San Antonio basins; species also found outside of the Edwards Plateau streams in decreased abundance, primarily in the lower Colorado River; two introduced populations have been established in the Nueces River system. A pure population was re-established in a portion of the Blanco River in 2014. Species prefers lentic environments but commonly taken in flowing water; numerous smaller fish occur in rapids, many times near eddies; large individuals found mainly in riffle tail races; usually found in spring-fed streams having clear water and relatively consistent temperatures.
Guadalupe Darter	*Percina apristis*	N/A	T, SGCN	Endemic to the Guadalupe River Basin; Found in riffles; most common under or around 25-30 cm boulders in the main current; seems to prefer moderately turbid water.
Guadalupe Roundnose Minnow	*Dionda flavipinnis*	N/A	SGCN	Endemic to Guadalupe and southern Colorado drainages; primarily restricted to clear spring-fed waters that have slight temperature variations.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Nueces Roundnose Minnow	*Dionda texensis*	N/A	SGCN	Endemic to the headwaters of the Nueces River; habitat unknown but likely similar to Devils River Minnow (Often found in association with spring outflows over gravel-cobble substrate and adjacent to aquatic macrophytes; may inhabit a microhabitat associated with the interface between spring runs and the river).
Texas Shiner	*Notropis amabilis*	N/A	SGCN	In Texas, it is found primarily in Edwards Plateau streams from the San Gabriel River in the east to the Pecos River in the west. Typical habitat includes rocky or sandy runs, as well as pools.
Insects				
American Bumblebee	*Bombus pensylvanicus*	N/A	SGCN	Habitat description is not available at this time.
Comal Springs Diving Beetle	*Comaldessus stygius*	N/A	SGCN	Known only from the outflows at Comal Springs; aquatic; diving beetles generally inhabit the water column
Comal Springs Dryopid Beetle	*Stygoparnus comalensis*	E	E, SGCN	Dryopids usually cling to objects in a stream; dryopids are sometimes found crawling on stream bottoms or along shores; adults may leave the stream and fly about, especially at night; most dryopid larvae are vermiform and live in soil or decaying wood
Comal Springs Riffle Beetle	*Heterelmis comalensis*	E	E, SGCN	Comal and San Marcos Springs
Edwards Aquifer Diving Beetle	*Haideoporus texanus*	N/A	SGCN	Habitat poorly known; known from an artesian well in Hays County
No Accepted Common Name	*Rhadine insolita*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Rhadine speca*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Pseudocentroptiloides morihari*	N/A	SGCN	Mayflies distinguished by aquatic larval stage; adult stage generally found in shoreline vegetation
No Accepted Common Name	*Ochrotrichia capitana*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Neotrichia juani*	N/A	SGCN	Specimens were collected from perennial and ephemeral rivers, and small spring-fed streams (Harris and Tiemann 1993).
No Accepted Common Name	*Xiphocentron messapus*	N/A	SGCN	Habitat description is not available at this time.
Purse Casemaker Caddisfly	*Hydroptila melia*	N/A	SGCN	Habitat description is not available at this time.
Mammals				
Big Free-Tailed Bat	*Nyctinomops macrotis*	N/A	SGCN	Habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Black-Tailed Prairie Dog	*Cynomys ludovicianus*	N/A	SGCN	Dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups
Cave Myotis Bat	*Myotis velifer*	N/A	SGCN	Colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore.
Eastern Spotted Skunk	*Spilogale putorius*	N/A	SGCN	Generalist; open fields prairies, croplands, fence rows, farmyards, forest edges & woodlands. Prefer wooded, brushy areas & tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.
Ghost-Faced Bat	*Mormoops megalophylla*	N/A	SGCN	Winter roosts are in large limestone caves. Buildings and rock crevasses provide roosts, as well.
Hoary Bat	*Lasiurus cinereus*	N/A	SGCN	Hoary bats are highly migratory, high-flying bats that have been noted throughout the state. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage roosting species) but are found in unforested parts of the state and lowland deserts. Tend to be captured over water and large, open flyways.
Plains Spotted Skunk	*Spilogale interrupta*	N/A	SGCN	Generalist; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie
Tricolored Bat	*Perimyotis subflavus*	PE	SGCN	Forest, woodland and riparian areas are important. Caves are very important to this species.
Wwhite-Nosed Coati	*Nasua narica*	N/A	T, SGCN	Woodlands, riparian corridors and canyons.Most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees; omnivorous; may be susceptible to hunting, trapping, and pet trade.
Mollusks				
Edwards Plateau Liptooth	*Millerelix gracilis*	N/A	SGCN	Habitat description is not available at this time.
False Spike	*Fusconaia mitchelli*	E	E, SGCN	Occurs in small streams to medium-size rivers in habitats such as riffles and runs with flowing water. Is often found in stable substrates of sand, gravel, and cobble (Howells 2010; Randklev et al. 2012; Sowards et al. 2013; Tsakiris and Randklev 2016). [Mussels of Texas 2019]
Glossy Wolfsnail	*Euglandina texasiana*	N/A	SGCN	Habitat description is not available at this time.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Guadalupe Fatmucket	*Lampsilis bergmanni*	E	T, SGCN	Reported to occur in slow to moderate current in sand, mud, and gravel substrates among large cobble, boulders, bedrock ledges, horizontal cracks in bedrock slabs, and macrophyte beds. Has also been observed inhabiting the roots of cypress trees and vegetation along steep banks. Reported in lakes at Kerrville, Texas, which suggests it may occasionally persist in some impoundment conditions (Robert G. Howells, personal communication). (Mussels of Texas, 2020)
Guadalupe Orb	*Cyclonaias necki*	E	E, SGCN	Species' distribution is limited to the Guadalupe River basin. Occurs in both mainstem and tributary habitats. Often found in substrates composed of sand, gravel, and cobble, including mud-silt or gravel-filled cracks in bedrock slabs. Considered intolerant of reservoirs, but are known to occur in them (Howells 2010m; Randklev et al. 2017b). [Mussels of Texas 2020]
Horseshoe Liptooth	*Daedalochila hippocrepis*	N/A	SGCN	Terrestrial snail known only from the steep, wooded hillsides of Landa Park in New Braunfels
Mapleleaf	*Quadrula quadrula*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs. In riverine habitats, it may be found in main-channel habitats such as riffles or runs in sand, gravel, and cobble substrates with moderate to swift currents. May also be found in nearshore habitats such as banks and backwaters to include pools in sand or mud substrates with little to no flow. (Williams et al. 2008; Howells 2016; Haag and Cicerello 2016).
No Accepted Common Name	*Phreatodrobia conica*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Phreatodrobia micra*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Phreatodrobia plana*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Phreatodrobia rotunda*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Stygopyrgus bartonensis*	N/A	SGCN	Habitat description is not available at this time.
Pimpleback	*Cyclonaias pustulosa*	N/A	SGCN	Occurs in small streams to large rivers in habitats including riffles and runs with flowing water, also found in nearshore habitats such as banks and backwaters or pools. Can occur in reservoirs but varies based by population. Is often found in substrates comprising of sand, gravel, and cobble but also mud and silt (Howells et al. 1996; Williams et al. 2008; Watters et al. 2009).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Pistolgrip	*Tritogonia verrucosa*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs, but considered less tolerant of impoundment (Haag and Cicerello 2016). Can occur in a variety of habitat types but most often found in main channel habitats such as riffles and runs with moderate current and sand, gravel, or cobble substrates (Howells et al. 1996; Williams et al. 2008).
Tampico Pearlymussel	*Cyrtonaias tampicoensis*	N/A	SGCN	Reported from streams to rivers, reservoirs, and canals. In riverine habitats often found in nearshore habitats such as banks and backwaters, to include pools and oxbows, in mud or sand or among cobble and boulders with still to moderate currents (Howells et al. 1996).
Reptiles				
American Alligator	*Alligator mississippiensis*	SAT	N/A	Aquatic: Coastal marshes; inland natural rivers, swamps and marshes; manmade impoundments.
Cagle's Map Turtle	*Graptemys caglei*	N/A	T, SGCN	Aquatic: shallow water with swift to moderate flow and gravel or cobble bottom, connected by deeper pools with a slower flow rate and a silt or mud bottom; gravel bar riffles and transition areas between riffles and pools especially important in providing insect prey items; nests on gently sloping sand banks within ca. 30 feet of waters edge.
Eastern Box Turtle	*Terrapene carolina*	N/A	SGCN	Terrestrial: Eastern box turtles inhabit forests, fields, forest-brush, and forest-field ecotones. In some areas they move seasonally from fields in spring to forest in summer. They commonly enters pools of shallow water in summer. For shelter, they burrow into loose soil, debris, mud, old stump holes, or under leaf litter. They can successfully hibernate in sites that may experience subfreezing temperatures.
Keeled Earless Lizard	*Holbrookia propinqua*	N/A	SGCN	Terrestrial: Habitats include coastal dunes, barrier islands, and other sandy areas (Axtell 1983). Although it occurs well inland, this species is most abundant on coastal dunes, were it seeks shelter in the burrows of small mammals or crabs (Bartlett and Bartlett 1999).
Plateau Spot-Tailed Earless Lizard	*Holbrookia lacerata*	N/A	SGCN	Terrestrial: Habitats include moderately open prairie-brushland regions, particularly fairly flat areas free of vegetation or other obstructions (e.g., open meadows, old and new fields, graded roadways, cleared and disturbed areas, prairie savanna, and active agriculture including row crops); also, oak-juniper woodlands and mesquite-prickly pear associations (Axtell 1968, Bartlett and Bartlett 1999).
Slender Glass Lizard	*Ophisaurus attenuatus*	N/A	SGCN	Terrestrial: Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Tamaulipan Spot-Tailed Earless Lizard	*Holbrookia subcaudalis*	N/A	SGCN	Terrestrial: Habitats include moderately open prairie-brushland regions, particularly fairly flat areas free of vegetation or other obstructions (e.g., open meadows, old and new fields, graded roadways, cleared and disturbed areas, prairie savanna, and active agriculture including row crops); also, oak-juniper woodlands and mesquite-prickly pear associations (Axtell 1968, Bartlett and Bartlett 1999).
Texas Horned Lizard	*Phrynosoma cornutum*	N/A	T, SGCN	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.
Texas Tortoise	*Gopherus berlandieri*	N/A	T, SGCN	Terrestrial: Open scrub woods, arid brush, lomas, grass-cactus association; often in areas with sandy well-drained soils. When inactive occupies shallow depressions dug at base of bush or cactus; sometimes in underground burrow or under object. Eggs are laid in nests dug in soil near or under bushes.
Western Box Turtle	*Terrapene ornata*	N/A	SGCN	Terrestrial: Ornate or western box turtles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species.
Plants				
Bigflower Cornsalad	*Valerianella stenocarpa*	N/A	SGCN	Usually along creekbeds or in vernally moist grassy open areas (Carr 2015).
Bracted Twistflower	*Streptanthus bracteatus*	T	SGCN	Shallow, well-drained gravelly clays and clay loams over limestone in oak juniper woodlands and associated openings, on steep to moderate slopes and in canyon bottoms; several known soils include Tarrant, Brackett, or Speck over Edwards, Glen Rose, and Walnut geologic formations; populations fluctuate widely from year to year, depending on winter rainfall; flowering mid April-late May, fruit matures and foliage withers by early summer
Buckley Tridens	*Tridens buckleyanus*	N/A	SGCN	Occurs in juniper-oak woodlands on rocky limestone slopes; Perennial; Flowering/Fruiting April-Nov
Canyon Mock-Orange	*Philadelphus texensis var. ernestii*	N/A	SGCN	Usually found growing from honeycomb pits on outcrops of Cretaceous limestone exposed as rimrock along mesic canyons, usually in the shade of mixed evergreen-deciduous canyon woodland; flowering April-June, fruit dehiscing September-October

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Comal Snakewood	*Colubrina stricta*	N/A	SGCN	In El Paso County, found in a patch of thorny shrubs in colluvial deposits and sandy soils at the base of an igneous rock outcrop; the historic Comal County record does not describe the habitat; in Mexico ,found in shrublands on calcareous, gravelly, clay soils with woody associates; flowering late spring or early summer
Darkstem Noseburn	*Tragia nigricans*	N/A	SGCN	Occurs in oak-juniper woodlands on mesic limestone slopes and canyon bottoms; Perennial; Flowering/Fruiting April-Oct
Glass Mountains Coral-Root	*Hexalectris nitida*	N/A	SGCN	Apparently rare in mixed woodlands in canyons in the mountains of the Brewster County, but encountered with regularity, albeit in small numbers, under Juniperus ashei in woodlands over limestone on the Edwards Plateau, Callahan Divide and Lampasas Cutplain; Perennial; Flowering June-Sept; Fruiting July-Sept
Gravelbar Brickellbush	*Brickellia dentata*	N/A	SGCN	Essentially restricted to frequently-scoured gravelly alluvial beds in creek and river bottoms; Perennial; Flowering June-Nov; Fruiting June-Oct
Greenman's Bluet	*Houstonia parviflora*	N/A	SGCN	Grass pastures. Feb- Apr. (Correll and Johnston 1970).
Heller's Marbleseed	*Onosmodium helleri*	N/A	SGCN	Occurs in loamy calcareous soils in oak-juniper woodlands on rocky limestone slopes, often in more mesic portions of canyons; Perennial; Flowering March-May
Hill Country Wild-Mercury	*Argythamnia aphoroides*	N/A	SGCN	Mostly in bluestem-grama grasslands associated with plateau live oak woodlands on shallow to moderately deep clays and clay loams over limestone on rolling uplands, also in partial shade of oak-juniper woodlands in gravelly soils on rocky limestone slopes; Perennial; Flowering April-May with fruit persisting until midsummer
Lindheimer's Tickseed	*Desmodium lindheimeri*	N/A	SGCN	Known in Texas only from three locations; US habitat is uncertain; has been found along rocky bed of dry ravine and among brush on the banks, steep ravine banks, dry caliche flat roadsides, in shallow soil on outcrops; occurred in deep to partial shade and openings in live oak-juniper woodland associations on the Edwards Limestone; flowering August-October or November.
Narrowleaf Brickellbush	*Brickellia eupatorioides var. gracillima*	N/A	SGCN	Moist to dry gravelly alluvial soils along riverbanks but also on limestone slopes; Perennial; Flowering/Fruiting April-Nov
Net-Leaf Bundleflower	*Desmanthus reticulatus*	N/A	SGCN	Mostly on clay prairies of the coastal plain of central and south Texas; Perennial; Flowering April-July; Fruiting April-Oct
Osage Plains False Foxglove	*Agalinis densiflora*	N/A	SGCN	Most records are from grasslands on shallow, gravelly, well drained, calcareous soils; Prairies, dry limestone soils; Annual; Flowering Aug-Oct

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Plateau Loosestrife	*Lythrum ovalifolium*	N/A	SGCN	Banks and gravelly beds of perennial (or strong intermittent) streams on the Edwards Plateau, Llano Uplift and Lampasas Cutplain; Perennial; Flowering/Fruiting April-Nov
Plateau Milkvine	*Matelea edwardsensis*	N/A	SGCN	Occurs in various types of juniper-oak and oak-juniper woodlands; Perennial; Flowering March-Oct; Fruiting May-June
Scarlet Leather-Flower	*Clematis texensis*	N/A	SGCN	Usually in oak-juniper woodlands in mesic rocky limestone canyons or along perennial streams; Perennial; Flowering March-July; Fruiting May-July
Sycamore-Leaf Snowbell	*Styrax platanifolius ssp. Platanifolius*	N/A	SGCN	Rare throughout range, usually in oak-juniper woodlands on steep rocky banks and ledges along intermittent or perennial streams, rarely far from some reliable source of moisture; Perennial; Flowering April-May; Fruiting May-Aug
Texas Almond	*Prunus minutiflora*	N/A	SGCN	Wide-ranging but scarce, in a variety of grassland and shrubland situations, mostly on calcareous soils underlain by limestone but occasionally in sandier neutral soils underlain by granite; Perennial; Flowering Feb-May and Oct; Fruiting Feb-Sept
Texas Amorpha	*Amorpha roemeriana*	N/A	SGCN	Juniper-oak woodlands or shrublands on rocky limestone slopes, sometimes on dry shelves above creeks; Perennial; Flowering May-June; Fruiting June-Oct
Texas Barberry	*Berberis swaseyi*	N/A	SGCN	Shallow calcareous stony clay of upland grasslands/shrublands over limestone as well as in loamier soils in openly wooded canyons and on creek terraces; Perennial; Flowering/Fruiting March-June
Texas Claret-Cup Cactus	*Echinocereus coccineus var. paucispinus*	N/A	SGCN	Mountains, hills, and mesas, igneous and limestone, oak-juniper-pinyon woodland or juniper woodland on limestone mesas, mostly rocky habitats but also in alluvial basins, grasslands, or among mesquite or other shrubs. Flowering March - April (Powell and Weedin 2004).
Texas Fescue	*Festuca versuta*	N/A	SGCN	Occurs in mesic woodlands on limestone-derived soils on stream terraces and canyon slopes; Perennial; Flowering/Fruiting April-June
Texas Mock-Orange	*Philadelphus texensis var. texensis*	N/A	SGCN	Limestone slopes and ravines, slopes in oak-juniper woodlands; variety texensis has a more westward range than var. ernestii; it is known from Bandera, Bexar, Edwards, Kendall, Medina, Real, and Uvalde counties in central Texas; Flowering Apr–May; fruiting Jun–Oct (Freeman 2017)
Texas Seymeria	*Seymeria texana*	N/A	SGCN	Found primarily in grassy openings in juniper-oak woodlands on dry rocky slopes but sometimes on rock outcrops in shaded canyons; Annual; Flowering May-Nov; Fruiting July-Nov
Tree Dodder	*Cuscuta exaltata*	N/A	SGCN	Parasitic on various Quercus, Juglans, Rhus, Vitis, Ulmus, and Diospyros species as well as Acacia berlandieri and other woody plants; Annual; Flowering May-Oct; Fruiting July-Oct

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Turnip-Root Scurfpea	*Pediomelum cyphocalyx*	N/A	SGCN	Grasslands and openings in juniper-oak woodlands on limestone substrates on the Edwards Plateau and in north-central Texas (Carr 2015).
Warnock's Coral-Root	*Hexalectris warnockii*	N/A	SGCN	In leaf litter and humus in oak-juniper woodlands on shaded slopes and intermittent, rocky creekbeds in canyons; in the Trans Pecos in oak-pinyon-juniper woodlands in higher mesic canyons (to 2000 m [6550 ft]), primarily on igneous substrates; in Terrell County under Quercus fusiformis mottes on terrraces of spring-fed perennial streams, draining an otherwise rather xeric limestone landscape; on the Callahan Divide (Taylor County), the White Rock Escarpment (Dallas County), and the Edwards Plateau in oak-juniper woodlands on limestone slopes; in Gillespie County on igneous substrates of the Llano Uplift; flowering June-September; individual plants do not usually bloom in successive years
Wright's Milkvetch	*Astragalus wrightii*	N/A	SGCN	On sandy or gravelly soils; Flowering/fruiting: April and May

Table 5D-6 Gonzales County - Threatened and Endangered Species and Species of Greatest Conservation Need Summary

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Amphibians				
Strecker's Chorus Frog	*Pseudacris streckeri*	N/A	SGCN	Terrestrial and aquatic: Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates.
Woodhouse's Toad	*Anaxyrus woodhousii*	N/A	SGCN	Terrestrial and aquatic: A wide variety of terrestrial habitats are used by this species, including forests, grasslands, and barrier island sand dunes. Aquatic habitats are equally varied.
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	DL	N/A	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds.
Bank Swallow	*Riparia riparia*	N/A	SGCN	Bank Swallows live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies of 10 to 2,000 nests. Though in the past Bank Swallows were most commonly found around natural bluffs or eroding streamside banks, they now often nest in human-made sites, such as sand and gravel quarries or road cuts. They forage in open areas and avoid places with tree cover.
Black Rail	*Laterallus jamaicensis*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia.
Brewer's Blackbird	*Euphagus cyanocephalus*	N/A	SGCN	Shrubby and bushy areas (especially near water), riparian woodland, aspen parklands, cultivated lands, marshes, and around human habitation; in migration and winter also in pastures and fields (AOU 1983).
Cactus Wren	*Campylorhynchus brunneicapillus*	N/A	SGCN	Desert (especially with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and in trees in towns in arid regions (Tropical to Subtropical zones) (AOU 1983). Nests in OPUNTIA cactus, or in twiggy, thorny, trees and shrubs, sometimes in buildings. Nest may be relined and used as a winter roost.
Chestnut-Collared Longspur	*Calcarius ornatus*	N/A	SGCN	Occurs in open shortgrass settings especially in patches with some bare ground. Also occurs in grain sorghum fields and Conservation Reserve Program lands.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Common Nighthawk	*Chordeiles minor*	N/A	SGCN	Common Nighthawks nest in both rural and urban habitats including coastal sand dunes and beaches, logged forest, recently burned forest, woodland clearings, prairies, plains, sagebrush, grasslands, open forests, and rock outcrops. They also nest on flat gravel rooftops, though less often as gravel roofs are being replaced by smooth, rubberized roofs that provide an unsuitable surface.
Franklin's Gull	*Leucophaeus pipixcan*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. This species is only a spring and fall migrant throughout Texas. It does not breed in or near Texas. Winter records are unusual consisting of one or a few individuals at a given site (especially along the Gulf coastline). During migration, these gulls fly during daylight hours but often come down to wetlands, lake shore, or islands to roost for the night.
Interior Least Tern	*Sternula antillarum athalassos*	DL	E	Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony.
Least Tern	*Sternula antillarum*	DL	SGCN	Sand beaches, flats, bays, inlets, lagoons, islands, river sandbars and flat gravel rooftops in urban areas.
Loggerhead Shrike	*Lanius ludovicianus*	N/A	SGCN	Loggerhead Shrikes inhabit open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead Shrikes are often seen along mowed roadsides with access to fence lines and utility poles.
Mottled Duck	*Anas fulvigula*	N/A	SGCN	Estuaries, ponds, lakes, secondary bays.
Mountain Plover	*Charadrius montanus*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Northern Bobwhite	*Colinus virginianus*	N/A	SGCN	Inhabits a wide variety of vegetation types, particularly early successional stages. Occurs in croplands, grasslands, pastures, fallow fields, grassbrush rangelands, open pinelands, open mixed pine-hardwood forests, and habitat mosaics (Brennan 1999).
Piping Plover	*Charadrius melodus*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.
Pyrrhuloxia	*Cardinalis sinuatus*	N/A	SGCN	Pyrrhuloxias live in upland deserts, mesquite savannas, riparian (streamside) woodlands, desert scrublands, farm fields with hedgerows, and residential areas with nearby mesquite. When not breeding, some Pyrrhuloxias wander into urban habitats, mesquite-hackberry habitats, and riparian habitats with Arizona sycamore and cottonwood.
Rufa Red Knot	*Calidris canutus rufa*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore. Bolivar Flats in Galveston County, sandy beaches Mustang Island, few on outer coastal and barrier beaches, tidal mudflats and salt marshes.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Sanderling	*Calidris alba*	N/A	SGCN	Nonbreeding: primarily sandy beaches, less frequently on mud flats and shores of lakes or rivers (AOU 1983) also on exposed reefs (Pratt et al. 1987). Sleeps/loafs on upper beach or on salt pond dike.
Snowy Plover	*Charadrius nivosus*	N/A	SGCN	Algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. An optimal site characteristic would be large in size. The size of populations appear to be roughly proportional to the total area of suitable habitat used. Formerly an uncommon breeder in the Panhandle; potential migrant; winter along coast.
Sprague's Pipit	*Anthus spragueii*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat during migration and in winter consists of pastures and weedy fields (AOU 1983), including grasslands with dense herbaceous vegetation or grassy agricultural fields.
Swallow-Tailed Kite	*Elanoides forficatus*		T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Lowland forested regions, especially swampy areas, ranging into open woodland; marshes, along rivers, lakes, and ponds; nests high in tall tree in clearing or on forest woodland edge, usually in pine, cypress, or various deciduous trees.
Western Burrowing Owl	*Athene cunicularia hypugaea*	N/A	N/A	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows.
White-Faced Ibis	*Plegadis chihi*	N/A	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Whooping Crane	*Grus americana*	E	E, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio.
Willet	*Tringa semipalmata*	N/A	SGCN	Marshes, tidal mudflats, beaches, lake margins, mangroves, tidal channels, river mouths, coastal lagoons, sandy or rocky shores, and, less frequently, open grassland (AOU 1983, Stiles and Skutch 1989).
Wilson's Warbler	*Cardellina pusilla*	N/A	SGCN	Wilson’s warblers key in on forests and scrubby areas along streams to fatten up during migration. During the nonbreeding season they use many types of habitats from lowland thickets near streams to high-elevation cloud forests in Mexico and Central America.
Wood Stork	*Mycteria americana*	N/A	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.
Yellow Rail	*Coturnicops noveboracensis*	N/A	SGCN	Breeding: Emergent wetlands, grass or sedge marshes and wet meadows in freshwater situations. Some breeding territories in these wet meadows contain firm footing and only a few remnant pools of water (Berkey 1991). These areas can range from damp to 38 cm (15 inches) of water but the average depth used for nesting is 8 to 15 cm (3 to 6 inches) (Savaloja 1981). Non-breeding: Grain fields in winter and when migrating. Winters in both freshwater and brackish marshes, as well as in dense, deep grass. During fall migration, will use many open habitats, from rice paddies to dry hayfields.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Yellow-Billed Cuckoo	*Coccyzus americanus*	T	SGCN	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Fish				
Burrhead Chub	*Macrhybopsis marconis*	N/A	SGCN	Occurs in the San Antonio and Guadalupe rivers; remnant populations may exist in the Edwards Plateau portion of the Colorado River. Occupies flowing water over coarse sand and fine gravel substrates in medium to large streams; found to be most abundant in riffles over large gravel and cobble.
Fountain Darter	*Etheostoma fonticola*	E	E, SGCN	Known only from the spring-fed San Marcos and Comal rivers in dense beds of aquatic plants growing close to bottom; may be found in slow- and fast-flowing habitats.
Guadalupe Bass	*Micropterus treculii*	N/A	SGCN	Endemic to the streams of the northern and eastern Edwards Plateau including portions of the Brazos, Colorado, Guadalupe, and San Antonio basins; species also found outside of the Edwards Plateau streams in decreased abundance, primarily in the lower Colorado River; two introduced populations have been established in the Nueces River system. A pure population was re-established in a portion of the Blanco River in 2014. Species prefers lentic environments but commonly taken in flowing water; numerous smaller fish occur in rapids, many times near eddies; large individuals found mainly in riffle tail races; usually found in spring-fed streams having clear water and relatively consistent temperatures.
Guadalupe Darter	*Percina apristis*	N/A	T, SGCN	Endemic to the Guadalupe River Basin; Found in riffles; most common under or around 25-30 cm boulders in the main current; seems to prefer moderately turbid water.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
River Darter	*Percina shumardi*	N/A	SGCN	In Texas limited to eastern streams including Red River southward to the Neches River, and a disjunct population in the Guadalupe and San Antonio river systems east of the Balcones Escarpment. Confined to large rivers and lower parts of major tributaries; usually found in deep chutes and riffles where current is swift and bottom composed of coarse gravel or rock.
Insects				
American Bumblebee	*Bombus pensylvanicus*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Bombus variabilis*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Melanoplus alexanderi*	N/A	SGCN	Primarily in open oak or pine/oak savannah type habitats with fine grain loamy sand to sandy loam soils.
Mammals				
Big Free-Tailed Bat	*Nyctinomops macrotis*	N/A	SGCN	Habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore.
Cave Myotis Bat	*Myotis velifer*	N/A	SGCN	Colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore.
Eeastern Spotted Skunk	*Spilogale putorius*	N/A	SGCN	Generalist; open fields prairies, croplands, fence rows, farmyards, forest edges; woodlands. Prefer wooded, brushy areas; tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.
Hoary Bat	*Lasiurus cinereus*	N/A	SGCN	Hoary bats are highly migratory, high-flying bats that have been noted throughout the state. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage roosting species) but are found in unforested parts of the state and lowland deserts. Tend to be captured over water and large, open flyways.
Mountain Lion	*Puma concolor*	N/A	SGCN	Generalist; found in a wide range of habitats statewide. Found most frequently in rugged mountains; riparian zones.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Plains Spotted Skunk	*Spilogale interrupta*	N/A	SGCN	Generalist; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie.
Seminole Bat	*Lasiurus seminolus*	N/A	SGCN	Pine-oak and long-leaf pine in east Texas. Habitats include pine, mixed pine-hardwood, and hardwood forests of uplands and bottomlands, particularly pine-dominated forests, including mature pine and pine-hardwood corridors in managed pine forest landscapes (Menzel et al. 1998, 1999, 2000; Carter et al. 2004; Marks and Marks 2006; Perry and Thill 2007; Perry et al. 2007; Hein et al. 2008; Ammerman et al. 2012).
Tricolored Bat	*Perimyotis subflavus*	PE	SGCN	Forest, woodland and riparian areas are important. Caves are very important to this species.
White-Nosed Coati	*Nasua narica*	N/A	T, SGCN	Woodlands, riparian corridors and canyons.Most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees; omnivorous; may be susceptible to hunting, trapping, and pet trade.
Mollusks				
False Spike	*Fusconaia mitchelli*	E	E, SGCN	Occurs in small streams to medium-size rivers in habitats such as riffles and runs with flowing water. Is often found in stable substrates of sand, gravel, and cobble (Howells 2010; Randklev et al. 2012; Sowards et al. 2013; Tsakiris and Randklev 2016). [Mussels of Texas 2019].
Guadalupe Fatmucket	*Lampsilis bergmanni*	E	T, SGCN	Reported to occur in slow to moderate current in sand, mud, and gravel substrates among large cobble, boulders, bedrock ledges, horizontal cracks in bedrock slabs, and macrophyte beds. Has also been observed inhabiting the roots of cypress trees and vegetation along steep banks. Reported in lakes at Kerrville, Texas, which suggests it may occasionally persist in some impoundment conditions (Robert G. Howells, personal communication). (Mussels of Texas 2020).
Guadalupe Orb	*Cyclonaias necki*	E	E, SGCN	Species' distribution is limited to the Guadalupe River basin. Occurs in both mainstem and tributary habitats. Often found in substrates composed of sand, gravel, and cobble, including mud-silt or gravel-filled cracks in bedrock slabs. Considered intolerant of reservoirs, but are known to occur in them (Howells 2010m; Randklev et al. 2017b). [Mussels of Texas 2020].
Lilliput	*Toxolasma parvum*	N/A	SGCN	Reported from small streams, where it may penetrate into the headwaters, to large rivers, oxbows, sloughs, lakes, ponds, canals, borrow pits, and reservoirs. Primarily occurs in still to slow currents in mud and sand substrates (Coker et al. 1921; Read 1954; Neck and Metcalf 1988; Williams et al. 2008; Watters et al. 2009).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Louisiana Fatmucket	*Lampsilis hydiana*	N/A	SGCN	Reported from streams to rivers, may penetrate into headwaters, oxbows, lakes, canals, and reservoirs. Reported to occur in still to moderate currents in sand, mud, and gravel substrates. In riverine systems it is found primarily in nearshore habitats such as banks, backwaters and oxbows (Howells et al. 1996; Randklev et al. 2013a; Randklev et al. 2014a; Tsakiris and Randklev 2016). It adapts readily to reservoirs and can cope with flow modification stemming from river impoundment (Randklev et al. 2016).
Mapleleaf	*Quadrula quadrula*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs. In riverine habitats, it may be found in main-channel habitats such as riffles or runs in sand, gravel, and cobble substrates with moderate to swift currents. May also be found in nearshore habitats such as banks and backwaters to include pools in sand or mud substrates with little to no flow. (Williams et al. 2008; Howells 2016; Haag and Cicerello 2016).
Pimpleback	*Cyclonaias pustulosa*	N/A	SGCN	Occurs in small streams to large rivers in habitats including riffles and runs with flowing water, also found in nearshore habitats such as banks and backwaters or pools. Can occur in reservoirs but varies based by population. Is often found in substrates comprising of sand, gravel, and cobble but also mud and silt (Howells et al. 1996; Williams et al. 2008; Watters et al. 2009).
Pistolgrip	*Tritogonia verrucosa*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs, but considered less tolerant of impoundment (Haag and Cicerello 2016). Can occur in a variety of habitat types but most often found in main channel habitats such as riffles and runs with moderate current and sand, gravel, or cobble substrates (Howells et al. 1996; Williams et al. 2008).
Pondmussel	*Sagittunio subrostratus*	N/A	SGCN	Reported from streams to rivers, where it can invade headwater systems but is rarely in large river systems. Can also inhabit natural and artificial ponds, lakes, reservoirs, and canals. In riverine habitat typically occurs in backwaters, pools, sloughs, and oxbows in little to no current in substrates of mud or sand (Parmalee and Bogan 1998; Williams et al. 2008; Watters et al. 2009; Haag and Cicerello 2016; Watters 2018).
Tampico Pearlymussel	*Cyrtonaias tampicoensis*	N/A	SGCN	Reported from streams to rivers, reservoirs, and canals. In riverine habitats often found in nearshore habitats such as banks and backwaters, to include pools and oxbows, in mud or sand or among cobble and boulders with still to moderate currents (Howells et al. 1996).
Reptiles				

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
American Alligator	*Alligator mississippiensis*	SAT	N/A	Aquatic: Coastal marshes; inland natural rivers, swamps and marshes; manmade impoundments.
Cagle's Map Turtle	*Graptemys caglei*	N/A	T, SGCN	Aquatic: shallow water with swift to moderate flow and gravel or cobble bottom, connected by deeper pools with a slower flow rate and a silt or mud bottom; gravel bar riffles and transition areas between riffles and pools especially important in providing insect prey items; nests on gently sloping sand banks within ca. 30 feet of waters edge.
Eastern Box Turtle	*Terrapene carolina*	N/A	SGCN	Terrestrial: Eastern box turtles inhabit forests, fields, forest-brush, and forest-field ecotones. In some areas they move seasonally from fields in spring to forest in summer. They commonly enters pools of shallow water in summer. For shelter, they burrow into loose soil, debris, mud, old stump holes, or under leaf litter. They can successfully hibernate in sites that may experience subfreezing temperatures.
Keeled Earless Lizard	*Holbrookia propinqua*	N/A	SGCN	Terrestrial: Habitats include coastal dunes, barrier islands, and other sandy areas (Axtell 1983). Although it occurs well inland, this species is most abundant on coastal dunes, were it seeks shelter in the burrows of small mammals or crabs (Bartlett and Bartlett 1999).
Prairie Skink	*Plestiodon septentrionalis*	N/A	SGCN	The prairie skink can occur in any native grassland habitat across the Rolling Plains, Blackland Prairie, Post Oak Savanna and Pineywoods ecoregions.
Slender Glass Lizard	*Ophisaurus attenuatus*	N/A	SGCN	Terrestrial: Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil.
Texas Horned Lizard	*Phrynosoma cornutum*	N/A	T, SGCN	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.
Western Box Turtle	*Terrapene ornata*	N/A	SGCN	Terrestrial: Ornate or western box turtles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species.
Plants				
Awnless Leastdaisy	*Chaetopappa imberbis*	N/A	SGCN	In woodlands on loams of Carrizo sand (TEX-LL specimens Carr 23875, 12507). Flowering and fruiting during Mar - May.
Bristle Nailwort	*Paronychia setacea*	N/A	SGCN	Flowering vascular plant endemic to eastern southcentral Texas, occurring in sandy soils.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Crestless Onion	*Allium canadense var. ecristatum*	N/A	SGCN	Occurs on poorly drained sites on sandy substrates within coastal prairies of the Coastal Bend area (Carr 2015).
Drummond's Rushpea	*Hoffmannseggia drummondii*	N/A	SGCN	Open areas on sandy clay; perennial.
Elmendorf's Onion	*Allium elmendorfii*	N/A	SGCN	Grassland openings in oak woodlands on deep, loose, well-drained sands; in Coastal Bend, on Pleistocene barrier island ridges and Holocene Sand Sheet that support live oak woodlands; to the north it occurs in post oak-black hickory-live oak woodlands over Queen City and similar Eocene formations; one anomalous specimen found on Llano Uplift in wet pockets of granitic loam; Perennial; Flowering March-April, May.
Green Hawthorn	*Crataegus viridis var. glabriuscula*	N/A	SGCN	In mesic soils of woods or on edge of woods, treeline/fenceline, or thicket. Above/near creeks and draws, in river bottoms. Flowering Mar-Apr; fruiting May-Oct.
Heartleaf Evening-Primrose	*Oenothera cordata*	N/A	SGCN	Occurs in post oak woodlands on sandy soils on the coastal plain (Carr 2015).
Hill Country Wild-Mercury	*Argythamnia aphoroides*	N/A	SGCN	Mostly in bluestem-grama grasslands associated with plateau live oak woodlands on shallow to moderately deep clays and clay loams over limestone on rolling uplands, also in partial shade of oak-juniper woodlands in gravelly soils on rocky limestone slopes; perennial; flowering April-May with fruit persisting until midsummer.
Low Spurge	*Euphorbia peplidion*	N/A	SGCN	Occurs in a variety of vernally-moist situations in a number of natural regions; annual; flowering Feb-April; fruiting March-April .
Net-Leaf Bundleflower	*Desmanthus reticulatus*	N/A	SGCN	Mostly on clay prairies of the coastal plain of central and south Texas; perennial; flowering April-July; fruiting April-Oct.
Sandhill Woolywhite	*Hymenopappus carrizoanus*	N/A	SGCN	Disturbed or open areas in grasslands and post oak woodlands on deep sands derived from the Carrizo Sand and similar Eocene formations; flowering April-June.
Sayersville Blue Eyes	*Nemophila sayersensis*	N/A	SGCN	Open fields and woodland margins on deep loose nutrient-poor sand (Simpson, Helfgott and Neff 2001). Mar-May.
Texas Beebalm	*Monarda viridissima*	N/A	SGCN	Endemic perennial herb of the Carrizo Sands; deep, well-drained sandy soils in openings of post oak woodlands; flowers white.
Texas Milk Vetch	*Astragalus reflexus*	N/A	SGCN	Grasslands, prairies, and roadsides on calcareous and clay substrates; annual; flowering Feb-June; fruiting April-June.
Texas Peachbush	*Prunus texana*	N/A	SGCN	Occurs at scattered sites in various well drained sandy situations; deep sand, plains and sand hills, grasslands, oak woods, 0-200 m elevation; perennial; flowering Feb-Mar; fruiting Apr-Jun.
Texas Pinkroot	*Spigelia texana*	N/A	SGCN	Woodlands on loamy soils; perennial; flowering March-Nov; fruiting April-Nov.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Texas Sandmint	*Rhododon ciliatus*	N/A	SGCN	Open sandy areas in the Post Oak Belt of east-central Texas; annual; flowering April-Aug; fruiting May-Aug.
Topeka Purple-Coneflower	*Echinacea atrorubens*	N/A	SGCN	Occurring mostly in tallgrass prairie of the southern Great Plains, in blackland prairies but also in a variety of other sites like limestone hillsides; perennial; flowering Apr-June.
Wright's Milkvetch	*Astragalus wrightii*	N/A	SGCN	On sandy or gravelly soils; flowering/fruiting: April and May.

Table 5D-7 Guadalupe County - Threatened and Endangered Species and Species of Greatest Conservation Need Summary

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Amphibians				
Strecker's Chorus Frog	*Pseudacris streckeri*	N/A	SGCN	Terrestrial and aquatic: Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates.
Texas Blind Salamander	*Eurycea rathbuni*	E	E, SGCN	Aquatic and subterranean; streams and caves.
Texas Salamander	*Eurycea neotenes*	N/A	T, SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
Woodhouse's Toad	*Anaxyrus woodhousii*	N/A	SGCN	Terrestrial and aquatic: A wide variety of terrestrial habitats are used by this species, including forests, grasslands, and barrier island sand dunes. Aquatic habitats are equally varied.
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	DL	N/A	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds.
Bank Swallow	*Riparia riparia*	N/A	SGCN	Bank Swallows live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies of 10 to 2,000 nests. Though in the past Bank Swallows were most commonly found around natural bluffs or eroding streamside banks, they now often nest in human-made sites, such as sand and gravel quarries or road cuts. They forage in open areas and avoid places with tree cover.
Black Rail	*Laterallus jamaicensis*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia.
Brewer's Blackbird	*Euphagus cyanocephalus*	N/A	SGCN	Shrubby and bushy areas (especially near water), riparian woodland, aspen parklands, cultivated lands, marshes, and around human habitation; in migration and winter also in pastures and fields (AOU 1983).
Cactus Wren	*Campylorhynchus brunneicapillus*	N/A	SGCN	Desert (especially with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and in trees in towns in arid regions (Tropical to Subtropical zones) (AOU 1983). Nests in OPUNTIA cactus, or in twiggy, thorny, trees and shrubs, sometimes in buildings. Nest may be relined and used as a winter roost.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Chestnut-Collared Longspur	*Calcarius ornatus*	N/A	SGCN	Occurs in open shortgrass settings especially in patches with some bare ground. Also occurs in grain sorghum fields and Conservation Reserve Program lands.
Common Nighthawk	*Chordeiles minor*	N/A	SGCN	Common Nighthawks nest in both rural and urban habitats including coastal sand dunes and beaches, logged forest, recently burned forest, woodland clearings, prairies, plains, sagebrush, grasslands, open forests, and rock outcrops. They also nest on flat gravel rooftops, though less often as gravel roofs are being replaced by smooth, rubberized roofs that provide an unsuitable surface.
Franklin's Gull	*Leucophaeus pipixcan*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. This species is only a spring and fall migrant throughout Texas. It does not breed in or near Texas. Winter records are unusual consisting of one or a few individuals at a given site (especially along the Gulf coastline). During migration, these gulls fly during daylight hours but often come down to wetlands, lake shore, or islands to roost for the night.
Interior Least Tern	*Sternula antillarum athalassos*	DL	E	Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony.
Lark Bunting	*Calamospiza melanocorys*	N/A	SGCN	Overall, it's a generalist in most short grassland settings including ones with some brushy component plus certain agricultural lands that include grain sorghum. Short grasses include sideoats and blue gramas, sand dropseed, prairie junegrass (Koeleria), buffalograss also with patches of bluestem and other mid-grass species. This bunting will frequent smaller patches of grasses or disturbed patches of grasses including rural yards. It also uses weedy fields surrounding playas. This species avoids urban areas and cotton fields.
Least Tern	*Sternula antillarum*	DL	SGCN	Sand beaches, flats, bays, inlets, lagoons, islands, river sandbars and flat gravel rooftops in urban areas.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Loggerhead Shrike	*Lanius ludovicianus*	N/A	SGCN	Loggerhead Shrikes inhabit open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead Shrikes are often seen along mowed roadsides with access to fence lines and utility poles.
Mottled Duck	*Anas fulvigula*	N/A	SGCN	Estuaries, ponds, lakes, secondary bays.
Mountain Plover	*Charadrius montanus*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous.
Northern Bobwhite	*Colinus virginianus*	N/A	SGCN	Inhabits a wide variety of vegetation types, particularly early successional stages. Occurs in croplands, grasslands, pastures, fallow fields, grassbrush rangelands, open pinelands, open mixed pine-hardwood forests, and habitat mosaics (Brennan 1999).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Piping Plover	*Charadrius melodus*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.
Pyrrhuloxia	*Cardinalis sinuatus*	N/A	SGCN	Pyrrhuloxias live in upland deserts, mesquite savannas, riparian (streamside) woodlands, desert scrublands, farm fields with hedgerows, and residential areas with nearby mesquite. When not breeding, some Pyrrhuloxias wander into urban habitats, mesquite-hackberry habitats, and riparian habitats with Arizona sycamore and cottonwood.
Sanderling	*Calidris alba*	N/A	SGCN	Nonbreeding: primarily sandy beaches, less frequently on mud flats and shores of lakes or rivers (AOU 1983) also on exposed reefs (Pratt et al. 1987). Sleeps/loafs on upper beach or on salt pond dike.
Snowy Plover	*Charadrius nivosus*	N/A	SGCN	Algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. An optimal site characteristic would be large in size. The size of populations appear to be roughly proportional to the total area of suitable habitat used. Formerly an uncommon breeder in the Panhandle; potential migrant; winter along coast.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Sprague's Pipit	*Anthus spragueii*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat during migration and in winter consists of pastures and weedy fields (AOU 1983), including grasslands with dense herbaceous vegetation or grassy agricultural fields.
Swallow-Tailed Kite	*Elanoides forficatus*		T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Lowland forested regions, especially swampy areas, ranging into open woodland; marshes, along rivers, lakes, and ponds; nests high in tall tree in clearing or on forest woodland edge, usually in pine, cypress, or various deciduous trees.
Western Burrowing Owl	*Athene cunicularia hypugaea*	N/A	N/A	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows.
White-Faced Ibis	*Plegadis chihi*	N/A	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.
Whooping Crane	*Grus americana*	E	E, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio.
Willet	*Tringa semipalmata*	N/A	SGCN	Marshes, tidal mudflats, beaches, lake margins, mangroves, tidal channels, river mouths, coastal lagoons, sandy or rocky shores, and, less frequently, open grassland (AOU 1983, Stiles and Skutch 1989).
Wilson's Warbler	*Cardellina pusilla*	N/A	SGCN	Wilson’s warblers key in on forests and scrubby areas along streams to fatten up during migration. During the nonbreeding season they use many types of habitats from lowland thickets near streams to high-elevation cloud forests in Mexico and Central America.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Wood Stork	*Mycteria americana*	N/A	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.
Yellow Rail	*Coturnicops noveboracensis*	N/A	SGCN	Breeding: Emergent wetlands, grass or sedge marshes and wet meadows in freshwater situations. Some breeding territories in these wet meadows contain firm footing and only a few remnant pools of water (Berkey 1991). These areas can range from damp to 38 cm (15 inches) of water but the average depth used for nesting is 8 to 15 cm (3 to 6 inches) (Savaloja 1981). Non-breeding: Grain fields in winter and when migrating. Winters in both freshwater and brackish marshes, as well as in dense, deep grass. During fall migration, will use many open habitats, from rice paddies to dry hayfields.
Yellow-Billed Cuckoo	*Coccyzus americanus*	T	SGCN	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Crustaceans				
Bifurcated Cave Amphipod	*Stygobromus bifurcatus*	N/A	SGCN	Habitat description is not available at this time.
Fish				

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
American Eel	*Anguilla rostrata*	N/A	SGCN	Originally found in all river systems from the Red River to the Rio Grande. Aquatic habtiats include large rivers, streams, tributaries, coastal watersheds, estuaries, bays, and oceans. Spawns in Sargasso Sea, larva move to coastal waters, metamorphose, and begin upstream movements. Females tend to move further upstream than males (who are often found in brackish estuaries). American Eel are habitat generalists and may be found in a broad range of habitat conditions including slow- and fast-flowing waters over many substrate types. Extirpation in upstream drainages attributed to reservoirs that impede upstream migration.
Fountain Darter	*Etheostoma fonticola*	E	E, SGCN	Known only from the spring-fed San Marcos and Comal rivers in dense beds of aquatic plants growing close to bottom; may be found in slow- and fast-flowing habitats.
Guadalupe Bass	*Micropterus treculii*	N/A	SGCN	Endemic to the streams of the northern and eastern Edwards Plateau including portions of the Brazos, Colorado, Guadalupe, and San Antonio basins; species also found outside of the Edwards Plateau streams in decreased abundance, primarily in the lower Colorado River; two introduced populations have been established in the Nueces River system. A pure population was re-established in a portion of the Blanco River in 2014. Species prefers lentic environments but commonly taken in flowing water; numerous smaller fish occur in rapids, many times near eddies; large individuals found mainly in riffle tail races; usually found in spring-fed streams having clear water and relatively consistent temperatures.
Guadalupe Darter	*Percina apristis*	N/A	T, SGCN	Endemic to the Guadalupe River Basin; found in riffles; most common under or around 25-30 cm boulders in the main current; seems to prefer moderately turbid water.
Guadalupe Roundnose Minnow	*Dionda flavipinnis*	N/A	SGCN	Endemic to Guadalupe and southern Colorado drainages; primarily restricted to clear spring-fed waters that have slight temperature variations.
Nueces Roundnose Minnow	*Dionda texensis*	N/A	SGCN	Endemic to the headwaters of the Nueces River; habitat unknown but likely similar to Devils River Minnow (Often found in association with spring outflows over gravel-cobble substrate and adjacent to aquatic macrophytes; may inhabit a microhabitat associated with the interface between spring runs and the river).
Plateau Shiner	*Cyprinella lepida*	N/A	T, SGCN	Edwards Plateau portion of Nueces basin, mainstem and tributaries of Nueces, Frio, and Sabinal rivers; may also be endemic to upper reaches of the Guadalupe River; clear, cool, spring-fed headwater creeks; usually over gravel and limestone substrates.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
River Darter	*Percina shumardi*	N/A	SGCN	In Texas limited to eastern streams including Red River southward to the Neches River, and a disjunct population in the Guadalupe and San Antonio river systems east of the Balcones Escarpment. Confined to large rivers and lower parts of major tributaries; usually found in deep chutes and riffles where current is swift and bottom composed of coarse gravel or rock.
Texas Shiner	*Notropis amabilis*	N/A	SGCN	In Texas, it is found primarily in Edwards Plateau streams from the San Gabriel River in the east to the Pecos River in the west. Typical habitat includes rocky or sandy runs, as well as pools.
Insects				
American Bumblebee	*Bombus pensylvanicus*	N/A	SGCN	Habitat description is not available at this time.
Comal Springs Diving Beetle	*Comaldessus stygius*	N/A	SGCN	Known only from the outflows at Comal Springs; aquatic; diving beetles generally inhabit the water column.
Comal Springs Dryopid Beetle	*Stygoparnus comalensis*	E	E, SGCN	Dryopids usually cling to objects in a stream; dryopids are sometimes found crawling on stream bottoms or along shores; adults may leave the stream and fly about, especially at night; most dryopid larvae are vermiform and live in soil or decaying wood.
Comal Springs Riffle Beetle	*Heterelmis comalensis*	E	E, SGCN	Comal and San Marcos Springs.
Edwards Aquifer Diving Beetle	*Haideoporus texanus*	N/A	SGCN	Habitat poorly known; known from an artesian well in Hays County.
No Accepted Common Name	*Rhadine insolita*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Rhadine speca*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Pseudocentroptiloides morihari*	N/A	SGCN	Mayflies distinguished by aquatic larval stage; adult stage generally found in shoreline vegetation.
No Accepted Common Name	*Ochrotrichia capitana*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Neotrichia juani*	N/A	SGCN	Specimens were collected from perennial and ephemeral rivers, and small spring-fed streams (Harris and Tiemann 1993).
No Accepted Common Name	*Xiphocentron messapus*	N/A	SGCN	Habitat description is not available at this time.
Purse Casemaker Caddisfly	*Hydroptila melia*	N/A	SGCN	Habitat description is not available at this time.
Mammals				
Big Free-Tailed Bat	*Nyctinomops macrotis*	N/A	SGCN	Habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Black-Tailed Prairie Dog	*Cynomys ludovicianus*	N/A	SGCN	Dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups.
Cave Myotis Bat	*Myotis velifer*	N/A	SGCN	Colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore.
Eastern Spotted Skunk	*Spilogale putorius*	N/A	SGCN	Generalist; open fields prairies, croplands, fence rows, farmyards, forest edges; woodlands. Prefer wooded, brushy areas; tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.
Ghost-Faced Bat	*Mormoops megalophylla*	N/A	SGCN	Winter roosts are in large limestone caves. Buildings and rock crevasses provide roosts, as well.
Hoary Bat	*Lasiurus cinereus*	N/A	SGCN	Hoary bats are highly migratory, high-flying bats that have been noted throughout the state. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage roosting species) but are found in unforested parts of the state and lowland deserts. Tend to be captured over water and large, open flyways.
Plains Spotted Skunk	*Spilogale interrupta*	N/A	SGCN	Generalist; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie.
Tricolored Bat	*Perimyotis subflavus*	PE	SGCN	Forest, woodland and riparian areas are important. Caves are very important to this species.
White-Nosed Coati	*Nasua narica*	N/A	T, SGCN	Woodlands, riparian corridors and canyons.Most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees; omnivorous; may be susceptible to hunting, trapping, and pet trade.
Mollusks				
Edwards Plateau Liptooth	*Millerelix gracilis*	N/A	SGCN	Habitat description is not available at this time.
False Spike	*Fusconaia mitchelli*	E	E, SGCN	Occurs in small streams to medium-size rivers in habitats such as riffles and runs with flowing water. Is often found in stable substrates of sand, gravel, and cobble (Howells 2010; Randklev et al. 2012; Sowards et al. 2013; Tsakiris and Randklev 2016). [Mussels of Texas 2019].
Glossy Wolfsnail	*Euglandina texasiana*	N/A	SGCN	Habitat description is not available at this time.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Guadalupe Fatmucket	*Lampsilis bergmanni*	E	T, SGCN	Reported to occur in slow to moderate current in sand, mud, and gravel substrates among large cobble, boulders, bedrock ledges, horizontal cracks in bedrock slabs, and macrophyte beds. Has also been observed inhabiting the roots of cypress trees and vegetation along steep banks. Reported in lakes at Kerrville, Texas, which suggests it may occasionally persist in some impoundment conditions (Robert G. Howells, personal communication). (Mussels of Texas, 2020).
Guadalupe Orb	*Cyclonaias necki*	E	E, SGCN	Species' distribution is limited to the Guadalupe River basin. Occurs in both mainstem and tributary habitats. Often found in substrates composed of sand, gravel, and cobble, including mud-silt or gravel-filled cracks in bedrock slabs. Considered intolerant of reservoirs, but are known to occur in them (Howells 2010m; Randklev et al. 2017b). [Mussels of Texas 2020].
Horseshoe Liptooth	*Daedalochila hippocrepis*	N/A	SGCN	Terrestrial snail known only from the steep, wooded hillsides of Landa Park in New Braunfels.
Mapleleaf	*Quadrula quadrula*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs. In riverine habitats, it may be found in main-channel habitats such as riffles or runs in sand, gravel, and cobble substrates with moderate to swift currents. May also be found in nearshore habitats such as banks and backwaters to include pools in sand or mud substrates with little to no flow. (Williams et al. 2008; Howells 2016; Haag and Cicerello 2016).
No Accepted Common Name	*Phreatodrobia conica*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Phreatodrobia micra*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Phreatodrobia plana*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Phreatodrobia rotunda*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Stygopyrgus bartonensis*	N/A	SGCN	Habitat description is not available at this time.
Pimpleback	*Cyclonaias pustulosa*	N/A	SGCN	Occurs in small streams to large rivers in habitats including riffles and runs with flowing water, also found in nearshore habitats such as banks and backwaters or pools. Can occur in reservoirs but varies based by population. Is often found in substrates comprising of sand, gravel, and cobble but also mud and silt (Howells et al. 1996; Williams et al. 2008; Watters et al. 2009).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Pistolgrip	*Tritogonia verrucosa*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs, but considered less tolerant of impoundment (Haag and Cicerello 2016). Can occur in a variety of habitat types but most often found in main channel habitats such as riffles and runs with moderate current and sand, gravel, or cobble substrates (Howells et al. 1996; Williams et al. 2008).
Tampico Pearlymussel	*Cyrtonaias tampicoensis*	N/A	SGCN	Reported from streams to rivers, reservoirs, and canals. In riverine habitats often found in nearshore habitats such as banks and backwaters, to include pools and oxbows, in mud or sand or among cobble and boulders with still to moderate currents (Howells et al. 1996).
Reptiles				
American Alligator	*Alligator mississippiensis*	SAT	N/A	Aquatic: Coastal marshes; inland natural rivers, swamps and marshes; manmade impoundments.
Cagle's Map Turtle	*Graptemys caglei*	N/A	T, SGCN	Aquatic: shallow water with swift to moderate flow and gravel or cobble bottom, connected by deeper pools with a slower flow rate and a silt or mud bottom; gravel bar riffles and transition areas between riffles and pools especially important in providing insect prey items; nests on gently sloping sand banks within ca. 30 feet of waters edge.
Eastern Box Turtle	*Terrapene carolina*	N/A	SGCN	Terrestrial: Eastern box turtles inhabit forests, fields, forest-brush, and forest-field ecotones. In some areas they move seasonally from fields in spring to forest in summer. They commonly enters pools of shallow water in summer. For shelter, they burrow into loose soil, debris, mud, old stump holes, or under leaf litter. They can successfully hibernate in sites that may experience subfreezing temperatures.
Keeled Earless Lizard	*Holbrookia propinqua*	N/A	SGCN	Terrestrial: Habitats include coastal dunes, barrier islands, and other sandy areas (Axtell 1983). Although it occurs well inland, this species is most abundant on coastal dunes, were it seeks shelter in the burrows of small mammals or crabs (Bartlett and Bartlett 1999).
Plateau Spot-Tailed Earless Lizard	*Holbrookia lacerata*	N/A	SGCN	Terrestrial: Habitats include moderately open prairie-brushland regions, particularly fairly flat areas free of vegetation or other obstructions (e.g., open meadows, old and new fields, graded roadways, cleared and disturbed areas, prairie savanna, and active agriculture including row crops); also, oak-juniper woodlands and mesquite-prickly pear associations (Axtell 1968, Bartlett and Bartlett 1999).
Slender Glass Lizard	*Ophisaurus attenuatus*	N/A	SGCN	Terrestrial: Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Tamaulipan Spot-Tailed Earless Lizard	*Holbrookia subcaudalis*	N/A	SGCN	Terrestrial: Habitats include moderately open prairie-brushland regions, particularly fairly flat areas free of vegetation or other obstructions (e.g., open meadows, old and new fields, graded roadways, cleared and disturbed areas, prairie savanna, and active agriculture including row crops); also, oak-juniper woodlands and mesquite-prickly pear associations (Axtell 1968, Bartlett and Bartlett 1999).
Texas Horned Lizard	*Phrynosoma cornutum*	N/A	T, SGCN	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.
Texas Tortoise	*Gopherus berlandieri*	N/A	T, SGCN	Terrestrial: Open scrub woods, arid brush, lomas, grass-cactus association; often in areas with sandy well-drained soils. When inactive occupies shallow depressions dug at base of bush or cactus; sometimes in underground burrow or under object. Eggs are laid in nests dug in soil near or under bushes.
Western Box Turtle	*Terrapene ornata*	N/A	SGCN	Terrestrial: Ornate or western box turtles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species.
Plants				
Bigflower Cornsalad	*Valerianella stenocarpa*	N/A	SGCN	Usually along creekbeds or in vernally moist grassy open areas (Carr 2015).
Bracted Twistflower	*Streptanthus bracteatus*	T	SGCN	Shallow, well-drained gravelly clays and clay loams over limestone in oak juniper woodlands and associated openings, on steep to moderate slopes and in canyon bottoms; several known soils include Tarrant, Brackett, or Speck over Edwards, Glen Rose, and Walnut geologic formations; populations fluctuate widely from year to year, depending on winter rainfall; flowering mid April-late May, fruit matures and foliage withers by early summer.
Buckley Tridens	*Tridens buckleyanus*	N/A	SGCN	Occurs in juniper-oak woodlands on rocky limestone slopes; Perennial; Flowering/Fruiting April-Nov.
Canyon Mock-Orange	*Philadelphus texensis var. ernestii*	N/A	SGCN	Usually found growing from honeycomb pits on outcrops of Cretaceous limestone exposed as rimrock along mesic canyons, usually in the shade of mixed evergreen-deciduous canyon woodland; flowering April-June, fruit dehiscing September-October.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Comal Snakewood	*Colubrina stricta*	N/A	SGCN	In El Paso County, found in a patch of thorny shrubs in colluvial deposits and sandy soils at the base of an igneous rock outcrop; the historic Comal County record does not describe the habitat; in Mexico, found in shrublands on calcareous, gravelly, clay soils with woody associates; flowering late spring or early summer.
Darkstem Noseburn	*Tragia nigricans*	N/A	SGCN	Occurs in oak-juniper woodlands on mesic limestone slopes and canyon bottoms; perennial; flowering/fruiting April-Oct.
Glass Mountains Coral-Root	*Hexalectris nitida*	N/A	SGCN	Apparently rare in mixed woodlands in canyons in the mountains of the Brewster County, but encountered with regularity, albeit in small numbers, under Juniperus ashei in woodlands over limestone on the Edwards Plateau, Callahan Divide and Lampasas Cutplain; perennial; flowering June-Sept; fruiting July-Sept.
Gravelbar Brickellbush	*Brickellia dentata*	N/A	SGCN	Essentially restricted to frequently-scoured gravelly alluvial beds in creek and river bottoms; perennial; flowering June-Nov; fruiting June-Oct.
Greenman's Bluet	*Houstonia parviflora*	N/A	SGCN	Grass pastures. Feb- Apr. (Correll and Johnston 1970).
Heller's Marbleseed	*Onosmodium helleri*	N/A	SGCN	Occurs in loamy calcareous soils in oak-juniper woodlands on rocky limestone slopes, often in more mesic portions of canyons; perennial; flowering March-May.
Hill Country Wild-Mercury	*Argythamnia aphoroides*	N/A	SGCN	Mostly in bluestem-grama grasslands associated with plateau live oak woodlands on shallow to moderately deep clays and clay loams over limestone on rolling uplands, also in partial shade of oak-juniper woodlands in gravelly soils on rocky limestone slopes; perennial; flowering April-May with fruit persisting until midsummer.
Lindheimer's Tickseed	*Desmodium lindheimeri*	N/A	SGCN	Known in Texas only from three locations; US habitat is uncertain; has been found along rocky bed of dry ravine and among brush on the banks, steep ravine banks, dry caliche flat roadsides, in shallow soil on outcrops; occurred in deep to partial shade and openings in live oak-juniper woodland associations on the Edwards Limestone; flowering August-October or November.
Narrowleaf Brickellbush	*Brickellia eupatorioides var. gracillima*	N/A	SGCN	Moist to dry gravelly alluvial soils along riverbanks but also on limestone slopes; perennial; flowering/fruiting April-Nov.
Net-Leaf Bundleflower	*Desmanthus reticulatus*	N/A	SGCN	Mostly on clay prairies of the coastal plain of central and south Texas; perennial; flowering April-July; fruiting April-Oct.
Osage Plains False Foxglove	*Agalinis densiflora*	N/A	SGCN	Most records are from grasslands on shallow, gravelly, well drained, calcareous soils; prairies, dry limestone soils; annual; flowering Aug-Oct.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Plateau Loosestrife	*Lythrum ovalifolium*	N/A	SGCN	Banks and gravelly beds of perennial (or strong intermittent) streams on the Edwards Plateau, Llano Uplift and Lampasas Cutplain; perennial; flowering/fruiting April-Nov.
Plateau Milkvine	*Matelea edwardsensis*	N/A	SGCN	Occurs in various types of juniper-oak and oak-juniper woodlands; perennial; flowering March-Oct; fruiting May-June.
Scarlet Leather-Flower	*Clematis texensis*	N/A	SGCN	Usually in oak-juniper woodlands in mesic rocky limestone canyons or along perennial streams; perennial; flowering March-July; fruiting May-July.
Sycamore-Leaf Snowbell	*Styrax platanifolius ssp. Platanifolius*	N/A	SGCN	Rare throughout range, usually in oak-juniper woodlands on steep rocky banks and ledges along intermittent or perennial streams, rarely far from some reliable source of moisture; perennial; flowering April-May; fruiting May-Aug.
Texas Almond	*Prunus minutiflora*	N/A	SGCN	Wide-ranging but scarce, in a variety of grassland and shrubland situations, mostly on calcareous soils underlain by limestone but occasionally in sandier neutral soils underlain by granite; perennial; flowering Feb-May and Oct; fruiting Feb-Sept.
Texas Amorpha	*Amorpha roemeriana*	N/A	SGCN	Juniper-oak woodlands or shrublands on rocky limestone slopes, sometimes on dry shelves above creeks; perennial; flowering May-June; fruiting June-Oct.
Texas Barberry	*Berberis swaseyi*	N/A	SGCN	Shallow calcareous stony clay of upland grasslands/shrublands over limestone as well as in loamier soils in openly wooded canyons and on creek terraces; Pperennial; flowering/fruiting March-June.
Texas Claret-Cup Cactus	*Echinocereus coccineus var. paucispinus*	N/A	SGCN	Mountains, hills, and mesas, igneous and limestone, oak-juniper-pinyon woodland or juniper woodland on limestone mesas, mostly rocky habitats but also in alluvial basins, grasslands, or among mesquite or other shrubs. Flowering March - April (Powell and Weedin 2004).
Texas Fescue	*Festuca versuta*	N/A	SGCN	Occurs in mesic woodlands on limestone-derived soils on stream terraces and canyon slopes; perennial; flowering/fruiting April-June.
Texas Mock-Orange	*Philadelphus texensis var. texensis*	N/A	SGCN	Limestone slopes and ravines, slopes in oak-juniper woodlands; variety texensis has a more westward range than var. ernestii; it is known from Bandera, Bexar, Edwards, Kendall, Medina, Real, and Uvalde counties in central Texas; flowering Apr–May; fruiting Jun–Oct (Freeman 2017).
Texas Seymeria	*Seymeria texana*	N/A	SGCN	Found primarily in grassy openings in juniper-oak woodlands on dry rocky slopes but sometimes on rock outcrops in shaded canyons; annual; flowering May-Nov; fruiting July-Nov.
Tree Dodder	*Cuscuta exaltata*	N/A	SGCN	Parasitic on various Quercus, Juglans, Rhus, Vitis, Ulmus, and Diospyros species as well as Acacia berlandieri and other woody plants; annual; flowering May-Oct; fruiting July-Oct.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Turnip-Root Scurfpea	*Pediomelum cyphocalyx*	N/A	SGCN	Grasslands and openings in juniper-oak woodlands on limestone substrates on the Edwards Plateau and in north-central Texas (Carr 2015).
Warnock's Coral-Root	*Hexalectris warnockii*	N/A	SGCN	In leaf litter and humus in oak-juniper woodlands on shaded slopes and intermittent, rocky creekbeds in canyons; in the Trans Pecos in oak-pinyon-juniper woodlands in higher mesic canyons (to 2000 m [6550 ft]), primarily on igneous substrates; in Terrell County under Quercus fusiformis mottes on terrraces of spring-fed perennial streams, draining an otherwise rather xeric limestone landscape; on the Callahan Divide (Taylor County), the White Rock Escarpment (Dallas County), and the Edwards Plateau in oak-juniper woodlands on limestone slopes; in Gillespie County on igneous substrates of the Llano Uplift; flowering June-September; individual plants do not usually bloom in successive years.
Wright's Milkvetch	*Astragalus wrightii*	N/A	SGCN	On sandy or gravelly soils; flowering/fruiting: April and May.

Table 5D-8 Hays County - Threatened and Endangered Species and Species of Greatest Conservation Need Summary

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Amphibians				
Barton Springs Salamander	*Eurycea sosorum*	E	E, SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
Blanco Blind Salamander	*Eurycea robusta*	N/A	T, SGCN	Aquatic and subterranean; streams and caves.
Blanco River Springs Salamander	*Eurycea pterophila*	N/A	SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
Pedernales River Springs Salamander	*Eurycea sp. 6*	N/A	N/A	Aquatic; springs, streams and caves with rocky or cobble beds.
San Marcos Salamander	*Eurycea nana*	T	T, SGCN	Aquatic; springs and associated water.
Strecker's Chorus Frog	*Pseudacris streckeri*	N/A	SGCN	Terrestrial and aquatic: Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates
Texas Blind Salamander	*Eurycea rathbuni*	E	E, SGCN	Aquatic and subterranean; streams and caves.
Texas Salamander	*Eurycea neotenes*	N/A	T, SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
Woodhouse's Toad	*Anaxyrus woodhousii*	N/A	SGCN	Terrestrial and aquatic: A wide variety of terrestrial habitats are used by this species, including forests, grasslands, and barrier island sand dunes. Aquatic habitats are equally varied.
Arachnids				
No Accepted Common Name	*Texella diplospina*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Texella grubbsi*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Texella mulaiki*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Texella renkesae*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Tartarocreagris grubbsi*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Cicurina ezelli*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Cicurina russelli*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Cicurina ubicki*	N/A	SGCN	Habitat description is not available at this time.
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	DL	N/A	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Bank Swallow	*Riparia riparia*	N/A	SGCN	Bank Swallows live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies of 10 to 2,000 nests. Though in the past Bank Swallows were most commonly found around natural bluffs or eroding streamside banks, they now often nest in human-made sites, such as sand and gravel quarries or road cuts. They forage in open areas and avoid places with tree cover.
Black-Capped Vireo	*Vireo atricapilla*	DL	SGCN	Oak-juniper woodlands with distinctive patchy, two-layered aspect; shrub and tree layer with open, grassy spaces; requires foliage reaching to ground level for nesting cover; return to same territory, or one nearby, year after year; deciduous and broad-leaved shrubs and trees provide insects for feeding; species composition less important than presence of adequate broad-leaved shrubs, foliage to ground level, and required structure; nesting season March-late summer.
Brewer's Blackbird	*Euphagus cyanocephalus*	N/A	SGCN	Shrubby and bushy areas (especially near water), riparian woodland, aspen parklands, cultivated lands, marshes, and around human habitation; in migration and winter also in pastures and fields (AOU 1983).
Cactus Wren	*Campylorhynchus brunneicapillus*	N/A	SGCN	Desert (especially with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and in trees in towns in arid regions (Tropical to Subtropical zones) (AOU 1983). Nests in Opuntia cactus, or in twiggy, thorny, trees and shrubs, sometimes in buildings. Nest may be relined and used as a winter roost.
Chestnut-Collared Longspur	*Calcarius ornatus*	N/A	SGCN	Occurs in open shortgrass settings especially in patches with some bare ground. Also occurs in grain sorghum fields and Conservation Reserve Program lands.
Common Nighthawk	*Chordeiles minor*	N/A	SGCN	Common Nighthawks nest in both rural and urban habitats including coastal sand dunes and beaches, logged forest, recently burned forest, woodland clearings, prairies, plains, sagebrush, grasslands, open forests, and rock outcrops. They also nest on flat gravel rooftops, though less often as gravel roofs are being replaced by smooth, rubberized roofs that provide an unsuitable surface.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Franklin's Gull	*Leucophaeus pipixcan*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. This species is only a spring and fall migrant throughout Texas. It does not breed in or near Texas. Winter records are unusual consisting of one or a few individuals at a given site (especially along the Gulf coastline). During migration, these gulls fly during daylight hours but often come down to wetlands, lake shore, or islands to roost for the night.
Golden-Cheeked Warbler	*Setophaga chrysoparia*	E	E, SGCN	Ashe juniper in mixed stands with various oaks (Quercus spp.). Edges of cedar brakes. Dependent on Ashe juniper (also known as cedar) for long fine bark strips, only available from mature trees, used in nest construction; nests are placed in various trees other than Ashe juniper; only a few mature junipers or nearby cedar brakes can provide the necessary nest material; forage for insects in broad-leaved trees and shrubs; nesting late March-early summer.
Interior Least Tern	*Sternula antillarum athalassos*	DL	E	Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony.
Lark Bunting	*Calamospiza melanocorys*	N/A	SGCN	Overall, it's a generalist in most short grassland settings including ones with some brushy component plus certain agricultural lands that include grain sorghum. Short grasses include sideoats and blue gramas, sand dropseed, prairie junegrass (Koeleria), buffalograss also with patches of bluestem and other mid-grass species. This bunting will frequent smaller patches of grasses or disturbed patches of grasses including rural yards. It also uses weedy fields surrounding playas. This species avoids urban areas and cotton fields.
Least Tern	*Sternula antillarum*	DL	SGCN	Sand beaches, flats, bays, inlets, lagoons, islands, river sandbars and flat gravel rooftops in urban areas.
Loggerhead Shrike	*Lanius ludovicianus*	N/A	SGCN	Loggerhead Shrikes inhabit open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead Shrikes are often seen along mowed roadsides with access to fence lines and utility poles.
Mottled Duck	*Anas fulvigula*	N/A	SGCN	Estuaries, ponds, lakes, secondary bays.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Mountain Plover	*Charadrius montanus*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous
Northern Bobwhite	*Colinus virginianus*	N/A	SGCN	Inhabits a wide variety of vegetation types, particularly early successional stages. Occurs in croplands, grasslands, pastures, fallow fields, grassbrush rangelands, open pinelands, open mixed pine-hardwood forests, and habitat mosaics (Brennan 1999).
Piping Plover	*Charadrius melodus*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.
Pyrrhuloxia	*Cardinalis sinuatus*	N/A	SGCN	Pyrrhuloxias live in upland deserts, mesquite savannas, riparian (streamside) woodlands, desert scrublands, farm fields with hedgerows, and residential areas with nearby mesquite. When not breeding, some Pyrrhuloxias wander into urban habitats, mesquite-hackberry habitats, and riparian habitats with Arizona sycamore and cottonwood.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Sanderling	*Calidris alba*	N/A	SGCN	Nonbreeding: primarily sandy beaches, less frequently on mud flats and shores of lakes or rivers (AOU 1983) also on exposed reefs (Pratt et al. 1987). Sleeps/loafs on upper beach or on salt pond dike.
Snowy Plover	*Charadrius nivosus*	N/A	SGCN	Algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. An optimal site characteristic would be large in size. The size of populations appear to be roughly proportional to the total area of suitable habitat used. Formerly an uncommon breeder in the Panhandle; potential migrant; winter along coast.
Sprague's Pipit	*Anthus spragueii*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat during migration and in winter consists of pastures and weedy fields (AOU 1983), including grasslands with dense herbaceous vegetation or grassy agricultural fields.
Western Burrowing Owl	*Athene cunicularia hypugaea*	N/A	N/A	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows
White-Faced Ibis	*Plegadis chihi*	N/A	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.
Whooping Crane	*Grus americana*	E	E, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.
Willet	*Tringa semipalmata*	N/A	SGCN	Marshes, tidal mudflats, beaches, lake margins, mangroves, tidal channels, river mouths, coastal lagoons, sandy or rocky shores, and, less frequently, open grassland (AOU 1983, Stiles and Skutch 1989).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Wilson's Warbler	*Cardellina pusilla*	N/A	SGCN	Wilson's warblers key in on forests and scrubby areas along streams to fatten up during migration. During the nonbreeding season they use many types of habitats from lowland thickets near streams to high-elevation cloud forests in Mexico and Central America.
Wood Stork	*Mycteria americana*	N/A	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.
Yellow-Billed Cuckoo	*Coccyzus americanus*	T	SGCN	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Crustaceans				
Balcones Cave Amphipod	*Stygobromus balconis*	N/A	SGCN	Subaquatic, subterranean obligate amphipod.
Bifurcated Cave Amphipod	*Stygobromus bifurcatus*	N/A	SGCN	Habitat description is not available at this time.
Ezell's Cave Amphipod	*Stygobromus flagellatus*	N/A	SGCN	Known only from artesian wells
No Accepted Common Name	*Palaemonetes texanus*	N/A	SGCN	Collected in Comal and Hays counties (Middel Guadalupe and San Marcos watersheds).
No Accepted Common Name	*Artesia subterranea*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Texiweckelia texensis*	N/A	SGCN	Habitat description is not available at this time.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Purgatory Cave Shrimp	*Calathaemon holthuisi*	N/A	SGCN	Last known collection was in San Marcos, Hays Co. (Ezell's Cave) (Reddell 1994).
Texas Troglobitic Water Slater	*Lirceolus smithii*	N/A	T, SGCN	Subaquatic, subterranean obligate, aquifer.
Fish				
American Eel	*Anguilla rostrata*	N/A	SGCN	Originally found in all river systems from the Red River to the Rio Grande. Aquatic habtiats include large rivers, streams, tributaries, coastal watersheds, estuaries, bays, and oceans. Spawns in Sargasso Sea, larva move to coastal waters, metamorphose, and begin upstream movements. Females tend to move further upstream than males (who are often found in brackish estuaries). American Eel are habitat generalists and may be found in a broad range of habitat conditions including slow- and fast-flowing waters over many substrate types. Extirpation in upstream drainages attributed to reservoirs that impede upstream migration.
Fountain Darter	*Etheostoma fonticola*	E	E, SGCN	Known only from the spring-fed San Marcos and Comal rivers in dense beds of aquatic plants growing close to bottom; may be found in slowand fast-flowing habitats.
Guadalupe Bass	*Micropterus treculii*	N/A	SGCN	Endemic to the streams of the northern and eastern Edwards Plateau including portions of the Brazos, Colorado, Guadalupe, and San Antonio basins; species also found outside of the Edwards Plateau streams in decreased abundance, primarily in the lower Colorado River; two introduced populations have been established in the Nueces River system. A pure population was re-established in a portion of the Blanco River in 2014. Species prefers lentic environments but commonly taken in flowing water; numerous smaller fish occur in rapids, many times near eddies; large individuals found mainly in riffle tail races; usually found in spring-fed streams having clear water and relatively consistent temperatures.
Guadalupe Darter	*Percina apristis*	N/A	T, SGCN	Endemic to the Guadalupe River Basin; Found in riffles; most common under or around 25-30 cm boulders in the main current; seems to prefer moderately turbid water.
Guadalupe Roundnose Minnow	*Dionda flavipinnis*	N/A	SGCN	Endemic to Guadalupe and southern Colorado drainages; primarily restricted to clear spring-fed waters that have slight temperature variations.
Headwater Catfish	*Ictalurus lupus*	N/A	T, SGCN	Originally throughout streams of the Edwards Plateau and the Rio Grande basin, currently limited to Rio Grande drainage, including Pecos River basin; springs, and sandy and rocky riffles, runs, and pools of clear creeks and small rivers.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Ironcolor Shiner	*Notropis chalybaeus*	N/A	SGCN	Found only in northeastern streams from the Sabine to the Red River with the exception of an isolated population found in the San Marcos River headwaters. Found primarily in acidic, tannin-stained, non-turbid, sluggish Coastal Plain streams and rivers of low to moderate gradient. Occurs in aggregation, often at the upstream ends of pools, with a moderate to sluggish current and sand, mud, silt or detritus substrates. Usually associated with aquatic vegetation.
Nueces Roundnose Minnow	*Dionda texensis*	N/A	SGCN	Endemic to the headwaters of the Nueces River; habitat unknown but likely similar to Devils River Minnow (Often found in association with spring outflows over gravel-cobble substrate and adjacent to aquatic macrophytes; may inhabit a microhabitat associated with the interface between spring runs and the river).
Texas Shiner	*Notropis amabilis*	N/A	SGCN	In Texas, it is found primarily in Edwards Plateau streams from the San Gabriel River in the east to the Pecos River in the west. Typical habitat includes rocky or sandy runs, as well as pools.
Insects				
American Bumblebee	*Bombus pensylvanicus*	N/A	SGCN	Habitat description is not available at this time.
Comal Springs Diving Beetle	*Comaldessus stygius*	N/A	SGCN	Known only from the outflows at Comal Springs; aquatic; diving beetles generally inhabit the water column.
Comal Springs Dryopid Beetle	*Stygoparnus comalensis*	E	E, SGCN	Dryopids usually cling to objects in a stream; dryopids are sometimes found crawling on stream bottoms or along shores; adults may leave the stream and fly about, especially at night; most dryopid larvae are vermiform and live in soil or decaying wood.
Comal Springs Riffle Beetle	*Heterelmis comalensis*	E	E, SGCN	Comal and San Marcos Springs.
Edwards Aquifer Diving Beetle	*Haideoporus texanus*	N/A	SGCN	Habitat poorly known; known from an artesian well in Hays County.
No Accepted Common Name	*Rhadine austinica*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Rhadine insolita*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Batrisodes grubbsi*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Procloeon distinctum*	N/A	SGCN	Mayflies distinguished by aquatic larval stage; adult stage generally found in shoreline vegetation.
No Accepted Common Name	*Plauditus texanus*	N/A	SGCN	Larvae are associated with small to medium limestone cobble and macrophytes in shallow riffles of clear, cool, alkaline streams (P. McCafferty, personal communication, December 2003).
No Accepted Common Name	*Xiphocentron messapus*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Ochrotrichia capitana*	N/A	SGCN	Habitat description is not available at this time.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
No Accepted Common Name	*Neotrichia juani*	N/A	SGCN	Specimens were collected from perennial and ephemeral rivers, and small spring-fed streams (Harris and Tiemann 1993).
San Marcos Saddle-Case Caddisfly	*Protoptila arca*	N/A	SGCN	Known from an artesian well in Hays County; locally very abundant; swift, well-oxygenated warm water about 1-2 m deep; larvae and pupal cases abundant on rocks.
Texas Austrotinodes Caddisfly	*Austrotinodes texensis*	N/A	SGCN	Appears endemic to the karst springs and spring runs of the Edwards Plateau region; flow in type locality swift but may drop significantly during periods of little drought; substrate coarse and ranges from cobble and gravel to limestone bedrock; many limestone outcroppings also found along the streams.
Mammals				
Big Free-Tailed Bat	*Nyctinomops macrotis*	N/A	SGCN	Habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore.
Cave Myotis Bat	*Myotis velifer*	N/A	SGCN	Colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore.
Eastern Spotted Skunk	*Spilogale putorius*	N/A	SGCN	Generalist; open fields prairies, croplands, fence rows, farmyards, forest edges & woodlands. Prefer wooded, brushy areas & tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.
Hoary Bat	*Lasiurus cinereus*	N/A	SGCN	Hoary bats are highly migratory, high-flying bats that have been noted throughout the state. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage roosting species) but are found in unforested parts of the state and lowland deserts. Tend to be captured over water and large, open flyways.
Mountain Lion	*Puma concolor*	N/A	SGCN	Generalist; found in a wide range of habitats statewide. Found most frequently in rugged mountains; riparian zones.
Plains Spotted Skunk	*Spilogale interrupta*	N/A	SGCN	Generalist; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Seminole Bat	*Lasiurus seminolus*	N/A	SGCN	Pine-oak and long-leaf pine in east Texas. Habitats include pine, mixed pine-hardwood, and hardwood forests of uplands and bottomlands, particularly pine-dominated forests, including mature pine and pine-hardwood corridors in managed pine forest landscapes (Menzel et al. 1998, 1999, 2000; Carter et al. 2004; Marks and Marks 2006; Perry and Thill 2007; Perry et al. 2007; Hein et al. 2008; Ammerman et al. 2012).
Tricolored Bat	*Perimyotis subflavus*	PE	SGCN	Forest, woodland and riparian areas are important. Caves are very important to this species.
Mollusks				
Balcones Spike	*Fusconaia iheringi*	N/A	SGCN	Habitat not yet described.
Edwards Plateau Liptooth	*Millerelix gracilis*	N/A	SGCN	Habitat description is not available at this time.
False Spike	*Fusconaia mitchelli*	E	E, SGCN	Occurs in small streams to medium-size rivers in habitats such as riffles and runs with flowing water. Is often found in stable substrates of sand, gravel, and cobble (Howells 2010; Randklev et al. 2012; Sowards et al. 2013; Tsakiris and Randklev 2016). [Mussels of Texas 2019].
Glossy Wolfsnail	*Euglandina texasiana*	N/A	SGCN	Habitat description is not available at this time.
Guadalupe Fatmucket	*Lampsilis bergmanni*	E	T, SGCN	Reported to occur in slow to moderate current in sand, mud, and gravel substrates among large cobble, boulders, bedrock ledges, horizontal cracks in bedrock slabs, and macrophyte beds. Has also been observed inhabiting the roots of cypress trees and vegetation along steep banks. Reported in lakes at Kerrville, Texas, which suggests it may occasionally persist in some impoundment conditions (Robert G. Howells, personal communication). (Mussels of Texas 2020).
Guadalupe Orb	*Cyclonaias necki*	E	E, SGCN	Species' distribution is limited to the Guadalupe River basin. Occurs in both mainstem and tributary habitats. Often found in substrates composed of sand, gravel, and cobble, including mud-silt or gravel-filled cracks in bedrock slabs. Considered intolerant of reservoirs, but are known to occur in them (Howells 2010m; Randklev et al. 2017b). [Mussels of Texas 2020].
Mapleleaf	*Quadrula quadrula*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs. In riverine habitats, it may be found in main-channel habitats such as riffles or runs in sand, gravel, and cobble substrates with moderate to swift currents. May also be found in nearshore habitats such as banks and backwaters to include pools in sand or mud substrates with little to no flow. (Williams et al. 2008; Howells 2016; Haag and Cicerello 2016).
No Accepted Common Name	*Phreatodrobia conica*	N/A	SGCN	Habitat description is not available at this time.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
No Accepted Common Name	*Phreatodrobia micra*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Phreatodrobia plana*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Phreatodrobia punctata*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Phreatodrobia rotunda*	N/A	SGCN	Habitat description is not available at this time.
Pimpleback	*Cyclonaias pustulosa*	N/A	SGCN	Occurs in small streams to large rivers in habitats including riffles and runs with flowing water, also found in nearshore habitats such as banks and backwaters or pools. Can occur in reservoirs but varies based by population. Is often found in substrates comprising of sand, gravel, and cobble but also mud and silt (Howells et al. 1996; Williams et al. 2008; Watters et al. 2009).
Pistolgrip	*Tritogonia verrucosa*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs, but considered less tolerant of impoundment (Haag and Cicerello 2016). Can occur in a variety of habitat types but most often found in main channel habitats such as riffles and runs with moderate current and sand, gravel, or cobble substrates (Howells et al. 1996; Williams et al. 2008).
Texas Fatmucket	*Lampsilis bracteata*	E	T, SGCN	Reported to occur in slow to moderate current in sand, mud, and gravel substrates among large cobble, boulders, bedrock ledges, horizontal cracks in bedrock slabs, and macrophyte beds. Has also been observed inhabiting the roots of cypress trees and vegetation along steep banks. Past authorities have reported this species intolerant of reservoir conditions but recent surveys suggest it may persist in some impoundment conditions (Howells 2010c; Randklev et al. 2017b). [Mussel of Texas 2019].
Texas Fawnsfoot	*Truncilla macrodon*	T	T, SGCN	Occurs in large rivers but may also be found in medium-sized streams. Is found in protected near shore areas such as banks and backwaters but also riffles and point bar habitats with low to moderate water velocities. Typically occurs in substrates of mud, sandy mud, gravel and cobble. Considered intolerant of reservoirs (Randklev et al. 2010; Howells 2010o; Randklev et al. 2014b,c; Randklev et al. 2017a,b). [Mussels of Texas 2019].
Texas Pimpleback	*Cyclonaias petrina*	E	E, SGCN	Occurs in medium-size streams to large rivers primarily in riffles and runs. Often found in substrates composed of sand, gravel, and cobble, including mud-silt or gravel-filled cracks in bedrock slabs. Considered intolerant of reservoirs (Howells 2010m; Randklev et al. 2017b). [Mussels of Texas 2019].
Reptiles				
American Alligator	*Alligator mississippiensis*	SAT	N/A	Aquatic: Coastal marshes; inland natural rivers, swamps and marshes; manmade impoundments.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Cagle's Map Turtle	*Graptemys caglei*	N/A	T, SGCN	Aquatic: shallow water with swift to moderate flow and gravel or cobble bottom, connected by deeper pools with a slower flow rate and a silt or mud bottom; gravel bar riffles and transition areas between riffles and pools especially important in providing insect prey items; nests on gently sloping sand banks within ca. 30 feet of waters edge.
Common Garter Snake	*Thamnophis sirtalis*	N/A	SGCN	Terrestrial and aquatic: Habitats used include the grasslands and modified open areas in the vicinity of aquatic features, such as ponds, streams or marshes. Damp soils and debris for cover are thought to be critical.
Eastern Box Turtle	*Terrapene carolina*	N/A	SGCN	Terrestrial: Eastern box turtles inhabit forests, fields, forest-brush, and forest-field ecotones. In some areas they move seasonally from fields in spring to forest in summer. They commonly enters pools of shallow water in summer. For shelter, they burrow into loose soil, debris, mud, old stump holes, or under leaf litter. They can successfully hibernate in sites that may experience subfreezing temperatures.
Keeled Earless Lizard	*Holbrookia propinqua*	N/A	SGCN	Terrestrial: Habitats include coastal dunes, barrier islands, and other sandy areas (Axtell 1983). Although it occurs well inland, this species is most abundant on coastal dunes, were it seeks shelter in the burrows of small mammals or crabs (Bartlett and Bartlett 1999).
Plateau Spot-Tailed Earless Lizard	*Holbrookia lacerata*	N/A	SGCN	Terrestrial: Habitats include moderately open prairie-brushland regions, particularly fairly flat areas free of vegetation or other obstructions (e.g., open meadows, old and new fields, graded roadways, cleared and disturbed areas, prairie savanna, and active agriculture including row crops); also, oak-juniper woodlands and mesquite-prickly pear associations (Axtell 1968, Bartlett and Bartlett 1999).
Slender Glass Lizard	*Ophisaurus attenuatus*	N/A	SGCN	Terrestrial: Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil.
Texas Horned Lizard	*Phrynosoma cornutum*	N/A	T, SGCN	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.
Texas Map Turtle	*Graptemys versa*	N/A	SGCN	Aquatic: Primarily a river turtle but can also be found in reservoirs. Can be found in deep and shallow water with sufficient basking sites (emergent rocks and woody debris).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Western Box Turtle	*Terrapene ornata*	N/A	SGCN	Terrestrial: Ornate or western box turtles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species.
Plants				
Bigflower Cornsalad	*Valerianella stenocarpa*	N/A	SGCN	Usually along creekbeds or in vernally moist grassy open areas (Carr 2015).
Bracted Twistflower	*Streptanthus bracteatus*	T	SGCN	Shallow, well-drained gravelly clays and clay loams over limestone in oak juniper woodlands and associated openings, on steep to moderate slopes and in canyon bottoms; several known soils include Tarrant, Brackett, or Speck over Edwards, Glen Rose, and Walnut geologic formations; populations fluctuate widely from year to year, depending on winter rainfall; flowering mid April-late May, fruit matures and foliage withers by early summer.
Buckley Tridens	*Tridens buckleyanus*	N/A	SGCN	Occurs in juniper-oak woodlands on rocky limestone slopes; perennial; flowering/fruiting April-Nov.
Canyon Mock-Orange	*Philadelphus texensis var. ernestii*	N/A	SGCN	Usually found growing from honeycomb pits on outcrops of Cretaceous limestone exposed as rimrock along mesic canyons, usually in the shade of mixed evergreen-deciduous canyon woodland; flowering April-June, fruit dehiscing September-October.
Darkstem Noseburn	*Tragia nigricans*	N/A	SGCN	Occurs in oak-juniper woodlands on mesic limestone slopes and canyon bottoms; perennial; flowering/fruiting April-Oct.
Glass Mountains Coral-Root	*Hexalectris nitida*	N/A	SGCN	Apparently rare in mixed woodlands in canyons in the mountains of the Brewster County, but encountered with regularity, albeit in small numbers, under Juniperus ashei in woodlands over limestone on the Edwards Plateau, Callahan Divide and Lampasas Cutplain; perennial; flowering June-Sept; fruiting July-Sept.
Gravelbar Brickellbush	*Brickellia dentata*	N/A	SGCN	Essentially restricted to frequently-scoured gravelly alluvial beds in creek and river bottoms; perennial; flowering June-Nov; fruiting June-Oct.
Hall's Prairie Clover	*Dalea hallii*	N/A	SGCN	In grasslands on eroded limestone or chalk and in oak scrub on rocky hillsides; perennial; flowering May-Sept; fruiting June-Sept.
Heller's Marbleseed	*Onosmodium helleri*	N/A	SGCN	Occurs in loamy calcareous soils in oak-juniper woodlands on rocky limestone slopes, often in more mesic portions of canyons; perennial; flowering March-May.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Hill Country Wild-Mercury	*Argythamnia aphoroides*	N/A	SGCN	Mostly in bluestem-grama grasslands associated with plateau live oak woodlands on shallow to moderately deep clays and clay loams over limestone on rolling uplands, also in partial shade of oak-juniper woodlands in gravelly soils on rocky limestone slopes; perennial; flowering April-May with fruit persisting until midsummer.
Narrowleaf Brickellbush	*Brickellia eupatorioides var. gracillima*	N/A	SGCN	Moist to dry gravelly alluvial soils along riverbanks but also on limestone slopes; perennial; flowering/fruiting April-Nov.
Net-Leaf Bundleflower	*Desmanthus reticulatus*	N/A	SGCN	Mostly on clay prairies of the coastal plain of central and south Texas; perennial; flowering April-July; fruiting April-Oct.
Osage Plains False Foxglove	*Agalinis densiflora*	N/A	SGCN	Most records are from grasslands on shallow, gravelly, well drained, calcareous soils; prairies, dry limestone soils; annual; flowering Aug-Oct.
Plateau Loosestrife	*Lythrum ovalifolium*	N/A	SGCN	Banks and gravelly beds of perennial (or strong intermittent) streams on the Edwards Plateau, Llano Uplift and Lampasas Cutplain; perennial; flowering/fruiting April-Nov.
Plateau Milkvine	*Matelea edwardsensis*	N/A	SGCN	Occurs in various types of juniper-oak and oak-juniper woodlands; perennial; flowering March-Oct; fruiting May-June.
Scarlet Leather-Flower	*Clematis texensis*	N/A	SGCN	Usually in oak-juniper woodlands in mesic rocky limestone canyons or along perennial streams; perennial; flowering March-July; fruiting May-July.
Stanfield's Beebalm	*Monarda stanfieldii*	N/A	SGCN	Largely confined to granite sands along the middle course of the Colorado River and its tributaries; perennial.
Sycamore-Leaf Snowbell	*Styrax platanifolius ssp. Platanifolius*	N/A	SGCN	Rare throughout range, usually in oak-juniper woodlands on steep rocky banks and ledges along intermittent or perennial streams, rarely far from some reliable source of moisture; perennial; flowering April-May; fruiting May-Aug.
Texas Amorpha	*Amorpha roemeriana*	N/A	SGCN	Juniper-oak woodlands or shrublands on rocky limestone slopes, sometimes on dry shelves above creeks; perennial; flowering May-June; fruiting June-Oct.
Texas Barberry	*Berberis swaseyi*	N/A	SGCN	Shallow calcareous stony clay of upland grasslands/shrublands over limestone as well as in loamier soils in openly wooded canyons and on creek terraces; perennial; flowering/fruiting March-June.
Texas Claret-Cup Cactus	*Echinocereus coccineus var. paucispinus*	N/A	SGCN	Mountains, hills, and mesas, igneous and limestone, oak-juniper-pinyon woodland or juniper woodland on limestone mesas, mostly rocky habitats but also in alluvial basins, grasslands, or among mesquite or other shrubs. Flowering March - April (Powell and Weedin 2004).
Texas Fescue	*Festuca versuta*	N/A	SGCN	Occurs in mesic woodlands on limestone-derived soils on stream terraces and canyon slopes; perennial; flowering/fruiting April-June.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Texas Seymeria	*Seymeria texana*	N/A	SGCN	Found primarily in grassy openings in juniper-oak woodlands on dry rocky slopes but sometimes on rock outcrops in shaded canyons; annual; flowering May-Nov; fruiting July-Nov.
Texas Wild-Rice	*Zizania texana*	E	E, SGCN	Spring-fed river, in clear, cool, swift water mostly less than 1 m deep, with coarse sandy soils rather than finer clays; flowering year-round, peaking March-June.
Threeflower Penstemon	*Penstemon triflorus var. triflorus*	N/A	SGCN	Occurs sparingly on rock outcrops and in grasslands associated with juniper-oak woodlands (Carr 2015).
Tree Dodder	*Cuscuta exaltata*	N/A	SGCN	Parasitic on various Quercus, Juglans, Rhus, Vitis, Ulmus, and Diospyros species as well as Acacia berlandieri and other woody plants; annual; flowering May-Oct; fruiting July-Oct.
Turnip-Root Scurfpea	*Pediomelum cyphocalyx*	N/A	SGCN	Grasslands and openings in juniper-oak woodlands on limestone substrates on the Edwards Plateau and in north-central Texas (Carr 2015).
Warnock's Coral-Root	*Hexalectris warnockii*	N/A	SGCN	In leaf litter and humus in oak-juniper woodlands on shaded slopes and intermittent, rocky creekbeds in canyons; in the Trans Pecos in oakpinyon-juniper woodlands in higher mesic canyons (to 2000 m [6550 ft]), primarily on igneous substrates; in Terrell County under Quercus fusiformis mottes on terrraces of spring-fed perennial streams, draining an otherwise rather xeric limestone landscape; on the Callahan Divide (Taylor County), the White Rock Escarpment (Dallas County), and the Edwards Plateau in oak-juniper woodlands on limestone slopes; in Gillespie County on igneous substrates of the Llano Uplift; flowering June-September; individual plants do not usually bloom in successive years.

Table 5D-9 Kendall County - Threatened and Endangered Species and Species of Greatest Conservation Need Summary

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Amphibians				
Blanco River Springs Salamander	*Eurycea pterophila*	N/A	SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
Cascade Caverns Salamander	*Eurycea latitans*	N/A	T, SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
Strecker's Chorus Frog	*Pseudacris streckeri*	N/A	SGCN	Terrestrial and aquatic: Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates
Texas Salamander	*Eurycea neotenes*	N/A	T, SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
Valdina Farms Sinkhole Salamander	*Eurycea troglodytes*	N/A	SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
Woodhouse's Toad	*Anaxyrus woodhousii*	N/A	SGCN	Terrestrial and aquatic: A wide variety of terrestrial habitats are used by this species, including forests, grasslands, and barrier island sand dunes. Aquatic habitats are equally varied
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	DL	N/A	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds
Bank Swallow	*Riparia riparia*	N/A	SGCN	Bank Swallows live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies of 10 to 2,000 nests. Though in the past Bank Swallows were most commonly found around natural bluffs or eroding streamside banks, they now often nest in human-made sites, such as sand and gravel quarries or road cuts. They forage in open areas and avoid places with tree cover.
Black-Capped Vireo	*Vireo atricapilla*	DL	SGCN	Oak-juniper woodlands with distinctive patchy, two-layered aspect; shrub and tree layer with open, grassy spaces; requires foliage reaching to ground level for nesting cover; return to same territory, or one nearby, year after year; deciduous and broad-leaved shrubs and trees provide insects for feeding; species composition less important than presence of adequate broad-leaved shrubs, foliage to ground level, and required structure; nesting season March-late summer.
Brewer's Blackbird	*Euphagus cyanocephalus*	N/A	SGCN	Shrubby and bushy areas (especially near water), riparian woodland, aspen parklands, cultivated lands, marshes, and around human habitation; in migration and winter also in pastures and fields (AOU 1983).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Cactus Wren	*Campylorhynchus brunneicapillus*	N/A	SGCN	Desert (especially with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and in trees in towns in arid regions (Tropical to Subtropical zones) (AOU 1983). Nests in OPUNTIA cactus, or in twiggy, thorny, trees and shrubs, sometimes in buildings. Nest may be relined and used as a winter roost.
Chestnut-Collared Longspur	*Calcarius ornatus*	N/A	SGCN	Occurs in open shortgrass settings especially in patches with some bare ground. Also occurs in grain sorghum fields and Conservation Reserve Program lands
Common Nighthawk	*Chordeiles minor*	N/A	SGCN	Common Nighthawks nest in both rural and urban habitats including coastal sand dunes and beaches, logged forest, recently burned forest, woodland clearings, prairies, plains, sagebrush, grasslands, open forests, and rock outcrops. They also nest on flat gravel rooftops, though less often as gravel roofs are being replaced by smooth, rubberized roofs that provide an unsuitable
Franklin's Gull	*Leucophaeus pipixcan*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. This species is only a spring and fall migrant throughout Texas. It does not breed in or near Texas. Winter records are unusual consisting of one or a few individuals at a given site (especially along the Gulf coastline). During migration, these gulls fly during daylight hours but often come down to wetlands, lake shore, or islands to roost for the night.
Golden-Cheeked Warbler	*Setophaga chrysoparia*	E	E, SGCN	Ashe juniper in mixed stands with various oaks (Quercus spp.). Edges of cedar brakes. Dependent on Ashe juniper (also known as cedar) for long fine bark strips, only available from mature trees, used in nest construction; nests are placed in various trees other than Ashe juniper; only a few mature junipers or nearby cedar brakes can provide the necessary nest material; forage for insects in broad-leaved trees and shrubs; nesting late March-early summer.
Lark Bunting	*Calamospiza melanocorys*	N/A	SGCN	Overall, it's a generalist in most short grassland settings including ones with some brushy component plus certain agricultural lands that include grain sorghum. Short grasses include sideoats and blue gramas, sand dropseed, prairie junegrass (Koeleria), buffalograss also with patches of bluestem and other mid-grass species. This bunting will frequent smaller patches of grasses or disturbed patches of grasses including rural yards. It also uses weedy fields surrounding playas. This species avoids urban areas and cotton fields.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Loggerhead Shrike	*Lanius ludovicianus*	N/A	SGCN	Loggerhead Shrikes inhabit open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead Shrikes are often seen along mowed roadsides with access to fence lines and utility
Mountain Plover	*Charadrius montanus*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed)
Northern Bobwhite	*Colinus virginianus*	N/A	SGCN	Inhabits a wide variety of vegetation types, particularly early successional stages. Occurs in croplands, grasslands, pastures, fallow fields, grassbrush rangelands, open pinelands, open mixed pine-hardwood forests, and habitat mosaics (Brennan 1999).
Pyrrhuloxia	*Cardinalis sinuatus*	N/A	SGCN	Pyrrhuloxias live in upland deserts, mesquite savannas, riparian (streamside) woodlands, desert scrublands, farm fields with hedgerows, and residential areas with nearby mesquite. When not breeding, some Pyrrhuloxias wander into urban habitats, mesquite-hackberry habitats, and riparian habitats with Arizona sycamore and cottonwood.
Sanderling	*Calidris alba*	N/A	SGCN	Nonbreeding: primarily sandy beaches, less frequently on mud flats and shores of lakes or rivers (AOU 1983) also on exposed reefs (Pratt et al. 1987). Sleeps/loafs on upper beach or on salt pond dike
Snowy Plover	*Charadrius nivosus*	N/A	SGCN	Algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. An optimal site characteristic would be large in size. The size of populations appear to be roughly proportional to the total area of suitable habitat used. Formerly an uncommon breeder in the Panhandle; potential migrant;
Sprague's Pipit	*Anthus spragueii*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat during migration and in winter consists of pastures and weedy fields (AOU 1983), including grasslands with dense herbaceous vegetation or grassy agricultural fields.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Western Burrowing Owl	*Athene cunicularia hypugaea*	N/A	N/A	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows
White-Faced Ibis	*Plegadis chihi*	N/A	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.
Whooping Crane	*Grus americana*	E	E, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and
Willet	*Tringa semipalmata*	N/A	SGCN	Marshes, tidal mudflats, beaches, lake margins, mangroves, tidal channels, river mouths, coastal lagoons, sandy or rocky shores, and, less frequently, open grassland (AOU 1983, Stiles and Skutch 1989)
Wilson's Warbler	*Cardellina pusilla*	N/A	SGCN	Wilson's warblers key in on forests and scrubby areas along streams to fatten up during migration. During the nonbreeding season they use many types of habitats from lowland thickets near streams to high-elevation cloud forests in Mexico and Central America.
Yellow-Billed Cuckoo	*Coccyzus americanus*	T	SGCN	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Zone-Tailed Hawk	*Buteo albonotatus*	N/A	T, SGCN	Arid open country, including open deciduous or pine-oak woodland, mesa or mountain county, often near watercourses, and wooded canyons and tree-lined rivers along middle-slopes of desert mountains; nests in various habitats and sites, ranging from small trees in lower desert, giant cottonwoods in riparian areas, to mature conifers in high mountain regions.
Crustaceans				
Balcones Cave Amphipod	*Stygobromus balconis*	N/A	SGCN	Subaquatic, subterranean obligate amphipod.
Bifurcated Cave Amphipod	*Stygobromus bifurcatus*	N/A	SGCN	Habitat description is not available at this time.
Cascade Cave Amphipod	*Stygobromus dejectus*	N/A	SGCN	Subaquatic crustacean; subterranean obligate; in pools.
Fish				
Guadalupe Bass	*Micropterus treculii*	N/A	SGCN	Endemic to the streams of the northern and eastern Edwards Plateau including portions of the Brazos, Colorado, Guadalupe, and San Antonio basins; species also found outside of the Edwards Plateau streams in decreased abundance, primarily in the lower Colorado River; two introduced populations have been established in the Nueces River system. A pure population was re-established in a portion of the Blanco River in 2014. Species prefers lentic environments but commonly taken in flowing water; numerous smaller fish occur in rapids, many times near eddies; large individuals found mainly in riffle tail races; usually found in spring-fed streams having clear water and relatively consistent temperatures.
Guadalupe Darter	*Percina apristis*	N/A	T, SGCN	Endemic to the Guadalupe River Basin; Found in riffles; most common under or around 25-30 cm boulders in the main current; seems to prefer moderately turbid water.
Headwater Catfish	*Ictalurus lupus*	N/A	T, SGCN	Originally throughout streams of the Edwards Plateau and the Rio Grande basin, currently limited to Rio Grande drainage, including Pecos River basin; springs, and sandy and rocky riffles, runs, and pools of clear creeks and small rivers.
Plateau Shiner	*Cyprinella lepida*	N/A	T, SGCN	Edwards Plateau portion of Nueces basin, mainstem and tributaries of Nueces, Frio, and Sabinal rivers; may also be endemic to upper reaches of the Guadalupe River; clear, cool, spring-fed headwater creeks; usually over gravel and limestone substrates.
Texas Shiner	*Notropis amabilis*	N/A	SGCN	In Texas, it is found primarily in Edwards Plateau streams from the San Gabriel River in the east to the Pecos River in the west. Typical habitat includes rocky or sandy runs, as well as pools.
Insects				
American Bumblebee	*Bombus pensylvanicus*	N/A	SGCN	Habitat description is not available at this time.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
No Accepted Common Name	*Rhadine speca*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Baetodes alleni*	N/A	SGCN	Mayflies distinguished by aquatic larval stage; adult stage generally found in shoreline vegetation.
Mammals				
Big Free-Tailed Bat	*Nyctinomops macrotis*	N/A	SGCN	Habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore.
Black Bear	*Ursus americanus*	N/A	T, SGCN	Generalist. Historically found throughout Texas. In Chisos, prefers higher elevations where pinyon-oaks predominate; also occasionally sighted in desert scrub of Trans-Pecos (Black Gap Wildlife Management Area) and Edwards Plateau in juniper-oak habitat. For ssp. luteolus, bottomland hardwoods, floodplain forests, upland hardwoods with mixed pine; marsh. Bottomland hardwoods and large tracts of inaccessible forested areas.
Black-Tailed Prairie Dog	*Cynomys ludovicianus*	N/A	SGCN	Dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups.
Cave Myotis Bat	*Myotis velifer*	N/A	SGCN	Colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore.
Eastern Spotted Skunk	*Spilogale putorius*	N/A	SGCN	Generalist; open fields prairies, croplands, fence rows, farmyards, forest edges; woodlands. Prefer wooded, brushy areas; tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.
Ghost-Faced Bat	*Mormoops megalophylla*	N/A	SGCN	Winter roosts are in large limestone caves. Buildings and rock crevasses provide roosts, as well.
Hoary Bat	*Lasiurus cinereus*	N/A	SGCN	Hoary bats are highly migratory, high-flying bats that have been noted throughout the state. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage roosting species) but are found in unforested parts of the state and lowland deserts. Tend to be captured over water and large, open flyways.
Llano Pocket Gopher	*Geomys texensis texensis*	N/A	SGCN	Found in deep, brown loamy sands or gravelly sandy loams and is isolated from other species of pocket gophers by intervening shallow stony to gravelly clayey soils.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Mountain Lion	*Puma concolor*	N/A	SGCN	Generalist; found in a wide range of habitats statewide. Found most frequently in rugged mountains; riparian zones.
Plains Spotted Skunk	*Spilogale interrupta*	N/A	SGCN	Generalist; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie.
Tricolored Bat	*Perimyotis subflavus*	PE	SGCN	Forest, woodland and riparian areas are important. Caves are very important to this species.
White-Nosed Coati	*Nasua narica*	N/A	T, SGCN	Woodlands, riparian corridors and canyons.Most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees; omnivorous; may be susceptible to hunting, trapping, and pet trade.
Mollusks				
False Spike	*Fusconaia mitchelli*	E	E, SGCN	Occurs in small streams to medium-size rivers in habitats such as riffles and runs with flowing water. Is often found in stable substrates of sand, gravel, and cobble (Howells 2010; Randklev et al. 2012; Sowards et al. 2013; Tsakiris and Randklev 2016). [Mussels of Texas 2019].
Guadalupe Fatmucket	*Lampsilis bergmanni*	E	T, SGCN	Reported to occur in slow to moderate current in sand, mud, and gravel substrates among large cobble, boulders, bedrock ledges, horizontal cracks in bedrock slabs, and macrophyte beds. Has also been observed inhabiting the roots of cypress trees and vegetation along steep banks. Reported in lakes at Kerrville, Texas, which suggests it may occasionally persist in some impoundment conditions (Robert G. Howells, personal communication). (Mussels of Texas, 2020).
Guadalupe Orb	*Cyclonaias necki*	E	E, SGCN	Species' distribution is limited to the Guadalupe River basin. Occurs in both mainstem and tributary habitats. Often found in substrates composed of sand, gravel, and cobble, including mud-silt or gravel-filled cracks in bedrock slabs. Considered intolerant of reservoirs, but are known to occur in them (Howells 2010m; Randklev et al. 2017b). [Mussels of Texas 2020].
Horseshoe Liptooth	*Daedalochila hippocrepis*	N/A	SGCN	Terrestrial snail known only from the steep, wooded hillsides of Landa Park in New Braunfels.
No Accepted Common Name	*Phreatodrobia micra*	N/A	SGCN	Habitat description is not available at this time.
Pimpleback	*Cyclonaias pustulosa*	N/A	SGCN	Occurs in small streams to large rivers in habitats including riffles and runs with flowing water, also found in nearshore habitats such as banks and backwaters or pools. Can occur in reservoirs but varies based by population. Is often found in substrates comprising of sand, gravel, and cobble but also mud and silt (Howells et al. 1996; Williams et al. 2008; Watters et al. 2009).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Pistolgrip	*Tritogonia verrucosa*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs, but considered less tolerant of impoundment (Haag and Cicerello 2016). Can occur in a variety of habitat types but most often found in main channel habitats such as riffles and runs with moderate current and sand, gravel, or cobble substrates (Howells et al. 1996; Williams et al. 2008).
Tampico Pearlymussel	*Cyrtonaias tampicoensis*	N/A	SGCN	Reported from streams to rivers, reservoirs, and canals. In riverine habitats often found in nearshore habitats such as banks and backwaters, to include pools and oxbows, in mud or sand or among cobble and boulders with still to moderate currents (Howells et al. 1996).
Reptiles				
American Alligator	*Alligator mississippiensis*	SAT	N/A	Aquatic: Coastal marshes; inland natural rivers, swamps and marshes; manmade impoundments.
Cagle's Map Turtle	*Graptemys caglei*	N/A	T, SGCN	Aquatic: shallow water with swift to moderate flow and gravel or cobble bottom, connected by deeper pools with a slower flow rate and a silt or mud bottom; gravel bar riffles and transition areas between riffles and pools especially important in providing insect prey items; nests on gently sloping sand banks within ca. 30 feet of waters edge
Eastern Box Turtle	*Terrapene carolina*	N/A	SGCN	Terrestrial: Eastern box turtles inhabit forests, fields, forest-brush, and forest-field ecotones. In some areas they move seasonally from fields in spring to forest in summer. They commonly enters pools of shallow water in summer. For shelter, they burrow into loose soil, debris, mud, old stump holes, or under leaf litter. They can successfully hibernate in sites that may experience subfreezing temperatures.
Plateau Spot-Tailed Earless Lizard	*Holbrookia lacerata*	N/A	SGCN	Terrestrial: Habitats include moderately open prairie-brushland regions, particularly fairly flat areas free of vegetation or other obstructions (e.g., open meadows, old and new fields, graded roadways, cleared and disturbed areas, prairie savanna, and active agriculture including row crops); also, oak-juniper woodlands and mesquite-prickly pear associations (Axtell 1968, Bartlett and Bartlett 1999).
Slender Glass Lizard	*Ophisaurus attenuatus*	N/A	SGCN	Terrestrial: Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Tamaulipan Spot-Tailed Earless	*Holbrookia subcaudalis*	N/A	SGCN	Terrestrial: Habitats include moderately open prairie-brushland regions, particularly fairly flat areas free of vegetation or other obstructions (e.g., open meadows, old and new fields, graded roadways, cleared and disturbed areas, prairie savanna, and active agriculture including row crops); also, oak-juniper woodlands and mesquite-prickly pear associations (Axtell 1968, Bartlett and Bartlett 1999).
Texas Horned Lizard	*Phrynosoma cornutum*	N/A	T, SGCN	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.
Texas Tortoise	*Gopherus berlandieri*	N/A	T, SGCN	Terrestrial: Open scrub woods, arid brush, lomas, grass-cactus association; often in areas with sandy well-drained soils. When inactive occupies shallow depressions dug at base of bush or cactus; sometimes in underground burrow or under object. Eggs are laid in nests dug in soil near or under bushes.
Western Box Turtle	*Terrapene ornata*	N/A	SGCN	Terrestrial: Ornate or western box turtles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species.
Plants				
Basin Bellflower	*Campanula reverchonii*	N/A	SGCN	Among scattered vegetation on loose gravel, gravelly sand, and rock outcrops on open slopes with exposures of igneous and metamorphic rocks; may also occur on sandbars and other alluvial deposits along major rivers; flowering May-July
Big Red Sage	*Salvia pentstemonoides*	N/A	SGCN	Moist to seasonally wet, steep limestone outcrops on seeps within canyons or along creek banks; occasionally on clayey to silty soils of creek banks and terraces, in partial shade to full sun; basal leaves conspicuous for much of the year; flowering June-October.
Bigflower Cornsalad	*Valerianella stenocarpa*	N/A	SGCN	Usually along creekbeds or in vernally moist grassy open areas (Carr 2015).
Bracted Twistflower	*Streptanthus bracteatus*	T	SGCN	Shallow, well-drained gravelly clays and clay loams over limestone in oak juniper woodlands and associated openings, on steep to moderate slopes and in canyon bottoms; several known soils include Tarrant, Brackett, or Speck over Edwards, Glen Rose, and Walnut geologic formations; populations fluctuate widely from year to year, depending on winter rainfall; flowering mid April-late May, fruit matures and foliage withers by early

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Buckley Tridens	*Tridens buckleyanus*	N/A	SGCN	Occurs in juniper-oak woodlands on rocky limestone slopes; Perennial; Flowering/Fruiting April-Nov.
Canyon Bean	*Phaseolus texensis*	N/A	SGCN	Narrowly endemic to rocky canyons in eastern and southern Edwards Plateau occurring on limestone soils in mixed woodlands, on limestone cliffs and outcrops, frequently along creeks. Flowering: May-Oct.
Canyon Mock-Orange	*Philadelphus texensis var. ernestii*	N/A	SGCN	Usually found growing from honeycomb pits on outcrops of Cretaceous limestone exposed as rimrock along mesic canyons, usually in the shade of mixed evergreen-deciduous canyon woodland; flowering April-June, fruit dehiscing September-October.
Canyon Sedge	*Carex edwardsiana*	N/A	SGCN	Dry-mesic decidous and deciduous-juniper woodlands in canyons and ravines, usually in clay loams very high in calcium on rocky banks and slopes just above streams and stream beds. Carex edwardsiana usually grows near C. planostachys. Fruiting spring (Ball, Reznicek, and 2003).
Darkstem Noseburn	*Tragia nigricans*	N/A	SGCN	Occurs in oak-juniper woodlands on mesic limestone slopes and canyon bottoms; perennial; flowering/fruiting April-Oct.
Glass Mountains Coral-Root	*Hexalectris nitida*	N/A	SGCN	Apparently rare in mixed woodlands in canyons in the mountains of the Brewster County, but encountered with regularity, albeit in small numbers, under Juniperus ashei in woodlands over limestone on the Edwards Plateau, Callahan Divide and Lampasas Cutplain; perennial; flowering June-Sept; fruiting July-Sept.
Hairy Sycamore-Leaf Snowbell	*Styrax platanifolius ssp. Stellatus*	N/A	SGCN	Rare throughout range, in habitats similar to those of var. platanifolius - usually in oak-juniper woodlands on steep rocky banks and ledges along intermittent or perennial streams, rarely far from some reliable source of moisture; perennial; flowering April-Oct; fruiting May-Sept.
Hall's Prairie Clover	*Dalea hallii*	N/A	SGCN	In grasslands on eroded limestone or chalk and in oak scrub on rocky hillsides; perennial; flowering May-Sept; fruiting June-Sept.
Heller's Marbleseed	*Onosmodium helleri*	N/A	SGCN	Occurs in loamy calcareous soils in oak-juniper woodlands on rocky limestone slopes, often in more mesic portions of canyons; perennial; flowering March-May.
Hill Country Wild-Mercury	*Argythamnia aphoroides*	N/A	SGCN	Mostly in bluestem-grama grasslands associated with plateau live oak woodlands on shallow to moderately deep clays and clay loams over limestone on rolling uplands, also in partial shade of oak-juniper woodlands in gravelly soils on rocky limestone slopes; perennial; flowering April-May with fruit persisting until midsummer.
Plateau Milkvine	*Matelea edwardsensis*	N/A	SGCN	Occurs in various types of juniper-oak and oak-juniper woodlands; perennial; flowering March-Oct; fruiting May-June.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Scarlet Leather-Flower	*Clematis texensis*	N/A	SGCN	Usually in oak-juniper woodlands in mesic rocky limestone canyons or along perennial streams; perennial; flowering March-July; fruiting May-July.
Sycamore-Leaf Snowbell	*Styrax platanifolius ssp. Platanifolius*	N/A	SGCN	Rare throughout range, usually in oak-juniper woodlands on steep rocky banks and ledges along intermittent or perennial streams, rarely far from some reliable source of moisture; perennial; flowering April-May; fruiting May-Aug.
Texas Amorpha	*Amorpha roemeriana*	N/A	SGCN	Juniper-oak woodlands or shrublands on rocky limestone slopes, sometimes on dry shelves above creeks; perennial; flowering May-June; fruiting June-Oct.
Texas Fescue	*Festuca versuta*	N/A	SGCN	Occurs in mesic woodlands on limestone-derived soils on stream terraces and canyon slopes; perennial; flowering/fruiting April-June.
Texas Mock-Orange	*Philadelphus texensis var. texensis*	N/A	SGCN	Limestone slopes and ravines, slopes in oak-juniper woodlands; variety texensis has a more westward range than var. ernestii; it is known from Bandera, Bexar, Edwards, Kendall, Medina, Real, and Uvalde counties in central Texas; flowering Apr–May; fruiting Jun–Oct (Freeman 2017).
Texas Seymeria	*Seymeria texana*	N/A	SGCN	Found primarily in grassy openings in juniper-oak woodlands on dry rocky slopes but sometimes on rock outcrops in shaded canyons; annual; flowering May-Nov; fruiting July-Nov.
Threeflower Penstemon	*Penstemon triflorus var. triflorus*	N/A	SGCN	Occurs sparingly on rock outcrops and in grasslands associated with juniper-oak woodlands (Carr 2015).
Tree Dodder	*Cuscuta exaltata*	N/A	SGCN	Parasitic on various Quercus, Juglans, Rhus, Vitis, Ulmus, and Diospyros species as well as Acacia berlandieri and other woody plants; annual; flowering May-Oct; fruiting July-Oct.
Turnip-Root Scurfpea	*Pediomelum cyphocalyx*	N/A	SGCN	Grasslands and openings in juniper-oak woodlands on limestone substrates on the Edwards Plateau and in north-central Texas (Carr 2015).
Wright's Milkvetch	*Astragalus wrightii*	N/A	SGCN	On sandy or gravelly soils; flowering/fruiting: April and May.

Table 5D-10 Medina County - Threatened and Endangered Species and Species of Greatest Conservation Need Summary

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Amphibians				
Strecker's Chorus Frog	*Pseudacris streckeri*	N/A	SGCN	Terrestrial and aquatic: Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates.
Valdina Farms Sinkhole Salamander	*Eurycea troglodytes*	N/A	SGCN	Aquatic; springs, streams and caves with rocky or cobble beds.
Woodhouse's Toad	*Anaxyrus woodhousii*	N/A	SGCN	Terrestrial and aquatic: A wide variety of terrestrial habitats are used by this species, including forests, grasslands, and barrier island sand dunes. Aquatic habitats are equally varied.
Arachnids				
No Accepted Common Name	*Cicurina medina*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Eidmannella nasuta*	N/A	SGCN	Habitat description is not available at this time.
Reddell's Cave Millipede	*Speodesmus reddelli*	N/A	SGCN	Habitat description is not available at this time.
Arthropods				
Sickled Cave Millipede	*Speodesmus falcatus*	N/A	SGCN	Habitat description is not available at this time.
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	DL	N/A	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds.
Bank Swallow	*Riparia riparia*	N/A	SGCN	Bank Swallows live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies of 10 to 2,000 nests. Though in the past Bank Swallows were most commonly found around natural bluffs or eroding streamside banks, they now often nest in human-made sites, such as sand and gravel quarries or road cuts. They forage in open areas and avoid places with tree cover.
Black-Capped Vireo	*Vireo atricapilla*	DL	SGCN	Oak-juniper woodlands with distinctive patchy, two-layered aspect; shrub and tree layer with open, grassy spaces; requires foliage reaching to ground level for nesting cover; return to same territory, or one nearby, year after year; deciduous and broad-leaved shrubs and trees provide insects for feeding; species composition less important than presence of adequate broad-leaved shrubs, foliage to ground level, and required structure; nesting season March-late summer.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Brewer's Blackbird	*Euphagus cyanocephalus*	N/A	SGCN	Shrubby and bushy areas (especially near water), riparian woodland, aspen parklands, cultivated lands, marshes, and around human habitation; in migration and winter also in pastures and fields (AOU 1983).
Cactus Wren	*Campylorhynchus brunneicapillus*	N/A	SGCN	Desert (especially with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and in trees in towns in arid regions (Tropical to Subtropical zones) (AOU 1983). Nests in OPUNTIA cactus, or in twiggy, thorny, trees and shrubs, sometimes in buildings. Nest may be relined and used as a winter roost.
Chestnut-Collared Longspur	*Calcarius ornatus*	N/A	SGCN	Occurs in open shortgrass settings especially in patches with some bare ground. Also occurs in grain sorghum fields and Conservation Reserve Program lands.
Common Nighthawk	*Chordeiles minor*	N/A	SGCN	Common Nighthawks nest in both rural and urban habitats including coastal sand dunes and beaches, logged forest, recently burned forest, woodland clearings, prairies, plains, sagebrush, grasslands, open forests, and rock outcrops. They also nest on flat gravel rooftops, though less often as gravel roofs are being replaced by smooth, rubberized roofs that provide an unsuitable surface.
Franklin's Gull	*Leucophaeus pipixcan*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. This species is only a spring and fall migrant throughout Texas. It does not breed in or near Texas. Winter records are unusual consisting of one or a few individuals at a given site (especially along the Gulf coastline). During migration, these gulls fly during daylight hours but often come down to wetlands, lake shore, or islands to roost for the night.
Golden-Cheeked Warbler	*Setophaga chrysoparia*	E	E, SGCN	Ashe juniper in mixed stands with various oaks (Quercus spp.). Edges of cedar brakes. Dependent on Ashe juniper (also known as cedar) for long fine bark strips, only available from mature trees, used in nest construction; nests are placed in various trees other than Ashe juniper; only a few mature junipers or nearby cedar brakes can provide the necessary nest material; forage for insects in broad-leaved trees and shrubs; nesting late March-early summer.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Lark Bunting	*Calamospiza melanocorys*	N/A	SGCN	Overall, it's a generalist in most short grassland settings including ones with some brushy component plus certain agricultural lands that include grain sorghum. Short grasses include sideoats and blue gramas, sand dropseed, prairie junegrass (Koeleria), buffalograss also with patches of bluestem and other mid-grass species. This bunting will frequent smaller patches of grasses or disturbed patches of grasses including rural yards. It also uses weedy fields surrounding playas. This species avoids urban areas and cotton fields.
Loggerhead Shrike	*Lanius ludovicianus*	N/A	SGCN	Loggerhead Shrikes inhabit open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead Shrikes are often seen along mowed roadsides with access to fence lines and utility poles
Mountain Plover	*Charadrius montanus*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous
Northern Bobwhite	*Colinus virginianus*	N/A	SGCN	Inhabits a wide variety of vegetation types, particularly early successional stages. Occurs in croplands, grasslands, pastures, fallow fields, grassbrush rangelands, open pinelands, open mixed pine-hardwood forests, and habitat mosaics (Brennan 1999).
Pyrrhuloxia	*Cardinalis sinuatus*	N/A	SGCN	Pyrrhuloxias live in upland deserts, mesquite savannas, riparian (streamside) woodlands, desert scrublands, farm fields with hedgerows, and residential areas with nearby mesquite. When not breeding, some Pyrrhuloxias wander into urban habitats, mesquite-hackberry habitats, and riparian habitats with Arizona sycamore and cottonwood.
Sanderling	*Calidris alba*	N/A	SGCN	Nonbreeding: primarily sandy beaches, less frequently on mud flats and shores of lakes or rivers (AOU 1983) also on exposed reefs (Pratt et al. 1987). Sleeps/loafs on upper beach or on salt pond dike.
Scaled Quail	*Callipepla squamata*	N/A	SGCN	In general, preferred habitat is arid-semiarid, mixed shrub-grassland. Common shrubs of preferred habitat include acacia (Acacia spp.), sand sagebrush (Artemesia filifolia), four-winged saltbush (Atriplex canescens), cacti (Opuntia spp.), honey mesquite (Prosopis glandulosa), sumacs (Rhus aromatica, R. microphylla, R. trilobata), yucca (Yucca spp.), and snakeweed (Xanthocephalum sarothrae).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Snowy Plover	*Charadrius nivosus*	N/A	SGCN	Algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. An optimal site characteristic would be large in size. The size of populations appear to be roughly proportional to the total area of suitable habitat used. Formerly an uncommon breeder in the Panhandle; potential migrant; winter along coast.
Sprague's Pipit	*Anthus spragueii*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat during migration and in winter consists of pastures and weedy fields (AOU 1983), including grasslands with dense herbaceous vegetation or grassy agricultural fields.
Western Burrowing Owl	*Athene cunicularia hypugaea*	N/A	N/A	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows.
White-Faced Ibis	*Plegadis chihi*	N/A	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.
Whooping Crane	*Grus americana*	E	E, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.
Willet	*Tringa semipalmata*	N/A	SGCN	Marshes, tidal mudflats, beaches, lake margins, mangroves, tidal channels, river mouths, coastal lagoons, sandy or rocky shores, and, less frequently, open grassland (AOU 1983, Stiles and Skutch 1989).
Wilson's Warbler	*Cardellina pusilla*	N/A	SGCN	Wilson's warblers key in on forests and scrubby areas along streams to fatten up during migration. During the nonbreeding season they use many types of habitats from lowland thickets near streams to high-elevation cloud forests in Mexico and Central America.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Wood Stork	*Mycteria americana*	N/A	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.
Yellow-Billed Cuckoo	*Coccyzus americanus*	T	SGCN	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Crustaceans				
No Accepted Common Name	*Mexiweckelia hardeni*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Seborgia hershleri*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Brackenridgia reddelli*	N/A	SGCN	Habitat description is not available at this time.
Fish				

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Guadalupe Bass	*Micropterus treculii*	N/A	SGCN	Endemic to the streams of the northern and eastern Edwards Plateau including portions of the Brazos, Colorado, Guadalupe, and San Antonio basins; species also found outside of the Edwards Plateau streams in decreased abundance, primarily in the lower Colorado River; two introduced populations have been established in the Nueces River system. A pure population was re-established in a portion of the Blanco River in 2014. Species prefers lentic environments but commonly taken in flowing water; numerous smaller fish occur in rapids, many times near eddies; large individuals found mainly in riffle tail races; usually found in spring-fed streams having clear water and relatively consistent temperatures.
Texas Shiner	*Notropis amabilis*	N/A	SGCN	In Texas, it is found primarily in Edwards Plateau streams from the San Gabriel River in the east to the Pecos River in the west. Typical habitat includes rocky or sandy runs, as well as pools.
Insects				
American Bumblebee	*Bombus pensylvanicus*	N/A	SGCN	Habitat description is not available at this time.
Manfreda Giant-Skipper	*Stallingsia maculosus*	N/A	SGCN	Most skippers are small and stout-bodied; name derives from fast, erratic flight; at rest most skippers hold front and hind wings at different angles; skipper larvae are smooth, with the head and neck constricted; skipper larvae usually feed inside a leaf shelter and pupate in a cocoon made of leaves fastened together with silk.
No Accepted Common Name	*Ochrotrichia capitana*	N/A	SGCN	Habitat description is not available at this time.
Mammals				
Black-Tailed Prairie Dog	*Cynomys ludovicianus*	N/A	SGCN	Dry, flat, short grasslands with low, relatively sparse vegetation, including areas overgrazed by cattle; live in large family groups.
Cave Myotis Bat	*Myotis velifer*	N/A	SGCN	Colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore.
Eastern Spotted Skunk	*Spilogale putorius*	N/A	SGCN	Generalist; open fields prairies, croplands, fence rows, farmyards, forest edges & woodlands. Prefer wooded, brushy areas & tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.
Frio Pocket Gopher	*Geomys texensis bakeri*	N/A	SGCN	Associated with nearly level Atco soil, which is well-drained and consists of sandy surface layers with loam extending to as deep as two meters.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Ghost-Faced Bat	*Mormoops megalophylla*	N/A	SGCN	Winter roosts are in large limestone caves. Buildings and rock crevasses provide roosts, as well.
Hoary Bat	*Lasiurus cinereus*	N/A	SGCN	Hoary bats are highly migratory, high-flying bats that have been noted throughout the state. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage roosting species) but are found in unforested parts of the state and lowland deserts. Tend to be captured over water and large, open flyways.
Mountain Lion	*Puma concolor*	N/A	SGCN	Generalist; found in a wide range of habitats statewide. Found most frequently in rugged mountains; riparian zones.
Plains Spotted Skunk	*Spilogale interrupta*	N/A	SGCN	Generalist; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie
Tricolored Bat	*Perimyotis subflavus*	PE	SGCN	Forest, woodland and riparian areas are important. Caves are very important to this species.
Western Pipistrelle	*Parastrellus hesperus*			Desert to pine-oak woodland. Cliffs and rock crevices provide roosts.
White-Nosed Coati	*Nasua narica*			Woodlands, riparian corridors and canyons.Most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees; omnivorous; may be susceptible to hunting, trapping, and pet trade.
Mollusks				
Edwards Plateau Liptooth	*Millerelix gracilis*	N/A	SGCN	Habitat description is not available at this time.
Reptiles				
Keeled Earless Lizard	*Holbrookia propinqua*	N/A	SGCN	Terrestrial: Habitats include coastal dunes, barrier islands, and other sandy areas (Axtell 1983). Although it occurs well inland, this species is most abundant on coastal dunes, were it seeks shelter in the burrows of small mammals or crabs (Bartlett and Bartlett 1999).
Texas Horned Lizard	*Phrynosoma cornutum*	N/A	T, SGCN	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.
Texas Tortoise	*Gopherus berlandieri*	N/A	T, SGCN	Terrestrial: Open scrub woods, arid brush, lomas, grass-cactus association; often in areas with sandy well-drained soils. When inactive occupies shallow depressions dug at base of bush or cactus; sometimes in underground burrow or under object. Eggs are laid in nests dug in soil near or under bushes.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Western Box Turtle	*Terrapene ornata*	N/A	SGCN	Terrestrial: Ornate or western box turtles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species.
Plants				
Bigflower Cornsalad	*Valerianella stenocarpa*	N/A	SGCN	Usually along creekbeds or in vernally moist grassy open areas (Carr 2015).
Bracted Twistflower	*Streptanthus bracteatus*	T	SGCN	Shallow, well-drained gravelly clays and clay loams over limestone in oak juniper woodlands and associated openings, on steep to moderate slopes and in canyon bottoms; several known soils include Tarrant, Brackett, or Speck over Edwards, Glen Rose, and Walnut geologic formations; populations fluctuate widely from year to year, depending on winter rainfall; flowering mid April-late May, fruit matures and foliage withers by early summer.
Bristle Nailwort	*Paronychia setacea*	N/A	SGCN	Flowering vascular plant endemic to eastern southcentral Texas, occurring in sandy soils.
Buckley Tridens	*Tridens buckleyanus*	N/A	SGCN	Occurs in juniper-oak woodlands on rocky limestone slopes; perennial; flowering/fruiting April-Nov.
Burridge Greenthread	*Thelesperma burridgeanum*	N/A	SGCN	Sandy open areas; annual; flowering March-Nov; fruiting March-June.
Canyon Bean	*Phaseolus texensis*	N/A	SGCN	Narrowly endemic to rocky canyons in eastern and southern Edwards Plateau occurring on limestone soils in mixed woodlands, on limestone cliffs and outcrops, frequently along creeks. Flowering: May-Oct.
Darkstem Noseburn	*Tragia nigricans*	N/A	SGCN	Occurs in oak-juniper woodlands on mesic limestone slopes and canyon bottoms; perennial; flowering/fruiting April-Oct.
Hairy Sycamore-Leaf Snowbell	*Styrax platanifolius ssp. Stellatus*	N/A	SGCN	Rare throughout range, in habitats similar to those of var. platanifolius - usually in oak-juniper woodlands on steep rocky banks and ledges along intermittent or perennial streams, rarely far from some reliable source of moisture; perennial; flowering April-Oct; fruiting May-Sept.
Longstalk Heimia	*Ammannia grayi*	N/A	SGCN	Moist or subirrigated alkaline or gypsiferous clayey soils along unshaded margins of cienegas and other wetlands; occurs sparingly on an alkaline, somewhat saline silt loam on terraces of spring-fed streams in grassland; also occurs common in moderately alkaline clay along perennial stream and in subirrigated wetlands atop poorly-defined spring system; also occurs in low, wetland area along highway right-of-way; flowering May-September.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Plateau Loosestrife	*Lythrum ovalifolium*	N/A	SGCN	Banks and gravelly beds of perennial (or strong intermittent) streams on the Edwards Plateau, Llano Uplift and Lampasas Cutplain; perennial; flowering/fruiting April-Nov.
Plateau Milkvine	*Matelea edwardsensis*	N/A	SGCN	Occurs in various types of juniper-oak and oak-juniper woodlands; perennial; flowering March-Oct; fruiting May-June.
Sandhill Woolywhite	*Hymenopappus carrizoanus*	N/A	SGCN	Disturbed or open areas in grasslands and post oak woodlands on deep sands derived from the Carrizo Sand and similar Eocene formations; flowering April-June.
Scarlet Leather-Flower	*Clematis texensis*	N/A	SGCN	Usually in oak-juniper woodlands in mesic rocky limestone canyons or along perennial streams; perennial; flowering March-July; fruiting May-July.
Texas Almond	*Prunus minutiflora*	N/A	SGCN	Wide-ranging but scarce, in a variety of grassland and shrubland situations, mostly on calcareous soils underlain by limestone but occasionally in sandier neutral soils underlain by granite; perennial; flowering Feb-May and Oct; fruiting Feb-Sept.
Texas Amorpha	*Amorpha roemeriana*	N/A	SGCN	Juniper-oak woodlands or shrublands on rocky limestone slopes, sometimes on dry shelves above creeks; perennial; flowering May-June; fruiting June-Oct.
Texas Barberry	*Berberis swaseyi*	N/A	SGCN	Shallow calcareous stony clay of upland grasslands/shrublands over limestone as well as in loamier soils in openly wooded canyons and on creek terraces; perennial; flowering/fruiting March-June.
Texas Fescue	*Festuca versuta*	N/A	SGCN	Occurs in mesic woodlands on limestone-derived soils on stream terraces and canyon slopes; perennial; flowering/fruiting April-June.
Texas Mock-Orange	*Philadelphus texensis var. texensis*	N/A	SGCN	Limestone slopes and ravines, slopes in oak-juniper woodlands; variety texensis has a more westward range than var. ernestii; it is known from Bandera, Bexar, Edwards, Kendall, Medina, Real, and Uvalde counties in central Texas; Flowering Apr–May; fruiting Jun–Oct (Freeman 2017).
Texas Peachbush	*Prunus texana*	N/A	SGCN	Occurs at scattered sites in various well drained sandy situations; deep sand, plains and sand hills, grasslands, oak woods, 0-200 m elevation; perennial; flowering Feb-Mar; fruiting Apr-Jun.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Tobusch Fishhook Cactus	*Sclerocactus brevihamatus ssp. Tobuschii*	T	E, SGCN	Shallow, moderately alkaline, stony clay and clay loams over massive fractured limestone; usually on level to slightly sloping hilltops; occasionally on relatively level areas on steeper slopes, and in rocky floodplains; usually open areas within a mosaic of oak-juniper woodlands, occasionally in pine-oak woodlands, rarely in cenizo shrublands or little bluestem grasslands; sites are usually open with only herbaceous cover, although the cactus may be somewhat protected by rocks, grasses, or spikemosses; flowering (late January/early February-March (rarely early April).
Woolly Butterfly-Weed	*Oenothera cinerea ssp. Parksii*	N/A	SGCN	Flats and hills of red sand of Rio Grande Plains (Raven and Gregory 1972). April-Oct.

Table 5D-11 Victoria County - Threatened and Endangered Species and Species of Greatest Conservation Need Summary

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Amphibians				
Southern Crawfish Frog	*Lithobates areolatus areolatus*	N/A	SGCN	Terrestrial and aquatic: The terestial habitat is primarily grassland and can vary from pasture to intact prairie; it can also include small prairies in the middle of large forested areas. Aquatic habitat is any body of water but preferred habitat is ephemeral wetlands.
Strecker's Chorus Frog	*Pseudacris streckeri*	N/A	SGCN	Terrestrial and aquatic: Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates.
Woodhouse's Toad	*Anaxyrus woodhousii*	N/A	SGCN	Terrestrial and aquatic: A wide variety of terrestrial habitats are used by this species, including forests, grasslands, and barrier island sand dunes. Aquatic habitats are equally varied.
Birds				
Attwater's Greater Prairie-Chicken	*Tympanuchus cupido attwateri*	E	E, SGCN	Open prairies of mostly thick grass one to three feet tall; sandhill country with bunch grass, sage, and shinnery oak. From near sea level to 200 feet along coastal plain on upper two-thirds of Texas coast; males form communal display flocks during late winter-early spring; booming grounds important; breeding February-July.
Bald Eagle	*Haliaeetus leucocephalus*	DL	N/A	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds.
Bank Swallow	*Riparia riparia*	N/A	SGCN	Bank Swallows live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies of 10 to 2,000 nests. Though in the past Bank Swallows were most commonly found around natural bluffs or eroding streamside banks, they now often nest in human-made sites, such as sand and gravel quarries or road cuts. They forage in open areas and avoid places with tree cover.
Black Rail	*Laterallus jamaicensis*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of
Brewer's Blackbird	*Euphagus cyanocephalus*	N/A	SGCN	Shrubby and bushy areas (especially near water), riparian woodland, aspen parklands, cultivated lands, marshes, and around human habitation; in migration and winter also in pastures and fields (AOU 1983).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Common Nighthawk	*Chordeiles minor*	N/A	SGCN	Common Nighthawks nest in both rural and urban habitats including coastal sand dunes and beaches, logged forest, recently burned forest, woodland clearings, prairies, plains, sagebrush, grasslands, open forests, and rock outcrops. They also nest on flat gravel rooftops, though less often as gravel roofs are being replaced by smooth, rubberized roofs that provide an unsuitable
Franklin's Gull	*Leucophaeus pipixcan*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. This species is only a spring and fall migrant throughout Texas. It does not breed in or near Texas. Winter records are unusual consisting of one or a few individuals at a given site (especially along the Gulf coastline). During migration, these gulls fly during daylight hours but often come down to wetlands, lake shore, or islands to roost for the night.
Henslow's Sparrow	*Centronyx henslowii*	N/A	SGCN	Wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking
Interior Least Tern	*Sternula antillarum athalassos*	DL	E	Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony.
Least Tern	*Sternula antillarum*	DL	SGCN	Sand beaches, flats, bays, inlets, lagoons, islands, river sandbars and flat gravel rooftops in urban areas.
Loggerhead Shrike	*Lanius ludovicianus*	N/A	SGCN	Loggerhead Shrikes inhabit open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead Shrikes are often seen along mowed roadsides with access to fence lines and utility
Mottled Duck	*Anas fulvigula*	N/A	SGCN	Estuaries, ponds, lakes, secondary bays.
Mountain Plover	*Charadrius montanus*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed)

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Northern Bobwhite	*Colinus virginianus*	N/A	SGCN	Inhabits a wide variety of vegetation types, particularly early successional stages. Occurs in croplands, grasslands, pastures, fallow fields, grassbrush rangelands, open pinelands, open mixed pine-hardwood forests, and habitat mosaics (Brennan 1999).
Piping Plover	*Charadrius melodus*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.
Pyrrhuloxia	*Cardinalis sinuatus*	N/A	SGCN	Pyrrhuloxias live in upland deserts, mesquite savannas, riparian (streamside) woodlands, desert scrublands, farm fields with hedgerows, and residential areas with nearby mesquite. When not breeding, some Pyrrhuloxias wander into urban habitats, mesquite-hackberry habitats, and riparian habitats with Arizona sycamore and cottonwood.
Reddish Egret	*Egretta rufescens*	N/A	T, SGCN	Resident of the Texas Gulf Coast; brackish marshes and shallow salt ponds and tidal flats; nests on ground or in trees or bushes, on dry coastal islands in brushy thickets of yucca and prickly pear

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Rufa Red Knot	*Calidris canutus rufa*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore. Bolivar Flats in Galveston County, sandy beaches Mustang Island, few on outer coastal and barrier beaches, tidal mudflats and salt marshes.
Sanderling	*Calidris alba*	N/A	SGCN	Nonbreeding: primarily sandy beaches, less frequently on mud flats and shores of lakes or rivers (AOU 1983) also on exposed reefs (Pratt et al. 1987). Sleeps/loafs on upper beach or on salt pond dike
Snowy Plover	*Charadrius nivosus*	N/A	SGCN	Algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. An optimal site characteristic would be large in size. The size of populations appear to be roughly proportional to the total area of suitable habitat used. Formerly an uncommon breeder in the Panhandle; potential migrant; winter along
Sprague's Pipit	*Anthus spragueii*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat during migration and in winter consists of pastures and weedy fields (AOU 1983), including grasslands with dense herbaceous vegetation or grassy agricultural fields.
Swallow-Tailed Kite	*Elanoides forficatus*	N/A	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Lowland forested regions, especially swampy areas, ranging into open woodland; marshes, along rivers, lakes, and ponds; nests high in tall tree in clearing or on forest woodland edge, usually in pine, cypress, or various deciduous trees.
Western Burrowing Owl	*Athene cunicularia hypugaea*	N/A	N/A	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
White-Faced Ibis	*Plegadis chihi*	N/A	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.
White-Tailed Hawk	*Buteo albicaudatus*	N/A	T	Near coast on prairies, cordgrass flats, and scrub-live oak; further inland on prairies, mesquite and oak savannas, and mixed savanna-chaparral; breeding March-May.
Whooping Crane	*Grus americana*	E	E, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and
Willet	*Tringa semipalmata*	N/A	SGCN	Marshes, tidal mudflats, beaches, lake margins, mangroves, tidal channels, river mouths, coastal lagoons, sandy or rocky shores, and, less frequently, open grassland (AOU 1983, Stiles and Skutch 1989).
Wilson's Warbler	*Cardellina pusilla*	N/A	SGCN	Wilson’s warblers key in on forests and scrubby areas along streams to fatten up during migration. During the nonbreeding season they use many types of habitats from lowland thickets near streams to high-elevation cloud forests in Mexico and Central America.
Wood Stork	*Mycteria americana*	N/A	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Yellow Rail	*Coturnicops noveboracensis*	N/A	SGCN	Breeding: Emergent wetlands, grass or sedge marshes and wet meadows in freshwater situations. Some breeding territories in these wet meadows contain firm footing and only a few remnant pools of water (Berkey 1991). These areas can range from damp to 38 cm (15 inches) of water but the average depth used for nesting is 8 to 15 cm (3 to 6 inches) (Savaloja 1981). Non-breeding: Grain fields in winter and when migrating. Winters in both freshwater and brackish marshes, as well as in dense, deep grass. During fall migration, will use many open habitats, from rice paddies to dry hayfields.
Yellow-Billed Cuckoo	*Coccyzus americanus*	T	SGCN	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Fish				
American Eel	*Anguilla rostrata*	N/A	SGCN	Originally found in all river systems from the Red River to the Rio Grande. Aquatic habtiats include large rivers, streams, tributaries, coastal watersheds, estuaries, bays, and oceans. Spawns in Sargasso Sea, larva move to coastal waters, metamorphose, and begin upstream movements. Females tend to move further upstream than males (who are often found in brackish estuaries). American Eel are habitat generalists and may be found in a broad range of habitat conditions including slow- and fast-flowing waters over many substrate types. Extirpation in upstream drainages attributed to reservoirs that impede upstream migration.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Guadalupe Bass	*Micropterus treculii*	N/A	SGCN	Endemic to the streams of the northern and eastern Edwards Plateau including portions of the Brazos, Colorado, Guadalupe, and San Antonio basins; species also found outside of the Edwards Plateau streams in decreased abundance, primarily in the lower Colorado River; two introduced populations have been established in the Nueces River system. A pure population was re-established in a portion of the Blanco River in 2014. Species prefers lentic environments but commonly taken in flowing water; numerous smaller fish occur in rapids, many times near eddies; large individuals found mainly in riffle tail races; usually found in spring-fed streams having clear water and relatively consistent temperatures.
Guadalupe Darter	*Percina apristis*	N/A	T, SGCN	Endemic to the Guadalupe River Basin; Found in riffles; most common under or around 25-30 cm boulders in the main current; seems to prefer moderately turbid water.
Southern Flounder	*Paralichthys lethostigma*	N/A	SGCN	This is an estuarine-dependent species that inhabits riverine, estuarine and coastal waters, and prefers muddy, sandy, or silty substrates (Reagan and Wingo 1985). Individuals can tolerate wide temperature (~5-35°C) and salinity ranges (0-60 ppt). Southern Flounder spawn in offshore waters of the Gulf of Mexico from October to February (Reagan and Wingo 1985). The oceanic larval stage is pelagic and lasts 30–60 days. Metamorphosing individuals enter estuaries and migrate towards low-salinity headwaters, where settlement occurs (Burke et al. 1991, Walsh et al. 1999). The young fish enter the bays during late winter and early spring, occupying seagrass; some may move further into coastal rivers and bayous. Juveniles remain in estuaries until the onset of sexual maturation (approximately two years), at which time they migrate out of estuaries to join adults on the inner continental shelf. Adult southern flounder leave the bays during the fall for spawning in the Gulf of Mexico. They spawn for the first time when two years old at depths of 50 to 100 feet. Although most of the adults leave the bays and enter the Gulf for spawning during the winter, some remain behind and spend winter in the bays. Those in the Gulf will reenter the bays in the spring. The spring influx is gradual and does not occur with large concentrations that characterize the fall emigration.
Spotted Sucker	*Minytrema melanops*	N/A	SGCN	Found primarily in east Texas streams from the Red to the Brazos river basins. An isolated, disjunct population occurs in the Llano River near Junction downstream to about Mason; this may be an introduced population. Typically in clear creeks with firm substrates.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Texas Shiner	*Notropis amabilis*	N/A	SGCN	In Texas, it is found primarily in Edwards Plateau streams from the San Gabriel River in the east to the Pecos River in the west. Typical habitat includes rocky or sandy runs, as well as pools.
Insects				
American Bumblebee	*Bombus pensylvanicus*	N/A	SGCN	Habitat description is not available at this time.
Comanche Harvester Ant	*Pogonomyrmex comanche*	N/A	SGCN	Habitat description is not available at this time.
No Accepted Common Name	*Tortopus circumfluus*	N/A	SGCN	Mayflies distinguished by aquatic larval stage; adult stage generally found in shoreline vegetation.
No Accepted Common Name	*Tricorythodes curvatus*	N/A	SGCN	AR, OK, TX; mayflies distinguished by aquatic larval stage; adult stage generally found in bankside vegetation.
Mammals				
Big Free-Tailed Bat	*Nyctinomops macrotis*	N/A	SGCN	Habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore.
Eastern Spotted Skunk	*Spilogale putorius*	N/A	SGCN	Generalist; open fields prairies, croplands, fence rows, farmyards, forest edges; woodlands. Prefer wooded, brushy areas; tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.
Hoary Bat	*Lasiurus cinereus*	N/A	SGCN	Hoary bats are highly migratory, high-flying bats that have been noted throughout the state. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage roosting species) but are found in unforested parts of the state and lowland deserts. Tend to be captured over water and large, open flyways.
Mountain Lion	*Puma concolor*	N/A	SGCN	Generalist; found in a wide range of habitats statewide. Found most frequently in rugged mountains; riparian zones.
Plains Spotted Skunk	*Spilogale interrupta*	N/A	SGCN	Generalist; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie.
Tricolored Bat	*Perimyotis subflavus*	PE	SGCN	Forest, woodland and riparian areas are important. Caves are very important to this species.
White-Nosed Coati	*Nasua narica*	N/A	T, SGCN	Woodlands, riparian corridors and canyons. Most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees; omnivorous; may be susceptible to hunting, trapping, and pet trade.
Mollusks				

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
False Spike	*Fusconaia mitchelli*	E	E, SGCN	Occurs in small streams to medium-size rivers in habitats such as riffles and runs with flowing water. Is often found in stable substrates of sand, gravel, and cobble (Howells 2010; Randklev et al. 2012; Sowards et al. 2013; Tsakiris and Randklev 2016). [Mussels of Texas 2019].
Guadalupe Orb	*Cyclonaias necki*	E	E, SGCN	Species' distribution is limited to the Guadalupe River basin. Occurs in both mainstem and tributary habitats. Often found in substrates composed of sand, gravel, and cobble, including mud-silt or gravel-filled cracks in bedrock slabs. Considered intolerant of reservoirs, but are known to occur in them (Howells 2010m; Randklev et al. 2017b). [Mussels of Texas 2020].
Lilliput	*Toxolasma parvum*	N/A	SGCN	Reported from small streams, where it may penetrate into the headwaters, to large rivers, oxbows, sloughs, lakes, ponds, canals, borrow pits, and reservoirs. Primarily occurs in still to slow currents in mud and sand substrates (Coker et al. 1921; Read 1954; Neck and Metcalf 1988; Williams et al. 2008; Watters et al. 2009).
Louisiana Fatmucket	*Lampsilis hydiana*	N/A	SGCN	Reported from streams to rivers, may penetrate into headwaters, oxbows, lakes, canals, and reservoirs. Reported to occur in still to moderate currents in sand, mud, and gravel substrates. In riverine systems it is found primarily in nearshore habitats such as banks, backwaters and oxbows (Howells et al. 1996; Randklev et al. 2013a; Randklev et al. 2014a; Tsakiris and Randklev 2016). It adapts readily to reservoirs and can cope with flow modification stemming from river impoundment (Randklev et al. 2016).
Mapleleaf	*Quadrula quadrula*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs. In riverine habitats, it may be found in main-channel habitats such as riffles or runs in sand, gravel, and cobble substrates with moderate to swift currents. May also be found in nearshore habitats such as banks and backwaters to include pools in sand or mud substrates with little to no flow. (Williams et al. 2008; Howells 2016; Haag and Cicerello 2016).
Pimpleback	*Cyclonaias pustulosa*	N/A	SGCN	Occurs in small streams to large rivers in habitats including riffles and runs with flowing water, also found in nearshore habitats such as banks and backwaters or pools. Can occur in reservoirs but varies based by population. Is often found in substrates comprising of sand, gravel, and cobble but also mud and silt (Howells et al. 1996; Williams et al. 2008; Watters et al. 2009).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Pistolgrip	*Tritogonia verrucosa*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs, but considered less tolerant of impoundment (Haag and Cicerello 2016). Can occur in a variety of habitat types but most often found in main channel habitats such as riffles and runs with moderate current and sand, gravel, or cobble substrates (Howells et al. 1996; Williams et al. 2008).
Pondmussel	*Sagittunio subrostratus*	N/A	SGCN	Reported from streams to rivers, where it can invade headwater systems but is rarely in large river systems. Can also inhabit natural and artificial ponds, lakes, reservoirs, and canals. In riverine habitat typically occurs in backwaters, pools, sloughs, and oxbows in little to no current in substrates of mud or sand (Parmalee and Bogan 1998; Williams et al. 2008; Watters et al. 2009; Haag and Cicerello 2016; Watters 2018).
Tampico Pearlymussel	*Cyrtonaias tampicoensis*	N/A	SGCN	Reported from streams to rivers, reservoirs, and canals. In riverine habitats often found in nearshore habitats such as banks and backwaters, to include pools and oxbows, in mud or sand or among cobble and boulders with still to moderate currents (Howells et al. 1996).
Reptiles				
American Alligator	*Alligator mississippiensis*	SAT	N/A	Aquatic: Coastal marshes; inland natural rivers, swamps and marshes; manmade impoundments.
Cagle's Map Turtle	*Graptemys caglei*	N/A	T, SGCN	Aquatic: shallow water with swift to moderate flow and gravel or cobble bottom, connected by deeper pools with a slower flow rate and a silt or mud bottom; gravel bar riffles and transition areas between riffles and pools especially important in providing insect prey items; nests on gently sloping sand banks within ca. 30 feet of waters edge.
Common Garter Snake	*Thamnophis sirtalis*	N/A	SGCN	Terrestrial and aquatic: Habitats used include the grasslands and modified open areas in the vicinity of aquatic features, such as ponds, streams or marshes. Damp soils and debris for cover are thought to be critical.
Eastern Box Turtle	*Terrapene carolina*	N/A	SGCN	Terrestrial: Eastern box turtles inhabit forests, fields, forest-brush, and forest-field ecotones. In some areas they move seasonally from fields in spring to forest in summer. They commonly enters pools of shallow water in summer. For shelter, they burrow into loose soil, debris, mud, old stump holes, or under leaf litter. They can successfully hibernate in sites that may experience subfreezing temperatures.
Keeled Earless Lizard	*Holbrookia propinqua*	N/A	SGCN	Terrestrial: Habitats include coastal dunes, barrier islands, and other sandy areas (Axtell 1983). Although it occurs well inland, this species is most abundant on coastal dunes, were it seeks shelter in the burrows of small mammals or crabs (Bartlett and Bartlett 1999).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Prairie Skink	*Plestiodon septentrionalis*	N/A	SGCN	The prairie skink can occur in any native grassland habitat across the Rolling Plains, Blackland Prairie, Post Oak Savanna and Pineywoods ecoregions.
Pygmy Rattlesnake	*Sistrurus miliarius*	N/A	SGCN	The pygmy rattlesnake occurs in a variety of wooded habitats from bottomland coastal hardwood forests to upland savannas. The species is frequently found in association with standing water.
Slender Glass Lizard	*Ophisaurus attenuatus*	N/A	SGCN	Terrestrial: Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil.
Texas Diamondback Terrapin	*Malaclemys terrapin littoralis*	N/A	SGCN	Coastal marshes, tidal flats, coves, estuaries, and lagoons behind barrier beaches; brackish and salt water; burrows into mud when inactive. Bay islands are important habitats. Nests on oyster shell beaches.
Texas Horned Lizard	*Phrynosoma cornutum*	N/A	T, SGCN	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.
Texas Tortoise	*Gopherus berlandieri*	N/A	T, SGCN	Terrestrial: Open scrub woods, arid brush, lomas, grass-cactus association; often in areas with sandy well-drained soils. When inactive occupies shallow depressions dug at base of bush or cactus; sometimes in underground burrow or under object. Eggs are laid in nests dug in soil near or under bushes.
Western Box Turtle	*Terrapene ornata*	N/A	SGCN	Terrestrial: Ornate or western box turtles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species.
Western Massasauga	*Sistrurus tergeminus*	N/A	SGCN	Terrestrial: Shortgrass or mixed grass prairie, with gravel or sandy soils. Often found associated with draws, floodplains, and more mesic habitats within the arid landscape. Frequently occurs in shrub encroached grasslands.
Plants				
Awnless Leastdaisy	*Chaetopappa imberbis*	N/A	SGCN	In woodlands on loams of Carrizo sand (TEX-LL specimens Carr 23875, 12507). Flowering and fruiting during Mar - May.
Coastal Gay-Feather	*Liatris bracteata*	N/A	SGCN	Coastal prairie grasslands of various types, from salty prairie on low- lying somewhat saline clay loams to upland prairie on nonsaline clayey to sandy loams; flowering in fall.
Crestless Onion	*Allium canadense var. ecristatum*	N/A	SGCN	Occurs on poorly drained sites on sandy substrates within coastal prairies of the Coastal Bend area (Carr 2015).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Heartleaf Evening-Primrose	*Oenothera cordata*	N/A	SGCN	Occurs in post oak woodlands on sandy soils on the coastal plain (Carr 2015).
Indianola Beakrush	*Rhynchospora indianolensis*	N/A	SGCN	Locally abundant in cattle pastures in some areas (at least during wet years), possibly becoming a management problem in such sites; perennial; flowering/fruiting April-Nov
Jones's Rainlilly	*Zephyranthes jonesii*	N/A	SGCN	Hardpan swales and other seasonally moist low areas (Jones 1977). Flowering mid summer--early fall (Jul--Oct) (Flagg, Smith & Flory 2002).
Texas Peachbush	*Prunus texana*	N/A	SGCN	Occurs at scattered sites in various well drained sandy situations; deep sand, plains and sand hills, grasslands, oak woods, 0-200 m elevation; perennial; flowering Feb-Mar; fruiting Apr-Jun
Texas Pinkroot	*Spigelia texana*	N/A	SGCN	Woodlands on loamy soils; perennial; flowering March-Nov; fruiting April-Nov.
Texas Tauschia	*Tauschia texana*	N/A	SGCN	Occurs in loamy soils in deciduous forests or woodlands on river and stream terraces; perennial; flowering/fruiting Feb-April.
Threeflower Broomweed	*Thurovia triflora*	N/A	SGCN	Near coast in sparse, low vegetation on a veneer of light colored silt or fine sand over saline clay along drier upper margins of ecotone between between salty prairies and tidal flats; further inland associated with vegetated slick spots on prairie mima mounds; flowering September-November
Two-Flower Stick-Pea	*Calliandra biflora*	N/A	SGCN	primarily in open areas on caliche outcrops or in shallow sandy soils over caliche; perennial; flowering/fruiting May-Aug.
Welder Machaeranthera	*Psilactis heterocarpa*	N/A	SGCN	Grasslands , varying from midgrass coastal prairies, and open mesquite-huisache woodlands on nearly level, gray to dark gray clayey to silty soils; known locations mapped on Victoria clay, Edroy clay, Dacosta sandy clay loam over Beaumont and Lissie formations; flowering September-November
Wright's Trichocoronis	*Trichocoronis wrightii var. wrightii*	N/A	SGCN	Most records from Texas are historical, perhaps indicating a decline as a result of alteration of wetland habitats; annual; flowering Feb-Oct; fruiting Feb-Sept.

Table 5D-12 Wilson County - Threatened and Endangered Species and Species of Greatest Conservation Need Summary

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Amphibians				
Strecker's Chorus Frog	*Pseudacris streckeri*	N/A	SGCN	Terrestrial and aquatic: Wooded floodplains and flats, prairies, cultivated fields and marshes. Likes sandy substrates.
Woodhouse's Toad	*Anaxyrus woodhousii*	N/A	SGCN	Terrestrial and aquatic: A wide variety of terrestrial habitats are used by this species, including forests, grasslands, and barrier island sand dunes. Aquatic habitats are equally varied.
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	DL	N/A	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds.
Bank Swallow	*Riparia riparia*	N/A	SGCN	Bank Swallows live in low areas along rivers, streams, ocean coasts, and reservoirs. Their territories usually include vertical cliffs or banks where they nest in colonies of 10 to 2,000 nests. Though in the past Bank Swallows were most commonly found around natural bluffs or eroding streamside banks, they now often nest in human-made sites, such as sand and gravel quarries or road cuts. They forage in open areas and avoid places with tree cover.
Black Rail	*Laterallus jamaicensis*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of
Brewer's Blackbird	*Euphagus cyanocephalus*	N/A	SGCN	Shrubby and bushy areas (especially near water), riparian woodland, aspen parklands, cultivated lands, marshes, and around human habitation; in migration and winter also in pastures and fields (AOU 1983).
Cactus Wren	*Campylorhynchus brunneicapillus*	N/A	SGCN	Desert (especially with cholla cactus or yucca), mesquite, arid scrub, coastal sage scrub, and in trees in towns in arid regions (Tropical to Subtropical zones) (AOU 1983). Nests in Opuntia cactus, or in twiggy, thorny, trees and shrubs, sometimes in buildings. Nest may be relined and used as a winter roost.
Chestnut-Collared Longspur	*Calcarius ornatus*	N/A	SGCN	Occurs in open shortgrass settings especially in patches with some bare ground. Also occurs in grain sorghum fields and Conservation Reserve Program lands.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Common Nighthawk	*Chordeiles minor*	N/A	SGCN	Common Nighthawks nest in both rural and urban habitats including coastal sand dunes and beaches, logged forest, recently burned forest, woodland clearings, prairies, plains, sagebrush, grasslands, open forests, and rock outcrops. They also nest on flat gravel rooftops, though less often as gravel roofs are being replaced by smooth, rubberized roofs that provide an unsuitable
Franklin's Gull	*Leucophaeus pipixcan*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. This species is only a spring and fall migrant throughout Texas. It does not breed in or near Texas. Winter records are unusual consisting of one or a few individuals at a given site (especially along the Gulf coastline). During migration, these gulls fly during daylight hours but often come down to wetlands, lake shore, or islands to roost for the night.
Interior Least Tern	*Sternula antillarum athalassos*	DL	E	Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony.
Lark Bunting	*Calamospiza melanocorys*	N/A	SGCN	Overall, it's a generalist in most short grassland settings including ones with some brushy component plus certain agricultural lands that include grain sorghum. Short grasses include sideoats and blue gramas, sand dropseed, prairie junegrass (Koeleria), buffalograss also with patches of bluestem and other mid-grass species. This bunting will frequent smaller patches of grasses or disturbed patches of grasses including rural yards. It also uses weedy fields surrounding playas. This species avoids urban areas and cotton fields.
Loggerhead Shrike	*Lanius ludovicianus*	N/A	SGCN	Loggerhead Shrikes inhabit open country with short vegetation and well-spaced shrubs or low trees, particularly those with spines or thorns. They frequent agricultural fields, pastures, old orchards, riparian areas, desert scrublands, savannas, prairies, golf courses, and cemeteries. Loggerhead Shrikes are often seen along mowed roadsides with access to fence lines and utility
Mottled Duck	*Anas fulvigula*	N/A	SGCN	Estuaries, ponds, lakes, secondary bays.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Mountain Plover	*Charadrius montanus*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed)
Northern Bobwhite	*Colinus virginianus*	N/A	SGCN	Inhabits a wide variety of vegetation types, particularly early successional stages. Occurs in croplands, grasslands, pastures, fallow fields, grassbrush rangelands, open pinelands, open mixed pine-hardwood forests, and habitat mosaics (Brennan 1999).
Piping Plover	*Charadrius melodus*	T	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.
Pyrrhuloxia	*Cardinalis sinuatus*	N/A	SGCN	Pyrrhuloxias live in upland deserts, mesquite savannas, riparian (streamside) woodlands, desert scrublands, farm fields with hedgerows, and residential areas with nearby mesquite. When not breeding, some Pyrrhuloxias wander into urban habitats, mesquite-hackberry habitats, and riparian habitats with Arizona sycamore and cottonwood.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Sanderling	*Calidris alba*	N/A	SGCN	Nonbreeding: primarily sandy beaches, less frequently on mud flats and shores of lakes or rivers (AOU 1983) also on exposed reefs (Pratt et al. 1987). Sleeps/loafs on upper beach or on salt pond dike
Snowy Plover	*Charadrius nivosus*	N/A	SGCN	Algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. An optimal site characteristic would be large in size. The size of populations appear to be roughly proportional to the total area of suitable habitat used. Formerly an uncommon breeder in the Panhandle; potential migrant;
Sprague's Pipit	*Anthus spragueii*	N/A	SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat during migration and in winter consists of pastures and weedy fields (AOU 1983), including grasslands with dense herbaceous vegetation or grassy agricultural fields.
Swallow-Tailed Kite	*Elanoides forficatus*		T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Lowland forested regions, especially swampy areas, ranging into open woodland; marshes, along rivers, lakes, and ponds; nests high in tall tree in clearing or on forest woodland edge, usually in pine, cypress, or various deciduous trees.
Western Burrowing Owl	*Athene cunicularia hypugaea*	N/A	N/A	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows
White-Faced Ibis	*Plegadis chihi*	N/A	T	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Whooping Crane	*Grus americana*	E	E, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and
Willet	*Tringa semipalmata*	N/A	SGCN	Marshes, tidal mudflats, beaches, lake margins, mangroves, tidal channels, river mouths, coastal lagoons, sandy or rocky shores, and, less frequently, open grassland (AOU 1983, Stiles and Skutch 1989)
Wilson's Warbler	*Cardellina pusilla*	N/A	SGCN	Wilson’s warblers key in on forests and scrubby areas along streams to fatten up during migration. During the nonbreeding season they use many types of habitats from lowland thickets near streams to high-elevation cloud forests in Mexico and Central America.
Wood Stork	*Mycteria americana*	N/A	T, SGCN	The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.
Yellow Rail	*Coturnicops noveboracensis*	N/A	SGCN	Breeding: Emergent wetlands, grass or sedge marshes and wet meadows in freshwater situations. Some breeding territories in these wet meadows contain firm footing and only a few remnant pools of water (Berkey 1991). These areas can range from damp to 38 cm (15 inches) of water but the average depth used for nesting is 8 to 15 cm (3 to 6 inches) (Savaloja 1981). Non-breeding: Grain fields in winter and when migrating. Winters in both freshwater and brackish marshes, as well as in dense, deep grass. During fall migration, will use many open habitats, from rice paddies to dry hayfields.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Yellow-Billed Cuckoo	*Coccyzus americanus*	T	SGCN	In Texas, the populations of concern are found breeding in riparian areas in the Trans Pecos (know as part of the Western Distinct Population Segment). It is the Western DPS that is on the U.S. ESA threatened list and includes the Texas counties Brewster, Culberson, El Paso, Hudspeth, Jeff Davis, and Presidio. Riparian woodlands below 6,000' in elevation consisting of cottonwoods and willows are prime habitat. This species is a long-distant migrant that summers in Texas, but winters mainly in South America. Breeding birds of the Trans Pecos populations typically arrive on their breeding grounds possibly in late April but the peak arrival time is in May. Threats to preferred habitat include hydrologic changes that don't promote the regeneration of cottonwoods and willows, plus livestock browsing and trampling of sapling trees in sensitive riparian areas.
Fish				
River Darter	*Percina shumardi*	N/A	SGCN	In Texas limited to eastern streams including Red River southward to the Neches River, and a disjunct population in the Guadalupe and San Antonio river systems east of the Balcones Escarpment. Confined to large rivers and lower parts of major tributaries; usually found in deep chutes and riffles where current is swift and bottom composed of coarse gravel or rock.
Insects				
American Bumblebee	*Bombus pensylvanicus*	N/A	SGCN	Habitat description is not available at this time.
Comanche Harvester Ant	*Pogonomyrmex comanche*	N/A	SGCN	Habitat description is not available at this time.
Manfreda Giant-Skipper	*Stallingsia maculosus*	N/A	SGCN	Most skippers are small and stout-bodied; name derives from fast, erratic flight; at rest most skippers hold front and hind wings at different angles; skipper larvae are smooth, with the head and neck constricted; skipper larvae usually feed inside a leaf shelter and pupate in a cocoon made of leaves fastened together with silk.
Mammals				
Big Free-Tailed Bat	*Nyctinomops macrotis*	N/A	SGCN	Habitat data sparse but records indicate that species prefers to roost in crevices and cracks in high canyon walls, but will use buildings, as well; reproduction data sparse, gives birth to single offspring late June-early July; females gather in nursery colonies; winter habits undetermined, but may hibernate in the Trans-Pecos; opportunistic insectivore.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Cave Myotis Bat	*Myotis velifer*	N/A	SGCN	Colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore
Eastern Spotted Skunk	*Spilogale putorius*	N/A	SGCN	Generalist; open fields prairies, croplands, fence rows, farmyards, forest edges; woodlands. Prefer wooded, brushy areas; tallgrass prairies. S.p. ssp. interrupta found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available.
Ghost-Faced Bat	*Mormoops megalophylla*	N/A	SGCN	Winter roosts are in large limestone caves. Buildings and rock crevasses provide roosts, as well.
Hoary Bat	*Lasiurus cinereus*	N/A	SGCN	Hoary bats are highly migratory, high-flying bats that have been noted throughout the state. Females are known to migrate to Mexico in the winter, males tend to remain further north and may stay in Texas year-round. Commonly associated with forests (foliage roosting species) but are found in unforested parts of the state and lowland deserts. Tend to be captured over water and large, open flyways.
Mountain Lion	*Puma concolor*	N/A	SGCN	Generalist; found in a wide range of habitats statewide. Found most frequently in rugged mountains; riparian zones.
Plains Spotted Skunk	*Spilogale interrupta*	N/A	SGCN	Generalist; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie.
Ttricolored Bat	*Perimyotis subflavus*	PE	SGCN	Forest, woodland and riparian areas are important. Caves are very important to this species.
White-Nosed Coati	*Nasua narica*	N/A	T, SGCN	Woodlands, riparian corridors and canyons.Most individuals in Texas probably transients from Mexico; diurnal and crepuscular; very sociable; forages on ground and in trees; omnivorous; may be susceptible to hunting, trapping, and pet trade.
Mollusks				
Louisiana Fatmucket	*Lampsilis hydiana*	N/A	SGCN	Reported from streams to rivers, may penetrate into headwaters, oxbows, lakes, canals, and reservoirs. Reported to occur in still to moderate currents in sand, mud, and gravel substrates. In riverine systems it is found primarily in nearshore habitats such as banks, backwaters and oxbows (Howells et al. 1996; Randklev et al. 2013a; Randklev et al. 2014a; Tsakiris and Randklev 2016). It adapts readily to reservoirs and can cope with flow modification stemming from river impoundment (Randklev et al. 2016).

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Mapleleaf	*Quadrula quadrula*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs. In riverine habitats, it may be found in main-channel habitats such as riffles or runs in sand, gravel, and cobble substrates with moderate to swift currents. May also be found in nearshore habitats such as banks and backwaters to include pools in sand or mud substrates with little to no flow. (Williams et al. 2008; Howells 2016; Haag and Cicerello 2016).
Pimpleback	*Cyclonaias pustulosa*	N/A	SGCN	Occurs in small streams to large rivers in habitats including riffles and runs with flowing water, also found in nearshore habitats such as banks and backwaters or pools. Can occur in reservoirs but varies based by population. Is often found in substrates comprising of sand, gravel, and cobble but also mud and silt (Howells et al. 1996; Williams et al. 2008; Watters et al. 2009).
Pistolgrip	*Tritogonia verrucosa*	N/A	SGCN	Reported from streams to rivers, lakes, and reservoirs, but considered less tolerant of impoundment (Haag and Cicerello 2016). Can occur in a variety of habitat types but most often found in main channel habitats such as riffles and runs with moderate current and sand, gravel, or cobble substrates (Howells et al. 1996; Williams et al. 2008).
Tampico Pearlymussel	*Cyrtonaias tampicoensis*	N/A	SGCN	Reported from streams to rivers, reservoirs, and canals. In riverine habitats often found in nearshore habitats such as banks and backwaters, to include pools and oxbows, in mud or sand or among cobble and boulders with still to moderate currents (Howells et al. 1996).
Reptiles				
American Alligator	*Alligator mississippiensis*	SAT	N/A	Aquatic: Coastal marshes; inland natural rivers, swamps and marshes; manmade impoundments.
Eastern Box Turtle	*Terrapene carolina*	N/A	SGCN	Terrestrial: Eastern box turtles inhabit forests, fields, forest-brush, and forest-field ecotones. In some areas they move seasonally from fields in spring to forest in summer. They commonly enters pools of shallow water in summer. For shelter, they burrow into loose soil, debris, mud, old stump holes, or under leaf litter. They can successfully hibernate in sites that may experience subfreezing temperatures.
Keeled Earless Lizard	*Holbrookia propinqua*	N/A	SGCN	Terrestrial: Habitats include coastal dunes, barrier islands, and other sandy areas (Axtell 1983). Although it occurs well inland, this species is most abundant on coastal dunes, were it seeks shelter in the burrows of small mammals or crabs (Bartlett and Bartlett 1999).
Prairie Skink	*Plestiodon septentrionalis*	N/A	SGCN	The prairie skink can occur in any native grassland habitat across the Rolling Plains, Blackland Prairie, Post Oak Savanna and Pineywoods ecoregions.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Slender Glass Lizard	*Ophisaurus attenuatus*	N/A	SGCN	Terrestrial: Habitats include open grassland, prairie, woodland edge, open woodland, oak savannas, longleaf pine flatwoods, scrubby areas, fallow fields, and areas near streams and ponds, often in habitats with sandy soil.
Tamaulipan Spot-Tailed Earless Lizard	*Holbrookia subcaudalis*	N/A	SGCN	Terrestrial: Habitats include moderately open prairie-brushland regions, particularly fairly flat areas free of vegetation or other obstructions (e.g., open meadows, old and new fields, graded roadways, cleared and disturbed areas, prairie savanna, and active agriculture including row crops); also, oak-juniper woodlands and mesquite-prickly pear associations (Axtell 1968, Bartlett and Bartlett 1999).
Texas Horned Lizard	*Phrynosoma cornutum*	N/A	T, SGCN	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.
Texas Tortoise	*Gopherus berlandieri*	N/A	T, SGCN	Terrestrial: Open scrub woods, arid brush, lomas, grass-cactus association; often in areas with sandy well-drained soils. When inactive occupies shallow depressions dug at base of bush or cactus; sometimes in underground burrow or under object. Eggs are laid in nests dug in soil near or under bushes.
Western Box Turtle	*Terrapene ornata*	N/A	SGCN	Terrestrial: Ornate or western box turtles inhabit prairie grassland, pasture, fields, sandhills, and open woodland. They are essentially terrestrial but sometimes enter slow, shallow streams and creek pools. For shelter, they burrow into soil (e.g., under plants such as yucca) (Converse et al. 2002) or enter burrows made by other species.
Plants				
Awnless Leastdaisy	*Chaetopappa imberbis*	N/A	SGCN	In woodlands on loams of Carrizo sand (TEX-LL specimens Carr 23875, 12507). Flowering and fruiting during Mar - May.
Big Red Sage	*Salvia pentstemonoides*	N/A	SGCN	Moist to seasonally wet, steep limestone outcrops on seeps within canyons or along creek banks; occasionally on clayey to silty soils of creek banks and terraces, in partial shade to full sun; basal leaves conspicuous for much of the year; flowering June-October.
Bigflower Cornsalad	*Valerianella stenocarpa*	N/A	SGCN	Usually along creekbeds or in vernally moist grassy open areas (Carr 2015).
Bristle Nailwort	*Paronychia setacea*	N/A	SGCN	Flowering vascular plant endemic to eastern south-central Texas, occurring in sandy soils.
Burridge Greenthread	*Thelesperma burridgeanum*	N/A	SGCN	Sandy open areas; annual; flowering March-Nov; fruiting March-June.
Drummond's Rushpea	*Hoffmannseggia drummondii*	N/A	SGCN	Open areas on sandy clay; perennial.

Species Common Name	Species Scientific Name	Federal Status	State Status	Suitable Habitat
Elmendorf's Onion	*Allium elmendorfii*	N/A	SGCN	Grassland openings in oak woodlands on deep, loose, well-drained sands; in Coastal Bend, on Pleistocene barrier island ridges and Holocene Sand Sheet that support live oak woodlands; to the north it occurs in post oak-black hickory-live oak woodlands over Queen City and similar Eocene formations; one anomalous specimen found on Llano Uplift in wet pockets of granitic loam; perennial; flowering March-April, May.
Green Hawthorn	*Crataegus viridis var. glabriuscula*	N/A	SGCN	In mesic soils of woods or on edge of woods, treeline/fenceline, or thicket. Above\near creeks and draws, in river bottoms. Flowering Mar-Apr; fruiting May-Oct
Greenman's Bluet	*Houstonia parviflora*	N/A	SGCN	Grass pastures. Feb- Apr. (Correll and Johnston 1970).
Heartleaf Evening-Primrose	*Oenothera cordata*	N/A	SGCN	Occurs in post oak woodlands on sandy soils on the coastal plain (Carr 2015).
Low Spurge	*Euphorbia peplidion*	N/A	SGCN	Occurs in a variety of vernally-moist situations in a number of natural regions; annual; flowering Feb-April; fruiting March-April.
Net-Leaf Bundleflower	*Desmanthus reticulatus*	N/A	SGCN	Mostly on clay prairies of the coastal plain of central and south Texas; perennial; flowering April-July; fruiting April-Oct.
Parks' Jointweed	*Polygonella parksii*	N/A	SGCN	Mostly found on deep, loose, whitish sand blowouts (unstable, deep, xeric, sandhill barrens) in Post Oak Savanna landscapes over the Carrizo and Sparta formations; also occurs in early successional grasslands, along right-of-ways, and on mechanically disturbed areas; flowering June-late October or September-November.
Texas Beebalm	*Monarda viridissima*	N/A	SGCN	Endemic perennial herb of the Carrizo Sands; deep, well-drained sandy soils in openings of post oak woodlands; flowers white.
Texas Peachbush	*Prunus texana*	N/A	SGCN	Occurs at scattered sites in various well drained sandy situations; deep sand, plains and sand hills, grasslands, oak woods, 0-200 m elevation; perennial; flowering Feb-Mar; fruiting Apr-Jun
Wright's Trichocoronis	*Trichocoronis wrightii var. wrightii*	N/A	SGCN	Most records from Texas are historical, perhaps indicating a decline as a result of alteration of wetland habitats; annual; flowering Feb-Oct; fruiting Feb-Sept.

Appendix 5E: Miscellaneous Water Management Strategy Cost Estimate Summaries

APPENDIX 5E. MISCELLANEOUS WATER MANAGEMENT STRATEGY COST ESTIMATE SUMMARIES

This appendix provides miscellaneous cost estimate summaries for WMSs that have multiple projects associated with them. The summaries are organized by the WMS name.

5E.1 Edwards Transfers

The Edwards Transfers WMS is described in Section 5.2.4. Cost estimate summary tables are included for the following Edwards Transfers WMS projects:

Table 5E.1-1 Cost Estimate Summary for the Edwards Transfers WMS: Alamo Heights

Item	Estimated Costs
Integration, Relocations, Backup Generator & Other	$62,000
TOTAL COST OF FACILITIES	**$62,000**
- Planning (3%)	$2,000
- Design (7%)	$4,000
- Construction Engineering (1%)	$1,000
Legal Assistance (2%)	$1,000
Fiscal Services (2%)	$1,000
All Other Facilities Contingency (20%)	$12,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$3,000
TOTAL COST OF PROJECT	**$86,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$6,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,000
Purchase of Water (200 acft/yr @ 1,928 $/acft)	$386,000
TOTAL ANNUAL COST	**$393,000**
Available Project Yield (acft/yr)	200
Annual Cost of Water ($ per acft)*	$1,965
Annual Cost of Water After Debt Service ($ per acft)*	$1,935
Annual Cost of Water ($ per 1,000 gallons)*	$6.03
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$5.94
*Based on a peaking factor of 1	

Table 5E.1-2 Cost Estimate Summary for the Edwards Transfers WMS: Bexar County WCID 10

Item	Estimated Costs
Integration, Relocations, Backup Generator & Other	$124,000
TOTAL COST OF FACILITIES	**$124,000**
- Planning (3%)	$4,000
- Design (7%)	$9,000
- Construction Engineering (1%)	$1,000
Legal Assistance (2%)	$2,000
Fiscal Services (2%)	$2,000
All Other Facilities Contingency (20%)	$25,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$6,000
TOTAL COST OF PROJECT	**$173,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$12,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,000
Purchase of Water (400 acft/yr @ 1,928 $/acft)	$771,000
TOTAL ANNUAL COST	**$784,000**
Available Project Yield (acft/yr)	400
Annual Cost of Water ($ per acft)*	$1,960
Annual Cost of Water After Debt Service ($ per acft)*	$1,930
Annual Cost of Water ($ per 1,000 gallons)*	$6.01
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$5.92
*Based on a peaking factor of 1	

Table 5E.1-3 Cost Estimate Summary for the Edwards Transfers WMS: Castroville

Item	Estimated Costs
Integration, Relocations, Backup Generator & Other	$309,000
TOTAL COST OF FACILITIES	**$309,000**
- Planning (3%)	$9,000
- Design (7%)	$22,000
- Construction Engineering (1%)	$3,000
Legal Assistance (2%)	$6,000
Fiscal Services (2%)	$6,000
All Other Facilities Contingency (20%)	$62,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$14,000
TOTAL COST OF PROJECT	**$431,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$30,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,000
Purchase of Water (1,000 acft/yr @ 1,928 $/acft)	$1,928,000
TOTAL ANNUAL COST	**$1,961,000**
Available Project Yield (acft/yr)	1,000
Annual Cost of Water ($ per acft)*	$1,961
Annual Cost of Water After Debt Service ($ per acft)*	$1,931
Annual Cost of Water ($ per 1,000 gallons)*	$6.02
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$5.93
*Based on a peaking factor of 1	

Table 5E.1-4 Cost Estimate Summary for the Edwards Transfers WMS: Converse

Item	Estimated Costs
Integration, Relocations, Backup Generator & Other	$62,000
TOTAL COST OF FACILITIES	**$62,000**
- Planning (3%)	$2,000
- Design (7%)	$4,000
- Construction Engineering (1%)	$1,000
Legal Assistance (2%)	$1,000
Fiscal Services (2%)	$1,000
All Other Facilities Contingency (20%)	$12,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$3,000
TOTAL COST OF PROJECT	**$86,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$6,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,000
Purchase of Water (200 acft/yr @ 1,928 $/acft)	$386,000
TOTAL ANNUAL COST	**$393,000**
Available Project Yield (acft/yr)	200
Annual Cost of Water ($ per acft)*	$1,965
Annual Cost of Water After Debt Service ($ per acft)*	$1,935
Annual Cost of Water ($ per 1,000 gallons)*	$6.03
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$5.94
*Based on a peaking factor of 1	

Table 5E.1-5 Cost Estimate Summary for the Edwards Transfers WMS: Fort Sam Houston

Item	Estimated Costs
Integration, Relocations, Backup Generator & Other	$3,878,000
TOTAL COST OF FACILITIES	**$3,878,000**
- Planning (3%)	$116,000
- Design (7%)	$271,000
- Construction Engineering (1%)	$39,000
Legal Assistance (2%)	$78,000
Fiscal Services (2%)	$78,000
All Other Facilities Contingency (20%)	$776,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$171,000
TOTAL COST OF PROJECT	**$5,407,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$380,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$39,000
Purchase of Water (12,550 acft/yr @ 1,928 $/acft)	$24,196,000
TOTAL ANNUAL COST	**$24,615,000**
Available Project Yield (acft/yr)	12,550
Annual Cost of Water ($ per acft)*	$1,961
Annual Cost of Water After Debt Service ($ per acft)*	$1,931
Annual Cost of Water ($ per 1,000 gallons)*	$6.02
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$5.93
*Based on a peaking factor of 1	

Table 5E.1-6 Cost Estimate Summary for the Edwards Transfers WMS: Hondo

Item	Estimated Costs
Integration, Relocations, Backup Generator & Other	$108,000
TOTAL COST OF FACILITIES	**$108,000**
- Planning (3%)	$3,000
- Design (7%)	$8,000
- Construction Engineering (1%)	$1,000
Legal Assistance (2%)	$2,000
Fiscal Services (2%)	$2,000
All Other Facilities Contingency (20%)	$22,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$5,000
TOTAL COST OF PROJECT	**$151,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$11,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,000
Purchase of Water (350 acft/yr @ 1,928 $/acft)	$675,000
TOTAL ANNUAL COST	**$687,000**
Available Project Yield (acft/yr)	350
Annual Cost of Water ($ per acft)*	$1,963
Annual Cost of Water After Debt Service ($ per acft)*	$1,931
Annual Cost of Water ($ per 1,000 gallons)*	$6.02
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$5.93
*Based on a peaking factor of 1	

Table 5E.1-7 Cost Estimate Summary for the Edwards Transfers WMS: Kirby

Item	Estimated Costs
Integration, Relocations, Backup Generator & Other	$46,000
TOTAL COST OF FACILITIES	**$46,000**
- Planning (3%)	$1,000
- Design (7%)	$3,000
Legal Assistance (2%)	$1,000
Fiscal Services (2%)	$1,000
All Other Facilities Contingency (20%)	$9,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$3,000
TOTAL COST OF PROJECT	**$64,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$5,000
Operation and Maintenance	
Purchase of Water (150 acft/yr @ 1,928 $/acft)	$289,000
TOTAL ANNUAL COST	**$294,000**
Available Project Yield (acft/yr)	150
Annual Cost of Water ($ per acft)*	$1,960
Annual Cost of Water After Debt Service ($ per acft)*	$1,927
Annual Cost of Water ($ per 1,000 gallons)*	$6.01
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$5.91
*Based on a peaking factor of 1	

Table 5E.1-8 Cost Estimate Summary for the Edwards Transfers WMS: Leon Valley

Item	Estimated Costs
Integration, Relocations, Backup Generator & Other	$309,000
TOTAL COST OF FACILITIES	**$309,000**
- Planning (3%)	$9,000
- Design (7%)	$22,000
- Construction Engineering (1%)	$3,000
Legal Assistance (2%)	$6,000
Fiscal Services (2%)	$6,000
All Other Facilities Contingency (20%)	$62,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$14,000
TOTAL COST OF PROJECT	**$431,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$30,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,000
Purchase of Water (1,000 acft/yr @ 1,928 $/acft)	$1,928,000
TOTAL ANNUAL COST	**$1,961,000**
Available Project Yield (acft/yr)	1,000
Annual Cost of Water ($ per acft)*	$1,961
Annual Cost of Water After Debt Service ($ per acft)*	$1,931
Annual Cost of Water ($ per 1,000 gallons)*	$6.02
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$5.93
*Based on a peaking factor of 1	

Table 5E.1-9 Cost Estimate Summary for the Edwards Transfers WMS: Lytle

Item	Estimated Costs
Integration, Relocations, Backup Generator & Other	$62,000
TOTAL COST OF FACILITIES	**$62,000**
- Planning (3%)	$2,000
- Design (7%)	$4,000
- Construction Engineering (1%)	$1,000
Legal Assistance (2%)	$1,000
Fiscal Services (2%)	$1,000
All Other Facilities Contingency (20%)	$12,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$3,000
TOTAL COST OF PROJECT	**$86,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$6,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,000
Purchase of Water (200 acft/yr @ 1,928 $/acft)	$386,000
TOTAL ANNUAL COST	**$393,000**
Available Project Yield (acft/yr)	200
Annual Cost of Water ($ per acft)*	$1,965
Annual Cost of Water After Debt Service ($ per acft)*	$1,935
Annual Cost of Water ($ per 1,000 gallons)*	$6.03
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$5.94
*Based on a peaking factor of 1	

Table 5E.1-10 Cost Estimate Summary for the Edwards Transfers WMS: Selma

Item	Estimated Costs
Integration, Relocations, Backup Generator & Other	$773,000
TOTAL COST OF FACILITIES	**$773,000**
- Planning (3%)	$23,000
- Design (7%)	$54,000
- Construction Engineering (1%)	$8,000
Legal Assistance (2%)	$15,000
Fiscal Services (2%)	$15,000
All Other Facilities Contingency (20%)	$155,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$34,000
TOTAL COST OF PROJECT	**$1,077,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$76,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$8,000
Purchase of Water (2,500 acft/yr @ 1,928 $/acft)	$4,820,000
TOTAL ANNUAL COST	**$4,904,000**
Available Project Yield (acft/yr)	2,500
Annual Cost of Water ($ per acft)*	$1,962
Annual Cost of Water After Debt Service ($ per acft)*	$1,931
Annual Cost of Water ($ per 1,000 gallons)*	$6.02
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$5.93
*Based on a peaking factor of 1	

Table 5E.1-11 Cost Estimate Summary for the Edwards Transfers WMS: Uvalde

Item	Estimated Costs
Integration, Relocations, Backup Generator & Other	$108,000
TOTAL COST OF FACILITIES	**$108,000**
- Planning (3%)	$3,000
- Design (7%)	$8,000
- Construction Engineering (1%)	$1,000
Legal Assistance (2%)	$2,000
Fiscal Services (2%)	$2,000
All Other Facilities Contingency (20%)	$22,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$5,000
TOTAL COST OF PROJECT	**$151,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$11,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,000
Purchase of Water (350 acft/yr @ 1,928 $/acft)	$675,000
TOTAL ANNUAL COST	**$687,000**
Available Project Yield (acft/yr)	350
Annual Cost of Water ($ per acft)*	$1,963
Annual Cost of Water After Debt Service ($ per acft)*	$1,931
Annual Cost of Water ($ per 1,000 gallons)*	$6.02
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$5.93
*Based on a peaking factor of 1	

Table 5E.1-12 Cost Estimate Summary for the Edwards Transfers WMS: Ville Dalsace Water Supply

Item	Estimated Costs
Integration, Relocations, Backup Generator & Other	$31,000
TOTAL COST OF FACILITIES	**$31,000**
- Planning (3%)	$1,000
- Design (7%)	$2,000
Legal Assistance (2%)	$1,000
Fiscal Services (2%)	$1,000
All Other Facilities Contingency (20%)	$6,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$2,000
TOTAL COST OF PROJECT	**$44,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,000
Operation and Maintenance	
Purchase of Water (100 acft/yr @ 1,928 $/acft)	$193,000
TOTAL ANNUAL COST	**$196,000**
Available Project Yield (acft/yr)	100
Annual Cost of Water ($ per acft)*	$1,960
Annual Cost of Water After Debt Service ($ per acft)*	$1,930
Annual Cost of Water ($ per 1,000 gallons)*	$6.01
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$5.92
*Based on a peaking factor of 1	

5E.2 Fresh Groundwater Development

The Fresh Groundwater Development WMS is described in Section 5.2.5. Cost estimate summary tables are included for the following Fresh Groundwater Development WMS projects:

Table 5E.2-1 Cost Estimate Summary for the Fresh Groundwater Development WMS: Atascosa Rural WSC

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$4,899,000
Water Treatment Plant (2 MGD)	$1,795,000
TOTAL COST OF FACILITIES	**$6,694,000**
- Planning (3%)	$201,000
- Design (7%)	$469,000
- Construction Engineering (1%)	$67,000
Legal Assistance (2%)	$134,000
Fiscal Services (2%)	$134,000
All Other Facilities Contingency (20%)	$1,339,000
Environmental & Archaeology Studies and Mitigation	$76,000
Land Acquisition and Surveying (9 acres)	$71,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$299,000
TOTAL COST OF PROJECT	**$9,484,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$667,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$49,000
Water Treatment Plant	$592,000
Pumping Energy Costs (72,304 kW-hr @ 0.09 $/kW-hr)	$7,000
TOTAL ANNUAL COST	**$1,315,000**
Available Project Yield (acft/yr)	1,200
Annual Cost of Water ($ per acft)*	$1,096
Annual Cost of Water After Debt Service ($ per acft)*	$540
Annual Cost of Water ($ per 1,000 gallons)*	$3.36
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$1.66
*Based on a peaking factor of 1	

Table 5E.2-2 Cost Estimate Summary for the Fresh Groundwater Development WMS: Clear Water Estates Water System

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$2,721,000
Water Treatment Plant (1.5 MGD)	$1,648,000
TOTAL COST OF FACILITIES	**$4,369,000**
- Planning (3%)	$131,000
- Design (7%)	$306,000
- Construction Engineering (1%)	$44,000
Legal Assistance (2%)	$87,000
Fiscal Services (2%)	$87,000
All Other Facilities Contingency (20%)	$874,000
Environmental & Archaeology Studies and Mitigation	$108,000
Land Acquisition and Surveying (9 acres)	$100,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$199,000
TOTAL COST OF PROJECT	**$6,305,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$444,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$27,000
Water Treatment Plant	$544,000
TOTAL ANNUAL COST	**$1,015,000**
Available Project Yield (acft/yr)	1,500
Annual Cost of Water ($ per acft)*	$677
Annual Cost of Water After Debt Service ($ per acft)*	$381
Annual Cost of Water ($ per 1,000 gallons)*	$2.08
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$1.17
*Based on a peaking factor of 1	

Table 5E.2-3 Cost Estimate Summary for the Fresh Groundwater Development WMS: County-Other, Comal

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$2,892,000
Water Treatment Plant (1.8 MGD)	$1,795,000
TOTAL COST OF FACILITIES	**$4,687,000**
- Planning (3%)	$141,000
- Design (7%)	$328,000
- Construction Engineering (1%)	$47,000
Legal Assistance (2%)	$94,000
Fiscal Services (2%)	$94,000
All Other Facilities Contingency (20%)	$937,000
Environmental & Archaeology Studies and Mitigation	$115,000
Land Acquisition and Surveying (3 acres)	$108,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$213,000
TOTAL COST OF PROJECT	**$6,764,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$476,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$29,000
Water Treatment Plant	$592,000
Pumping Energy Costs (1,539,320 kW-hr @ 0.09 $/kW-hr)	$139,000
TOTAL ANNUAL COST	**$1,236,000**
Available Project Yield (acft/yr)	1,000
Annual Cost of Water ($ per acft)*	$1,236
Annual Cost of Water After Debt Service ($ per acft)*	$760
Annual Cost of Water ($ per 1,000 gallons)*	$3.79
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$2.33
*Based on a peaking factor of 1	

Table 5E.2-4 Cost Estimate Summary for the Fresh Groundwater Development WMS: County-Other, Victoria

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$703,000
TOTAL COST OF FACILITIES	**$703,000**
- Planning (3%)	$21,000
- Design (7%)	$49,000
- Construction Engineering (1%)	$7,000
Legal Assistance (2%)	$14,000
Fiscal Services (2%)	$14,000
All Other Facilities Contingency (20%)	$141,000
Environmental & Archaeology Studies and Mitigation	$49,000
Land Acquisition and Surveying (3 acres)	$47,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$34,000
TOTAL COST OF PROJECT	**$1,079,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$76,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$7,000
Pumping Energy Costs (8,934 kW-hr @ 0.09 $/kW-hr)	$1,000
TOTAL ANNUAL COST	**$84,000**
Available Project Yield (acft/yr)	300
Annual Cost of Water ($ per acft)*	$280
Annual Cost of Water After Debt Service ($ per acft)*	$27
Annual Cost of Water ($ per 1,000 gallons)*	$0.86
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.08
*Based on a peaking factor of 1	

Table 5E.2-5 Cost Estimate Summary for the Fresh Groundwater Development WMS: Crystal Clear SUD Carrizo-Wilcox Project

Item	Estimated Costs
Transmission Pipeline (16 in. dia., 7.6 miles)	$10,464,000
Transmission Pump Station(s) & Storage Tank(s)	$3,100,000
Well Fields (Wells, Pumps, and Piping)	$3,981,000
Water Treatment Plant (0.7 MGD)	$1,051,000
TOTAL COST OF FACILITIES	**$18,596,000**
- Planning (3%)	$558,000
- Design (7%)	$1,302,000
- Construction Engineering (1%)	$186,000
Legal Assistance (2%)	$372,000
Fiscal Services (2%)	$372,000
Pipeline Contingency (15%)	$1,570,000
All Other Facilities Contingency (20%)	$1,626,000
Environmental & Archaeology Studies and Mitigation	$592,000
Land Acquisition and Surveying (123 acres)	$1,348,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$862,000
TOTAL COST OF PROJECT	**$27,384,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,927,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$159,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$40,000
Water Treatment Plant	$347,000
Pumping Energy Costs (95,639 kW-hr @ 0.09 $/kW-hr)	$9,000
TOTAL ANNUAL COST	**$2,482,000**
Available Project Yield (acft/yr)	280
Annual Cost of Water ($ per acft)*	$8,864
Annual Cost of Water After Debt Service ($ per acft)*	$1,982
Annual Cost of Water ($ per 1,000 gallons)*	$27.20
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$6.08
*Based on a peaking factor of 1	

Table 5E.2-6 Cost Estimate Summary for the Fresh Groundwater Development WMS: Crystal Clear SUD Trinity Project

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$3,460,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,404,000
Integration, Relocations, Backup Generator & Other	$19,000
TOTAL COST OF FACILITIES	**$12,586,000**
- Planning (3%)	$378,000
- Design (7%)	$881,000
- Construction Engineering (1%)	$126,000
Legal Assistance (2%)	$252,000
Fiscal Services (2%)	$252,000
All Other Facilities Contingency (20%)	$977,000
Environmental & Archaeology Studies and Mitigation	$301,000
Land Acquisition and Surveying (68 acres)	$749,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$574,000
TOTAL COST OF PROJECT	**$18,231,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,281,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$126,000
Pumping Energy Costs (376,463 kW-hr @ 0.09 $/kW-hr)	$34,000
TOTAL ANNUAL COST	**$1,441,000**
Available Project Yield (acft/yr)	1,988
Annual Cost of Water ($ per acft)*	$725
Annual Cost of Water After Debt Service ($ per acft)*	$80
Annual Cost of Water ($ per 1,000 gallons)*	$2.22
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.25
*Based on a peaking factor of 0	

Table 5E.2-7 Cost Estimate Summary for the Fresh Groundwater Development WMS: Elmendorf

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$1,981,000
Water Treatment Plant (1 MGD)	$1,402,000
TOTAL COST OF FACILITIES	**$3,383,000**
- Planning (3%)	$102,000
- Design (7%)	$237,000
- Construction Engineering (1%)	$34,000
Legal Assistance (2%)	$68,000
Fiscal Services (2%)	$68,000
All Other Facilities Contingency (20%)	$677,000
Environmental & Archaeology Studies and Mitigation	$72,000
Land Acquisition and Surveying (6 acres)	$67,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$153,000
TOTAL COST OF PROJECT	**$4,861,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$342,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$20,000
Water Treatment Plant	$463,000
Pumping Energy Costs (30,798 kW-hr @ 0.09 $/kW-hr)	$3,000
TOTAL ANNUAL COST	**$828,000**
Available Project Yield (acft/yr)	847
Annual Cost of Water ($ per acft)*	$978
Annual Cost of Water After Debt Service ($ per acft)*	$574
Annual Cost of Water ($ per 1,000 gallons)*	$3.00
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$1.76
*Based on a peaking factor of 1	

Table 5E.2-8 Cost Estimate Summary for the Fresh Groundwater Development WMS: Garden Ridge

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$3,213,000
Water Treatment Plant (1.5 MGD)	$1,648,000
TOTAL COST OF FACILITIES	**$4,861,000**
- Planning (3%)	$146,000
- Design (7%)	$340,000
- Construction Engineering (1%)	$49,000
Legal Assistance (2%)	$97,000
Fiscal Services (2%)	$97,000
All Other Facilities Contingency (20%)	$972,000
Environmental & Archaeology Studies and Mitigation	$108,000
Land Acquisition and Surveying (9 acres)	$100,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$221,000
TOTAL COST OF PROJECT	**$6,991,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$492,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$32,000
Water Treatment Plant	$544,000
TOTAL ANNUAL COST	**$1,068,000**
Available Project Yield (acft/yr)	750
Annual Cost of Water ($ per acft)*	$1,424
Annual Cost of Water After Debt Service ($ per acft)*	$768
Annual Cost of Water ($ per 1,000 gallons)*	$4.37
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$2.36
*Based on a peaking factor of 1	

Table 5E.2-9 Cost Estimate Summary for the Fresh Groundwater Development WMS: KT Water Development

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$5,253,000
Water Treatment Plant (3.5 MGD)	$2,631,000
TOTAL COST OF FACILITIES	**$7,884,000**
- Planning (3%)	$237,000
- Design (7%)	$552,000
- Construction Engineering (1%)	$79,000
Legal Assistance (2%)	$158,000
Fiscal Services (2%)	$158,000
All Other Facilities Contingency (20%)	$1,577,000
Environmental & Archaeology Studies and Mitigation	$186,000
Land Acquisition and Surveying (16 acres)	$173,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$358,000
TOTAL COST OF PROJECT	**$11,362,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$799,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$53,000
Water Treatment Plant	$868,000
TOTAL ANNUAL COST	**$1,720,000**
Available Project Yield (acft/yr)	486
Annual Cost of Water ($ per acft)*	$3,539
Annual Cost of Water After Debt Service ($ per acft)*	$1,895
Annual Cost of Water ($ per 1,000 gallons)*	$10.86
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$5.81
*Based on a peaking factor of 1	

Table 5E.2-10 Cost Estimate Summary for the Fresh Groundwater Development WMS: Martindale WSC

Item	Estimated Costs
Intake Pump Stations (0 MGD)	$661,000
Transmission Pipeline (6 in. dia., 0.2 miles)	$160,000
Well Fields (Wells, Pumps, and Piping)	$109,000
Integration, Relocations, Backup Generator & Other	$2,000
TOTAL COST OF FACILITIES	**$932,000**
- Planning (3%)	$28,000
- Design (7%)	$65,000
- Construction Engineering (1%)	$9,000
Legal Assistance (2%)	$19,000
Fiscal Services (2%)	$19,000
Pipeline Contingency (15%)	$24,000
All Other Facilities Contingency (20%)	$154,000
Environmental & Archaeology Studies and Mitigation	$94,000
Land Acquisition and Surveying (9 acres)	$122,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$48,000
TOTAL COST OF PROJECT	**$1,514,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$106,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,000
Intake and Pump Stations (2.5% of Cost of Facilities)	$17,000
Pumping Energy Costs (27,469 kW-hr @ 0.09 $/kW-hr)	$2,000
TOTAL ANNUAL COST	**$128,000**
Available Project Yield (acft/yr)	240
Annual Cost of Water ($ per acft)*	$533
Annual Cost of Water After Debt Service ($ per acft)*	$92
Annual Cost of Water ($ per 1,000 gallons)*	$1.64
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.28
*Based on a peaking factor of 1	

Table 5E.2-11 Cost Estimate Summary for the Fresh Groundwater Development WMS: Springs Hill WSC (Mesa Trail)

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$930,000
TOTAL COST OF FACILITIES	**$930,000**
- Planning (3%)	$28,000
- Design (7%)	$65,000
- Construction Engineering (1%)	$9,000
Legal Assistance (2%)	$19,000
Fiscal Services (2%)	$19,000
All Other Facilities Contingency (20%)	$186,000
Environmental & Archaeology Studies and Mitigation	$34,000
Land Acquisition and Surveying (3 acres)	$31,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$43,000
TOTAL COST OF PROJECT	**$1,364,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$96,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$9,000
TOTAL ANNUAL COST	**$105,000**
Available Project Yield (acft/yr)	205
Annual Cost of Water ($ per acft)*	$512
Annual Cost of Water After Debt Service ($ per acft)*	$44
Annual Cost of Water ($ per 1,000 gallons)*	$1.57
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.13
*Based on a peaking factor of 1	

Table 5E.2-12 Cost Estimate Summary for the Fresh Groundwater Development WMS: Springs Hill WSC (Wilson)

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$1,230,000
Water Treatment Plant (1.8 MGD)	$1,795,000
TOTAL COST OF FACILITIES	**$4,705,000**
- Planning (3%)	$141,000
- Design (7%)	$329,000
- Construction Engineering (1%)	$47,000
Legal Assistance (2%)	$94,000
Fiscal Services (2%)	$94,000
All Other Facilities Contingency (20%)	$741,000
Environmental & Archaeology Studies and Mitigation	$123,000
Land Acquisition and Surveying (21 acres)	$229,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$217,000
TOTAL COST OF PROJECT	**$6,870,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$483,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$22,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$17,000
Water Treatment Plant	$592,000
Pumping Energy Costs (22,760 kW-hr @ 0.09 $/kW-hr)	$2,000
TOTAL ANNUAL COST	**$1,116,000**
Available Project Yield (acft/yr)	95
Annual Cost of Water ($ per acft)*	$11,747
Annual Cost of Water After Debt Service ($ per acft)*	$6,663
Annual Cost of Water ($ per 1,000 gallons)*	$36.05
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$20.45
*Based on a peaking factor of 1	

Table 5E.2-13 Cost Estimate Summary for the Fresh Groundwater Development WMS: Uvalde County Mining

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$1,147,000
TOTAL COST OF FACILITIES	**$1,147,000**
- Planning (3%)	$34,000
- Design (7%)	$80,000
- Construction Engineering (1%)	$11,000
Legal Assistance (2%)	$23,000
Fiscal Services (2%)	$23,000
All Other Facilities Contingency (20%)	$229,000
Environmental & Archaeology Studies and Mitigation	$70,000
Land Acquisition and Surveying (10 acres)	$59,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$55,000
TOTAL COST OF PROJECT	**$1,731,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$122,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$11,000
Pumping Energy Costs (41,694 kW-hr @ 0.09 $/kW-hr)	$4,000
TOTAL ANNUAL COST	**$137,000**
Available Project Yield (acft/yr)	1,400
Annual Cost of Water ($ per acft)*	$98
Annual Cost of Water After Debt Service ($ per acft)*	$11
Annual Cost of Water ($ per 1,000 gallons)*	$0.30
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.03
*Based on a peaking factor of 1	

Table 5E.2-14 Cost Estimate Summary for the Fresh Groundwater Development WMS: Wingert Water Systems

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$488,000
Water Treatment Plant (0.1 MGD)	$348,000
TOTAL COST OF FACILITIES	**$836,000**
- Planning (3%)	$25,000
- Design (7%)	$58,000
- Construction Engineering (1%)	$8,000
Legal Assistance (2%)	$17,000
Fiscal Services (2%)	$17,000
All Other Facilities Contingency (20%)	$167,000
Environmental & Archaeology Studies and Mitigation	$43,000
Land Acquisition and Surveying (3 acres)	$41,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$40,000
TOTAL COST OF PROJECT	**$1,252,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$88,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$5,000
Water Treatment Plant	$115,000
TOTAL ANNUAL COST	**$208,000**
Available Project Yield (acft/yr)	35
Annual Cost of Water ($ per acft)*	$5,943
Annual Cost of Water After Debt Service ($ per acft)*	$3,429
Annual Cost of Water ($ per 1,000 gallons)*	$18.24
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$10.52
*Based on a peaking factor of 1	

5E.3 Brackish Groundwater Development

The Brackish Groundwater Development WMS is described in Section 5.2.6. Cost estimate summary tables are included for the following Brackish Groundwater Development WMS projects:

Table 5E.3-1 Cost Estimate Summary for the Brackish Groundwater Development WMS: Caldwell Brackish Partnership Project

Item	Estimated Costs
Pump Station(s) (11 MGD)	$5,297,000
Transmission Pipeline (30 in. dia., 18.2 miles)	$68,105,000
Well Fields (Wells, Pumps, and Piping)	$41,140,000
Storage Tank(s) (Other Than at Booster Pump Stations)	$9,677,000
Water Treatment Plant (11 MGD)	$83,899,000
Integration, Relocations, Backup Generator & Other	$163,000
TOTAL COST OF FACILITIES	**$208,281,000**
- Planning (3%)	$6,248,000
- Design (7%)	$14,580,000
- Construction Engineering (1%)	$2,083,000
Legal Assistance (2%)	$8,331,000
Fiscal Services (2%)	$4,166,000
Pipeline Contingency (15%)	$10,216,000
All Other Facilities Contingency (20%)	$28,035,000
Environmental & Archaeology Studies and Mitigation	$680,000
Land Acquisition and Surveying (136 acres)	$961,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$9,212,000
TOTAL COST OF PROJECT	**$292,793,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$20,645,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,191,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$132,000
Water Treatment Plant	$15,731,000
Pumping Energy Costs (20,667,380 kW-hr @ 0.09 $/kW-hr)	$1,860,000
Purchase of Water (11,201 ac-ft/yr @ 125 $/ac-ft)	$1,400,000
TOTAL ANNUAL COST	**$40,904,000**
Available Project Yield (acft/yr)	6,303
Annual Cost of Water ($ per acft)*	$6,490
Annual Cost of Water After Debt Service ($ per acft)*	$3,214
Annual Cost of Water ($ per 1,000 gallons)*	$19.91
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$9.86
*Based on a peaking factor of 1.1	

Table 5E.3-2 Cost Estimate Summary for the Brackish Groundwater Development WMS: Gonzales and Guadalupe Brackish Partnership Project

Item	Estimated Costs
Pump Station(s) (14.3 MGD)	$9,582,000
Transmission Pipeline (30 in. dia., 32.1 miles)	$120,519,000
Well Fields (Wells, Pumps, and Piping)	$50,289,000
Storage Tanks (Other Than at Booster Pump Stations)	$11,964,000
Water Treatment Plant (14.3 MGD)	$98,447,000
Integration, Relocations, Backup Generator & Other	$499,000
TOTAL COST OF FACILITIES	**$300,344,000**
- Planning (3%)	$9,010,000
- Design (7%)	$21,024,000
- Construction Engineering (1%)	$3,003,000
Legal Assistance (2%)	$12,014,000
Fiscal Services (2%)	$6,007,000
Pipeline Contingency (15%)	$18,078,000
All Other Facilities Contingency (20%)	$35,965,000
Environmental & Archaeology Studies and Mitigation	$1,115,000
Land Acquisition and Surveying (229 acres)	$1,632,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$13,251,000
TOTAL COST OF PROJECT	**$421,443,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$29,618,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,861,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$395,000
Water Treatment Plant	$18,459,000
Pumping Energy Costs (42,795,949 kW-hr @ 0.09 $/kW-hr)	$3,852,000
Purchase of Water (14,562 ac-ft/yr @ 125 $/ac-ft)	$1,820,000
TOTAL ANNUAL COST	**$56,005,000**
Available Project Yield (acft/yr)	9,144
Annual Cost of Water ($ per acft)*	$6,125
Annual Cost of Water After Debt Service ($ per acft)*	$2,886
Annual Cost of Water ($ per 1,000 gallons)*	$18.80
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$8.86
*Based on a peaking factor of 1.1	

Table 5E.3-3 Cost Estimate Summary for the Brackish Groundwater Development WMS: County Line SUD Brackish Trinity Project

Item	Estimated Costs
Well Fields (Wells, Pumps, and Piping)	$6,651,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,784,000
Water Treatment Plant (2.3 MGD)	$31,609,000
TOTAL COST OF FACILITIES	**$40,044,000**
- Planning (3%)	$1,201,000
- Design (7%)	$2,803,000
- Construction Engineering (1%)	$400,000
Legal Assistance (2%)	$801,000
Fiscal Services (2%)	$801,000
All Other Facilities Contingency (20%)	$8,009,000
Environmental & Archaeology Studies and Mitigation	$245,000
Land Acquisition and Surveying (17 acres)	$238,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,773,000
TOTAL COST OF PROJECT	**$56,315,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,962,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$84,000
Water Treatment Plant	$5,927,000
Pumping Energy Costs (69,122 kW-hr @ 0.09 $/kW-hr)	$6,000
TOTAL ANNUAL COST	**$9,979,000**
Available Project Yield (acft/yr)	500
Annual Cost of Water ($ per acft)*	$19,958
Annual Cost of Water After Debt Service ($ per acft)*	$12,034
Annual Cost of Water ($ per 1,000 gallons)*	$61.24
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$36.93
*Based on a peaking factor of 1	

Table 5E.3-4 Cost Estimate Summary for the Brackish Groundwater Development WMS: County Line SUD Brackish Edwards Project

Item	Estimated Costs
Transmission Pipeline (12 in. dia., 0.1 miles)	$107,000
Transmission Pump Station(s) & Storage Tank(s)	$1,587,000
Well Fields (Wells, Pumps, and Piping)	$8,251,000
Water Treatment Plant (2.3 MGD)	$6,371,000
TOTAL COST OF FACILITIES	**$14,622,000**
- Planning (3%)	$439,000
- Design (7%)	$1,023,000
- Construction Engineering (1%)	$146,000
Legal Assistance (2%)	$292,000
Fiscal Services (2%)	$292,000
All Other Facilities Contingency (20%)	$2,924,000
Environmental & Archaeology Studies and Mitigation	$261,000
Land Acquisition and Surveying (39 acres)	$249,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$659,000
TOTAL COST OF PROJECT	**$20,907,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,471,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$83,000
Water Treatment Plant	$5,927,000
Pumping Energy Costs (119,177 kW-hr @ 0.09 $/kW-hr)	$11,000
TOTAL ANNUAL COST	**$7,492,000**
Available Project Yield (acft/yr)	500
Annual Cost of Water ($ per acft)*	$14,984
Annual Cost of Water After Debt Service ($ per acft)*	$12,042
Annual Cost of Water ($ per 1,000 gallons)*	$45.98
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$36.95
*Based on a peaking factor of 1	

Table 5E.3-5 Cost Estimate Summary for the Brackish Groundwater Development WMS: Maxwell SUD Brackish Trinity Project

Item	Estimated Costs
Transmission Pipeline (16 in. dia., 1 miles)	$2,056,000
Well Fields (Wells, Pumps, and Piping)	$2,591,000
Storage Tanks (Other Than at Booster Pump Stations)	$1,024,000
Water Treatment Plant (0.3 MGD)	$7,111,000
TOTAL COST OF FACILITIES	**$12,782,000**
- Planning (3%)	$383,000
- Design (7%)	$895,000
- Construction Engineering (1%)	$128,000
Legal Assistance (2%)	$256,000
Fiscal Services (2%)	$256,000
Pipeline Contingency (15%)	$308,000
All Other Facilities Contingency (20%)	$2,145,000
Environmental & Archaeology Studies and Mitigation	$89,000
Land Acquisition and Surveying (17 acres)	$239,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$569,000
TOTAL COST OF PROJECT	**$18,050,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,270,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$57,000
Water Treatment Plant	$1,346,000
Pumping Energy Costs (9,321 kW-hr @ 0.09 $/kW-hr)	$1,000
TOTAL ANNUAL COST	**$2,674,000**
Available Project Yield (acft/yr)	230
Annual Cost of Water ($ per acft), based on PF=1	$11,626
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$6,104
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$35.67
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$18.73
*Based on a peaking factor of 1	

Table 5E.3-6 Cost Estimate Summary for the Brackish Groundwater Development WMS: S S WSC Brackish Carrizo-Wilcox Project

Item	Estimated Costs
Transmission Pipeline (12 in. dia., 0.1 miles)	$107,000
Transmission Pump Station(s) & Storage Tank(s)	$1,587,000
Well Fields (Wells, Pumps, and Piping)	$9,853,000
Water Treatment Plant (1.4 MGD)	$26,187,000
TOTAL COST OF FACILITIES	**$37,734,000**
- Planning (3%)	$1,132,000
- Design (7%)	$2,641,000
- Construction Engineering (1%)	$377,000
Legal Assistance (2%)	$755,000
Fiscal Services (2%)	$755,000
Pipeline Contingency (15%)	$16,000
All Other Facilities Contingency (20%)	$7,525,000
Environmental & Archaeology Studies and Mitigation	$166,000
Land Acquisition and Surveying (39 acres)	$135,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,666,000
TOTAL COST OF PROJECT	**$52,902,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,722,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$111,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$10,000
Water Treatment Plant	$4,959,000
Pumping Energy Costs (144,699 kW-hr @ 0.09 $/kW-hr)	$13,000
TOTAL ANNUAL COST	**$8,815,000**
Available Project Yield (acft/yr)	705
Annual Cost of Water ($ per acft)*	$12,504
Annual Cost of Water After Debt Service ($ per acft)*	$7,224
Annual Cost of Water ($ per 1,000 gallons)*	$38.37
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$22.17
*Based on a peaking factor of 2	

5E.4 Facilities Expansion

The Facilities Expansion WMS is described in Section 5.2.8. Cost estimate summary tables are included for the following Facilities Expansion WMS projects:

Table 5E.4-1 Cost Estimate Summary for the Facilities Expansion WMS: Canyon Regional Water Authority Lake Dunlap WTP Expansion

Item	Estimated Costs
Water Treatment Plant (2 MGD)	$9,889,000
TOTAL COST OF FACILITIES	**$9,889,000**
- Planning (3%)	$297,000
- Design (7%)	$692,000
- Construction Engineering (1%)	$99,000
Legal Assistance (2%)	$198,000
Fiscal Services (2%)	$198,000
All Other Facilities Contingency (20%)	$1,978,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$434,000
TOTAL COST OF PROJECT	**$13,785,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$970,000
Operation and Maintenance	
Water Treatment Plant	$893,000
TOTAL ANNUAL COST	**$1,863,000**
Available Project Yield (acft/yr)	59
Annual Cost of Water ($ per acft)*	$31,576
Annual Cost of Water After Debt Service ($ per acft)*	$15,136
Annual Cost of Water ($ per 1,000 gallons)*	$96.89
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$46.44
*Based on a peaking factor of 1	

Table 5E.4-2 Cost Estimate Summary for the Facilities Expansion WMS: Canyon Regional Water Authority Hays Caldwell WTP Expansion

Item	Estimated Costs
Water Treatment Plant (2 MGD)	$9,889,000
TOTAL COST OF FACILITIES	**$9,889,000**
- Planning (3%)	$297,000
- Design (7%)	$692,000
- Construction Engineering (1%)	$99,000
Legal Assistance (2%)	$198,000
Fiscal Services (2%)	$198,000
All Other Facilities Contingency (20%)	$1,978,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$434,000
TOTAL COST OF PROJECT	**$13,785,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$970,000
Operation and Maintenance	
Water Treatment Plant	$893,000
TOTAL ANNUAL COST	**$1,863,000**
Available Project Yield (acft/yr)	406
Annual Cost of Water ($ per acft)*	$4,589
Annual Cost of Water After Debt Service ($ per acft)*	$2,200
Annual Cost of Water ($ per 1,000 gallons)*	$14.08
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$6.75
*Based on a peaking factor of 1	

Table 5E.4-3 Cost Estimate Summary for the Facilities Expansion WMS: County Line SUD SH-21 Booster Site

Item	Estimated Costs
Transmission Pump Station(s) & Storage Tank(s)	$1,500,000
TOTAL COST OF FACILITIES	**$1,500,000**
- Planning (3%)	$45,000
- Design (7%)	$105,000
- Construction Engineering (1%)	$15,000
Legal Assistance (2%)	$30,000
Fiscal Services (2%)	$30,000
All Other Facilities Contingency (20%)	$300,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$67,000
TOTAL COST OF PROJECT	**$2,106,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$148,000
Operation and Maintenance	
Intakes and Pump Stations (2.5% of Cost of Facilities)	$38,000
Pumping Energy Costs (399,102 kW-hr @ 0.09 $/kW-hr)	$36,000
TOTAL ANNUAL COST	**$222,000**
Available Project Yield (acft/yr)	1,120
Annual Cost of Water ($ per acft)*	$198
Annual Cost of Water After Debt Service ($ per acft)*	$66
Annual Cost of Water ($ per 1,000 gallons)*	$0.61
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.20
*Based on a peaking factor of 1.5	

Table 5E.4-4 Cost Estimate Summary for the Facilities Expansion WMS: County Line SUD High Road Booster Site

Item	Estimated Costs
Transmission Pump Station(s) & Storage Tank(s)	$1,000,000
TOTAL COST OF FACILITIES	**$1,000,000**
- Planning (3%)	$30,000
- Design (7%)	$70,000
- Construction Engineering (1%)	$10,000
Legal Assistance (2%)	$20,000
Fiscal Services (2%)	$20,000
All Other Facilities Contingency (20%)	$200,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$45,000
TOTAL COST OF PROJECT	**$1,409,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$99,000
Operation and Maintenance	
Intakes and Pump Stations (2.5% of Cost of Facilities)	$25,000
Pumping Energy Costs (789,308 kW-hr @ 0.09 $/kW-hr)	$24,000
TOTAL ANNUAL COST	**$148,000**
Available Project Yield (acft/yr)	76
Annual Cost of Water ($ per acft)*	$1,947
Annual Cost of Water After Debt Service ($ per acft)*	$645
Annual Cost of Water ($ per 1,000 gallons)*	$5.98
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$1.98
*Based on a peaking factor of 1.5	

Table 5E.4-5 Cost Estimate Summary for the Facilities Expansion WMS: County Line SUD Bobwhite Booster Site

Item	Estimated Costs
Transmission Pump Station(s) & Storage Tank(s)	$2,000,000
TOTAL COST OF FACILITIES	**$2,000,000**
- Planning (3%)	$60,000
- Design (7%)	$140,000
- Construction Engineering (1%)	$20,000
Legal Assistance (2%)	$40,000
Fiscal Services (2%)	$40,000
All Other Facilities Contingency (20%)	$400,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$89,000
TOTAL COST OF PROJECT	**$2,803,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$197,000
Operation and Maintenance	
Intakes and Pump Stations (2.5% of Cost of Facilities)	$50,000
Pumping Energy Costs (789,308 kW-hr @ 0.09 $/kW-hr)	$71,000
TOTAL ANNUAL COST	**$318,000**
Available Project Yield (acft/yr)	2,240
Annual Cost of Water ($ per acft)*	$142
Annual Cost of Water After Debt Service ($ per acft)*	$54
Annual Cost of Water ($ per 1,000 gallons)*	$0.44
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.17
*Based on a peaking factor of 1.5	

Table 5E.4-6 Cost Estimate Summary for the Facilities Expansion WMS: Guadalupe-Blanco River Authority Western Canyon WTP Expansion

Item	Estimated Costs
Water Treatment Plant (5 MGD)	$16,986,000
TOTAL COST OF FACILITIES	**$16,986,000**
- Planning (3%)	$510,000
- Design (7%)	$1,189,000
- Construction Engineering (1%)	$170,000
Legal Assistance (2%)	$340,000
Fiscal Services (2%)	$340,000
All Other Facilities Contingency (20%)	$3,397,000
Environmental & Archaeology Studies and Mitigation	$25,000
Land Acquisition and Surveying (3 acres)	$27,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$747,000
TOTAL COST OF PROJECT	**$23,731,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,670,000
Operation and Maintenance	
Water Treatment Plant	$1,314,000
TOTAL ANNUAL COST	**$2,984,000**
Available Project Yield (acft/yr)	1,245
Annual Cost of Water ($ per acft)*	$2,397
Annual Cost of Water After Debt Service ($ per acft)*	$1,055
Annual Cost of Water ($ per 1,000 gallons)*	$7.35
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$3.24
*Based on a peaking factor of 1	

Table 5E.4-7 Cost Estimate Summary for the Facilities Expansion WMS: New Braunfels Utilities South WTP Expansion

Item	Estimated Costs
Water Treatment Plant Expansion (8 MGD)	$24,083,000
TOTAL COST OF FACILITIES	**$24,083,000**
- Planning (3%)	$722,000
- Design (7%)	$1,686,000
- Construction Engineering (1%)	$241,000
Legal Assistance (2%)	$482,000
Fiscal Services (2%)	$482,000
All Other Facilities Contingency (20%)	$4,817,000
Environmental & Archaeology Studies and Mitigation	$40,000
Land Acquisition and Surveying (4 acres)	$44,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,060,000
TOTAL COST OF PROJECT	**$33,657,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$2,368,000
Operation and Maintenance	
Water Treatment Plant	$1,736,000
TOTAL ANNUAL COST	**$4,104,000**
Available Project Yield (acft/yr)	6,800
Annual Cost of Water ($ per acft)*	$604
Annual Cost of Water After Debt Service ($ per acft)*	$255
Annual Cost of Water ($ per 1,000 gallons)*	$1.85
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.78
*Based on a peaking factor of 1	

Table 5E.4-8 Cost Estimate Summary for the Facilities Expansion WMS: New Braunfels Utilities South WTP 2

Item	Estimated Costs
Water Treatment Plant Expansion (4 MGD)	$60,620,000
TOTAL COST OF FACILITIES	**$60,620,000**
- Planning (3%)	$1,819,000
- Design (7%)	$4,243,000
- Construction Engineering (1%)	$606,000
Legal Assistance (2%)	$1,212,000
Fiscal Services (2%)	$1,212,000
All Other Facilities Contingency (20%)	$12,124,000
Environmental & Archaeology Studies and Mitigation	$40,000
Land Acquisition and Surveying (2 acres)	$44,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$2,663,000
TOTAL COST OF PROJECT	**$84,583,000**
Debt Service (3.5 percent, 20 years)	$5,951,000
Water Treatment Plant	$4,386,000
TOTAL ANNUAL COST	**$10,337,000**
Available Project Yield (acft/yr)	6,800
Annual Cost of Water ($ per acft)*	$1,520
Annual Cost of Water After Debt Service ($ per acft)*	$645
Annual Cost of Water ($ per 1,000 gallons)*	$4.66
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$1.98
*Based on a peaking factor of 1	

Table 5E.4-9 Cost Estimate Summary for the Facilities Expansion WMS: New Braunfels Utilities South WTP 2 (Expansion 1)

Item	Estimated Costs
Water Treatment Plant (4 MGD)	$14,620,000
TOTAL COST OF FACILITIES	**$14,620,000**
- Planning (3%)	$439,000
- Design (7%)	$1,023,000
- Construction Engineering (1%)	$146,000
Legal Assistance (2%)	$292,000
Fiscal Services (2%)	$292,000
All Other Facilities Contingency (20%)	$2,924,000
Environmental & Archaeology Studies and Mitigation	$20,000
Land Acquisition and Surveying (2 acres)	$22,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$643,000
TOTAL COST OF PROJECT	**$20,421,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,437,000
Operation and Maintenance	
Water Treatment Plant	$1,174,000
TOTAL ANNUAL COST	**$2,611,000**
Available Project Yield (acft/yr)	6,800
Annual Cost of Water ($ per acft)*	$384
Annual Cost of Water After Debt Service ($ per acft)*	$173
Annual Cost of Water ($ per 1,000 gallons)*	$1.18
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.53
*Based on a peaking factor of 1	

Table 5E.4-10 Cost Estimate Summary for the Facilities Expansion WMS: New Braunfels Utilities South WTP 2 (Expansion 2)

Item	Estimated Costs
Water Treatment Plant (4 MGD)	$14,620,000
TOTAL COST OF FACILITIES	**$14,620,000**
- Planning (3%)	$439,000
- Design (7%)	$1,023,000
- Construction Engineering (1%)	$146,000
Legal Assistance (2%)	$292,000
Fiscal Services (2%)	$292,000
All Other Facilities Contingency (20%)	$2,924,000
Environmental & Archaeology Studies and Mitigation	$20,000
Land Acquisition and Surveying (2 acres)	$22,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$643,000
TOTAL COST OF PROJECT	**$20,421,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,437,000
Operation and Maintenance	
Water Treatment Plant	$1,174,000
TOTAL ANNUAL COST	**$2,611,000**
Available Project Yield (acft/yr)	6,800
Annual Cost of Water ($ per acft)*	$384
Annual Cost of Water After Debt Service ($ per acft)*	$173
Annual Cost of Water ($ per 1,000 gallons)*	$1.18
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.53
*Based on a peaking factor of 1	

Table 5E.4-11 Cost Estimate Summary for the Facilities Expansion WMS: New Braunfels Utilities – Seguin Interconnect

Item	Estimated Costs
Intake Pump Stations (0 MGD)	$2,525,000
Transmission Pipeline (14 in. dia., 5 miles)	$8,808,000
Integration, Relocations, Backup Generator & Other	$55,000
TOTAL COST OF FACILITIES	**$11,388,000**
- Planning (3%)	$342,000
- Design (7%)	$797,000
- Construction Engineering (1%)	$114,000
Legal Assistance (2%)	$228,000
Fiscal Services (2%)	$228,000
Pipeline Contingency (15%)	$1,321,000
All Other Facilities Contingency (20%)	$516,000
Environmental & Archaeology Studies and Mitigation	$199,000
Land Acquisition and Surveying (35 acres)	$387,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$503,000
TOTAL COST OF PROJECT	**$16,023,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,124,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$89,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$63,000
Pumping Energy Costs (906,248 kW-hr @ 0.09 $/kW-hr)	$82,000
Purchase of Water (2,500 acft/yr @ 100 $/acft)	$250,000
TOTAL ANNUAL COST	**$1,608,000**
Available Project Yield (acft/yr)	2,500
Annual Cost of Water ($ per acft)*	$643
Annual Cost of Water After Debt Service ($ per acft)*	$194
Annual Cost of Water ($ per 1,000 gallons)*	$1.97
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.59
*Based on a peaking factor of 1.3	

Table 5E.4-12 Cost Estimate Summary for the Facilities Expansion WMS: San Antonio Water System Southeast Integration Pipeline

Item	Estimated Costs
Intake Pump Stations (21 MGD)	$9,160,000
Transmission Pipeline (36 in. dia., 9.5 miles)	$46,917,000
Integration, Relocations, Backup Generator & Other	$333,000
TOTAL COST OF FACILITIES	**$56,410,000**
- Planning (3%)	$1,692,000
- Design (7%)	$3,949,000
- Construction Engineering (1%)	$564,000
Legal Assistance (2%)	$1,128,000
Fiscal Services (2%)	$1,128,000
Pipeline Contingency (15%)	$7,038,000
All Other Facilities Contingency (20%)	$1,899,000
Environmental & Archaeology Studies and Mitigation	$336,000
Land Acquisition and Surveying (40 acres)	$436,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$2,413,000
TOTAL COST OF PROJECT	**$76,993,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$5,394,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$472,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$229,000
Pumping Energy Costs (5,459,393 kW-hr @ 0.09 $/kW-hr)	$491,000
TOTAL ANNUAL COST	**$6,586,000**
Available Project Yield (acft/yr)	21,000
Annual Cost of Water ($ per acft)*	$314
Annual Cost of Water After Debt Service ($ per acft)*	$57
Annual Cost of Water ($ per 1,000 gallons)*	$0.96
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.17
*Based on a peaking factor of 1	

Table 5E.4-13 Cost Estimate Summary for the Facilities Expansion WMS: SAWS Expanded ASR Treatment Plant

Item	Estimated Costs
Water Treatment Plant (30 MGD)	$66,425,000
TOTAL COST OF FACILITIES	**$66,425,000**
- Planning (3%)	$1,993,000
- Design (7%)	$4,650,000
- Construction Engineering (1%)	$664,000
Legal Assistance (2%)	$1,329,000
Fiscal Services (2%)	$1,329,000
All Other Facilities Contingency (20%)	$13,285,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$2,915,000
TOTAL COST OF PROJECT	**$92,590,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$6,515,000
Operation and Maintenance	
Water Treatment Plant	$4,650,000
TOTAL ANNUAL COST	**$11,165,000**
Available Project Yield (acft/yr)	33,600
Annual Cost of Water ($ per acft)*	$332
Annual Cost of Water After Debt Service ($ per acft)*	$138
Annual Cost of Water ($ per 1,000 gallons)*	$1.02
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.42
*Based on a peaking factor of 1	

Table 5E.4-14 Cost Estimate Summary for the Facilities Expansion WMS: Springs Hill WSC Zone 2 Transmission Main

Item	Estimated Costs
Intake Pump Stations (0 MGD)	$1,540,000
Transmission Pipeline (16 in. dia., 19.3 miles)	$40,463,000
Integration, Relocations, Backup Generator & Other	$36,000
TOTAL COST OF FACILITIES	**$42,039,000**
- Planning (3%)	$1,261,000
- Design (7%)	$2,943,000
- Construction Engineering (1%)	$420,000
Legal Assistance (2%)	$841,000
Fiscal Services (2%)	$841,000
Pipeline Contingency (15%)	$6,069,000
All Other Facilities Contingency (20%)	$315,000
Environmental & Archaeology Studies and Mitigation	$629,000
Land Acquisition and Surveying (122 acres)	$1,341,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,842,000
TOTAL COST OF PROJECT	**$58,541,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$4,117,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$405,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$39,000
Pumping Energy Costs (596,959 kW-hr @ 0.09 $/kW-hr)	$54,000
TOTAL ANNUAL COST	**$4,615,000**
Available Project Yield (acft/yr)	2,240
Annual Cost of Water ($ per acft)*	$2,060
Annual Cost of Water After Debt Service ($ per acft)*	$222
Annual Cost of Water ($ per 1,000 gallons)*	$6.32
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.68
*Based on a peaking factor of 1	

Table 5E.4-15 Cost Estimate Summary for the Facilities Expansion WMS: Springs Hill WSC Gamecock WTP

Item	Estimated Costs
Water Treatment Plant (4 MGD)	$38,169,000
TOTAL COST OF FACILITIES	**$45,901,000**
- Planning (3%)	$1,377,000
- Design (7%)	$3,213,000
- Construction Engineering (1%)	$459,000
Legal Assistance (2%)	$918,000
Fiscal Services (2%)	$918,000
All Other Facilities Contingency (20%)	$9,180,000
Environmental & Archaeology Studies and Mitigation	$130,000
Land Acquisition and Surveying (19 acres)	$210,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$2,024,000
TOTAL COST OF PROJECT	**$64,330,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$4,523,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$192,000
Water Treatment Plant	$3,098,000
Pumping Energy Costs (893,963 kW-hr @ 0.09 $/kW-hr)	$80,000
TOTAL ANNUAL COST	**$7,894,000**
Available Project Yield (acft/yr)	3,200
Annual Cost of Water ($ per acft)*	$2,467
Annual Cost of Water After Debt Service ($ per acft)*	$1,053
Annual Cost of Water ($ per 1,000 gallons)*	$7.57
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$3.23
*Based on a peaking factor of 1	

Table 5E.4-16 Cost Estimate Summary for the Facilities Expansion WMS: CPS Energy Direct Recycle Pipeline (Bexar Co. Steam-Electric)

Item	Estimated Costs
Intake Pump Stations (0 MGD)	$13,441,000
Transmission Pipeline (54 in. dia., 9 miles)	$48,285,000
Integration, Relocations, Backup Generator & Other	$480,000
TOTAL COST OF FACILITIES	**$62,206,000**
- Planning (3%)	$1,866,000
- Design (7%)	$4,354,000
- Construction Engineering (1%)	$622,000
Legal Assistance (2%)	$1,244,000
Fiscal Services (2%)	$1,244,000
Pipeline Contingency (15%)	$7,243,000
All Other Facilities Contingency (20%)	$2,784,000
Environmental & Archaeology Studies and Mitigation	$319,000
Land Acquisition and Surveying (59 acres)	$652,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$2,667,000
TOTAL COST OF PROJECT	**$85,201,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$5,961,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$488,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$336,000
Pumping Energy Costs (7,871,546 kW-hr @ 0.09 $/kW-hr)	$708,000
TOTAL ANNUAL COST	**$7,493,000**
Available Project Yield (acft/yr)	5,000
Annual Cost of Water ($ per acft)*	$1,499
Annual Cost of Water After Debt Service ($ per acft)*	$306
Annual Cost of Water ($ per 1,000 gallons)*	$4.60
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.94
*Based on a peaking factor of 1	

5E.5 Recycled Water

The Recycled Water WMS is described in Section 5.2.9. Cost estimate summary tables are included for the following Recycled Water WMS projects:

Table 5E.5-1 Cost Estimate Summary for the Recycled Water WMS: Boerne Non-Potable Reuse

Item	Estimated Costs
Pump Stations	$1,033,000
Storage Tanks (Other Than at Booster Pump Stations)	$6,039,000
Integration, Relocations, Backup Generator & Other	$16,000
TOTAL COST OF FACILITIES	**$7,088,000**
- Planning (3%)	$213,000
- Design (7%)	$496,000
- Construction Engineering (1%)	$71,000
Legal Assistance (2%)	$142,000
Fiscal Services (2%)	$142,000
All Other Facilities Contingency (20%)	$1,418,000
Environmental & Archaeology Studies and Mitigation	$51,000
Land Acquisition and Surveying (7 acres)	$56,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$314,000
TOTAL COST OF PROJECT	**$9,991,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$702,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$61,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$26,000
Pumping Energy Costs (283,766,340 kW-hr @ 0.09 $/kW-hr)	$24,000
TOTAL ANNUAL COST	**$813,000**
Available Project Yield (acft/yr)	1,500
Annual Cost of Water ($ per acft)*	$542
Annual Cost of Water After Debt Service ($ per acft)*	$74
Annual Cost of Water ($ per 1,000 gallons)*	$1.66
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.23
*Based on a peaking factor of 1	

Table 5E.5-2 Cost Estimate Summary for the Recycled Water WMS: County Line SUD Non-Potable Reuse

Item	Estimated Costs
Pump Stations	$1,906,000
Transmission Pipeline (12 in. dia., 1.9 miles)	$3,206,000
Water Treatment Plant (3 MGD)	$32,557,000
Integration, Relocations, Backup Generator & Other	$51,000
TOTAL COST OF FACILITIES	**$37,720,000**
- Planning (3%)	$1,132,000
- Design (7%)	$2,640,000
- Construction Engineering (1%)	$377,000
Legal Assistance (2%)	$754,000
Fiscal Services (2%)	$754,000
Pipeline Contingency (15%)	$481,000
All Other Facilities Contingency (20%)	$6,903,000
Environmental & Archaeology Studies and Mitigation	$93,000
Land Acquisition and Surveying (29 acres)	$223,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,659,000
TOTAL COST OF PROJECT	**$52,736,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$3,707,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$33,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$48,000
Water Treatment Plant	$2,777,000
Pumping Energy Costs (830,846 kW-hr @ 0.09 $/kW-hr)	$75,000
TOTAL ANNUAL COST	**$6,640,000**
Available Project Yield (acft/yr)	560
Annual Cost of Water ($ per acft)*	$11,857
Annual Cost of Water After Debt Service ($ per acft)*	$5,238
Annual Cost of Water ($ per 1,000 gallons)*	$36.38
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$16.07
*Based on a peaking factor of 1	

Table 5E.5-3 Cost Estimate Summary for the Recycled Water WMS: Fair Oaks Ranch Non-Potable Reuse

Item	Estimated Costs
Pump Stations	$732,000
Transmission Pipeline (12 in. dia., 1 miles)	$2,003,000
Integration, Relocations, Backup Generator & Other	$5,000
TOTAL COST OF FACILITIES	**$2,740,000**
- Planning (3%)	$82,000
- Design (7%)	$192,000
- Construction Engineering (1%)	$27,000
Legal Assistance (2%)	$55,000
Fiscal Services (2%)	$55,000
Pipeline Contingency (15%)	$301,000
All Other Facilities Contingency (20%)	$147,000
Environmental & Archaeology Studies and Mitigation	$29,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$118,000
TOTAL COST OF PROJECT	**$3,746,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$263,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$20,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$18,000
Pumping Energy Costs (75,254 kW-hr @ 0.09 $/kW-hr)	$7,000
TOTAL ANNUAL COST	**$308,000**
Available Project Yield (acft/yr)	425
Annual Cost of Water ($ per acft)*	$725
Annual Cost of Water After Debt Service ($ per acft)*	$106
Annual Cost of Water ($ per 1,000 gallons)*	$2.22
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.32
*Based on a peaking factor of 1	

Table 5E.5-4 Cost Estimate Summary for the Recycled Water WMS: Guadalupe-Blanco River Authority Stein Falls WWTF

Item	Estimated Costs
Pump Stations	$24,456,000
Integration, Relocations, Backup Generator & Other	$275,000
TOTAL COST OF FACILITIES	**$29,262,000**
- Planning (3%)	$878,000
- Design (7%)	$2,048,000
- Construction Engineering (1%)	$293,000
Legal Assistance (2%)	$585,000
Fiscal Services (2%)	$585,000
All Other Facilities Contingency (20%)	$4,946,000
Environmental & Archaeology Studies and Mitigation	$176,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$1,299,000
TOTAL COST OF PROJECT	**$41,535,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$2,903,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$48,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$611,000
Pumping Energy Costs (4,515,488 kW-hr @ 0.09 $/kW-hr)	$406,000
TOTAL ANNUAL COST	**$3,968,000**
Available Project Yield (acft/yr)	1,064
Annual Cost of Water ($ per acft)*	$3,729
Annual Cost of Water After Debt Service ($ per acft)*	$1,001
Annual Cost of Water ($ per 1,000 gallons)*	$11.44
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$3.07
*Based on a peaking factor of 1	

Table 5E.5-5 Cost Estimate Summary for the Recycled Water WMS: Kyle Non-Potable Reuse

Item	Estimated Costs
Pump Stations	$3,005,000
Transmission Pipeline (16 in. dia., 5 miles)	$6,906,000
Integration, Relocations, Backup Generator & Other	$96,000
TOTAL COST OF FACILITIES	**$10,007,000**
- Planning (3%)	$300,000
- Design (7%)	$700,000
- Construction Engineering (1%)	$100,000
Legal Assistance (2%)	$200,000
Fiscal Services (2%)	$200,000
Pipeline Contingency (15%)	$1,036,000
All Other Facilities Contingency (20%)	$620,000
Environmental & Archaeology Studies and Mitigation	$215,000
Land Acquisition and Surveying (66 acres)	$939,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$463,000
TOTAL COST OF PROJECT	**$14,780,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$1,033,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$70,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$75,000
Pumping Energy Costs (283,766,340 kW-hr @ 0.09 $/kW-hr)	$141,000
TOTAL ANNUAL COST	**$1,319,000**
Available Project Yield (acft/yr)	3,105
Annual Cost of Water ($ per acft)*	$425
Annual Cost of Water After Debt Service ($ per acft)*	$92
Annual Cost of Water ($ per 1,000 gallons)*	$1.30
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.28
*Based on a peaking factor of 1	

Table 5E.5-6 Cost Estimate Summary for the Recycled Water WMS: New Braunfels Utilities Direct Potable Reuse

Item	Estimated Costs
Pump Stations	$2,562,000
Transmission Pipeline (24 in. dia., 5 miles)	$14,216,000
Integration, Relocations, Backup Generator & Other	$74,000
TOTAL COST OF FACILITIES	**$53,188,000**
- Planning (3%)	$1,596,000
- Design (7%)	$3,723,000
- Construction Engineering (1%)	$532,000
Legal Assistance (2%)	$1,064,000
Fiscal Services (2%)	$1,064,000
Pipeline Contingency (15%)	$2,132,000
All Other Facilities Contingency (20%)	$7,794,000
Environmental & Archaeology Studies and Mitigation	$270,000
Land Acquisition and Surveying (73 acres)	$798,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$2,343,000
TOTAL COST OF PROJECT	**$74,504,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$5,237,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$143,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$64,000
Water Treatment Plant	$2,544,000
Pumping Energy Costs (1,219,281 kW-hr @ 0.09 $/kW-hr)	$110,000
TOTAL ANNUAL COST	**$8,098,000**
Available Project Yield (acft/yr)	7,800
Annual Cost of Water ($ per acft)*	$1,038
Annual Cost of Water After Debt Service ($ per acft)*	$367
Annual Cost of Water ($ per 1,000 gallons)*	$3.19
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$1.13
*Based on a peaking factor of 1	

Table 5E.5-7 Cost Estimate Summary for the Recycled Water WMS: San Marcos Non-Potable Reuse

Item	Estimated Costs
Pump Stations	$6,957,000
Integration, Relocations, Backup Generator & Other	$70,000
TOTAL COST OF FACILITIES	**$7,027,000**
- Planning (3%)	$211,000
- Design (7%)	$492,000
- Construction Engineering (1%)	$70,000
Legal Assistance (2%)	$141,000
Fiscal Services (2%)	$141,000
All Other Facilities Contingency (20%)	$1,405,000
Environmental & Archaeology Studies and Mitigation	$135,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$311,000
TOTAL COST OF PROJECT	**$9,933,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$694,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$174,000
Pumping Energy Costs (1,140,626 kW-hr @ 0.09 $/kW-hr)	$103,000
TOTAL ANNUAL COST	**$972,000**
Available Project Yield (acft/yr)	1,971
Annual Cost of Water ($ per acft)*	$493
Annual Cost of Water After Debt Service ($ per acft)*	$141
Annual Cost of Water ($ per 1,000 gallons)*	$1.51
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.43
*Based on a peaking factor of 1	

Table 5E.5-8 Cost Estimate Summary for the Recycled Water WMS: San Marcos Potable Reuse

Item	Estimated Costs
Transmission Pipeline (24 in. dia., 2.2 miles)	$5,385,000
Water Treatment Plant (5 MGD)	$67,942,000
TOTAL COST OF FACILITIES	**$73,327,000**
- Planning (3%)	$2,200,000
- Design (7%)	$5,133,000
- Construction Engineering (1%)	$733,000
Legal Assistance (2%)	$1,467,000
Fiscal Services (2%)	$1,467,000
Pipeline Contingency (15%)	$808,000
All Other Facilities Contingency (20%)	$13,588,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$3,209,000
TOTAL COST OF PROJECT	$101,932,000
	$2,200,000
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$7,172,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$54,000
TOTAL ANNUAL COST	**$7,226,000**
Available Project Yield (acft/yr)	4,705
Annual Cost of Water ($ per acft)*	$1,536
Annual Cost of Water After Debt Service ($ per acft)*	$11
Annual Cost of Water ($ per 1,000 gallons)*	$4.71
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.04
*Based on a peaking factor of 1	

Table 5E.5-9 Cost Estimate Summary for the Recycled Water WMS: San Antonio River Authority Non-Potable Reuse

Item	Estimated Costs
Integration, Relocations, Backup Generator & Other	$101,950,000
TOTAL COST OF FACILITIES	**$101,950,000**
- Planning (3%)	$3,059,000
- Design (7%)	$7,137,000
- Construction Engineering (1%)	$1,020,000
Legal Assistance (2%)	$2,039,000
Fiscal Services (2%)	$2,039,000
All Other Facilities Contingency (20%)	$20,390,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$4,474,000
TOTAL COST OF PROJECT	**$142,108,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$9,999,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,020,000
TOTAL ANNUAL COST	**$11,019,000**
Available Project Yield (acft/yr)	6,750
Annual Cost of Water ($ per acft)*	$1,632
Annual Cost of Water After Debt Service ($ per acft)*	$151
Annual Cost of Water ($ per 1,000 gallons)*	$5.01
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$0.46
*Based on a peaking factor of 1	

Table 5E.5-10 Cost Estimate Summary for the Recycled Water WMS: San Antonio Water System Direct Non-Potable Reuse

Item	Estimated Costs
Pump Stations	$27,481,000
Transmission Pipeline (30 in. dia., 70 miles)	$238,901,000
Integration, Relocations, Backup Generator & Other	$17,296,000
TOTAL COST OF FACILITIES	**$283,678,000**
- Planning (3%)	$8,510,000
- Design (7%)	$19,857,000
- Construction Engineering (1%)	$2,837,000
Legal Assistance (2%)	$5,674,000
Fiscal Services (2%)	$5,674,000
Pipeline Contingency (15%)	$35,835,000
All Other Facilities Contingency (20%)	$8,955,000
Environmental & Archaeology Studies and Mitigation	$2,899,000
Land Acquisition and Surveying (928 acres)	$10,205,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$11,922,000
TOTAL COST OF PROJECT	**$396,046,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$26,649,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$2,562,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$687,000
Pumping Energy Costs (283,766,340 kW-hr @ 0.09 $/kW-hr)	$25,539,000
TOTAL ANNUAL COST	**$55,437,000**
Available Project Yield (acft/yr)	5,000
Annual Cost of Water ($ per acft)*	$11,087
Annual Cost of Water After Debt Service ($ per acft)*	$5,758
Annual Cost of Water ($ per 1,000 gallons)*	$34.02
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$17.67
*Based on a peaking factor of 1	

Table 5E.5-11 Cost Estimate Summary for the Recycled Water WMS: San Antonio Water System Direct Potable Reuse (Alternative)

Item	Estimated Costs
Pump Stations	$15,684,000
Transmission Pipeline (42 in. dia., 9.6 miles)	$69,818,000
Advanced Water Treatment Facility (22.5 MGD)	$165,521,000
Integration, Relocations, Backup Generator & Other	$624,000
TOTAL COST OF FACILITIES	**$251,647,000**
- Planning (3%)	$7,549,000
- Design (7%)	$17,615,000
- Construction Engineering (1%)	$2,516,000
Legal Assistance (2%)	$5,033,000
Fiscal Services (2%)	$5,033,000
Pipeline Contingency (15%)	$10,473,000
All Other Facilities Contingency (20%)	$36,366,000
Environmental & Archaeology Studies and Mitigation	$337,000
Land Acquisition and Surveying (132 acres)	$1,331,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$10,962,000
TOTAL COST OF PROJECT	**$348,862,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$24,503,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$704,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$392,000
Advanced Water Treatment Facility	$19,801,000
Pumping Energy Costs (10,238,349 kW-hr @ 0.09 $/kW-hr)	$921,000
TOTAL ANNUAL COST	**$46,321,000**
Available Project Yield (acft/yr)	25,000
Annual Cost of Water ($ per acft)*	$1,853
Annual Cost of Water After Debt Service ($ per acft)*	$873
Annual Cost of Water ($ per 1,000 gallons)*	$5.69
Annual Cost of Water After Debt Service ($ per 1,000 gallons)*	$2.68
*Based on a peaking factor of 1	

INITIALLY PREPARED PLAN

CHAPTER 6: IMPACTS OF THE REGIONAL WATER PLAN AND CONSISTENCY WITH PROTECTION OF RESOURCES

South Central Texas Regional Water Plan

B&V PROJECT NO. 411170

PREPARED FOR

South Central Texas Regional Water Planning Group

3 MARCH 2025

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%	Percent
acft/yr	Acre-Feet per Year
ARWA	Alliance Regional Water Authority
ASR	Aquifer Storage and Recovery
BFZ	Balcones Fault Zone
cfs	Cubic Foot per Second
CRWA	Canyon Regional Water Authority
CVLGC	Cibolo Valley Local Government Corporation
DFC	Desired Future Condition
DB27	2027 Regional and State Water Planning Database
DO	Dissolved Oxygen
EAA	Edwards Aquifer Authority
EAHCP	Edwards Aquifer Habitat Conservation Plan
GAM	Groundwater Availability Model
GBRA	Guadalupe-Blanco River Authority
GIS	Geographic Information System
GMA	Groundwater Management Area
IH	Interstate Highway
IPP	Initially Prepared Plan
MAG	Modeled Available Groundwater
msl	Mean Sea Level
NBU	New Braunfels Utilities
Region K	Lower Colorado Region
Region L	South Central Texas Region
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SAWS	San Antonio Water System
SCTRWP	South Central Texas Regional Water Plan
SCTRWPG	South Central Texas Regional Water Planning Group
SGCN	Species of Greatest Conservation Need
SSLGC	Schertz-Seguin Local Government Corporation
SUD	Special Utility District
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TPWD	Texas Parks and Wildlife Department

TWDB	Texas Water Development Board
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
VISPO	Voluntary Irrigation Suspension Program Option
WSC	Water Supply Corporation
WMS	Water Management Strategy
WUG	Water User Group

6.0 Impacts of the Regional Water Plan and Consistency with Protection of Resources

The 2026 South Central Texas Regional Water Plan (SCTRWP) provides for the orderly development, management, and conservation of water resources to meet the region's near and long-term water needs during drought. This chapter describes the impacts of the 2026 SCTRWP and how the 2026 SCTRWP is consistent with long-term protection of the state's water resources, agricultural resources, and natural resources. The chapter also presents a description of unmet needs, and the socioeconomic impacts of not meeting those needs.

6.1 Cumulative Effects of Regional Water Plan Implementation and Consistency with Long-Term Protection of the State's Water, Agricultural, and Natural Resources

In 2015, the 84th Texas Legislature designated five river or stream segments in South Central Texas Regional Water Planning Area (Region L) as having unique ecological value. In accordance with Title 31 of the Texas Administrative Code (TAC) Section 357.43(b)(2), Regional Water Planning Groups (RWPGs) must assess the impact of the regional water plan (RWP) on designated unique river or stream segments. The rules state, "The assessment shall be a quantitative analysis of the impact of the plan on the flows important to the river or stream segment, as determined by the RWPG, comparing current conditions to conditions with implementation of all recommended water management strategies (WMSs). The assessment shall also describe the impact of the plan on the unique features cited in the region's recommendation of that segment." To comply with these requirements and to assess the consistency with long-term protection of the state's resources, the South Central Texas Regional Water Planning Group (SCTRWPG) performed a cumulative effects analysis of full implementation of the SCTRWP. The following sections summarize the results of the cumulative effects analysis and describe the consistency with long-term protection of resources.

6.1.1 Hydrologic Models

Table 6-1 provides the details of any hydrologic models used for the Cumulative Effects Analysis, including the model name, version date, model input/output files used, date model used, and any relevant comments. Hydrologic variance requests from the SCTRWPG and approvals by the TWDB are documented in Appendix 3B.

Table 6-1 Hydrologic Models used for Cumulative Effects Analysis

Model Name	Version Date	Input/Output Files Used	Date Model Used	Comments
TCEQ Full Authorization WAM for the Guadalupe-San Antonio River Basin	October 1, 2023	WRAP SIM input file extensions: DAT, DIS, FLO, EVA, FAD, HIS WRAP SIM output file extensions: OUT WRAP TAB input file extensions: TIN WRAP TAB output file extensions: TOU	January 2025	N/A – None

Model Name	Version Date	Input/Output Files Used	Date Model Used	Comments
Flow Regime Application Tool (FRAT) v4.0.xlsb	January 13, 2012	Inputs: WAM generated regulated and available flows qnday daily disaggregation of monthly flows Pulse Translation Output: Monthly e-flow pass-through requirements	January 2025	N/A – None
2021 GMA 7 Model Files	August 12, 2022	Input: GAM RUN 21-012 MAG: Modeled Available Groundwater for the aquifers in Groundwater Management Area 7	January 2025	Edwards-Trinity Aquifer
2021 GMA 13 GAM Modeling Files	January 14, 2022	Input: GAM RUN 21-018 MAG: Modeled Available Groundwater for the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers in Groundwater Management Area 13	December 2024	Carrizo-Wilcox Aquifer
2021 GMA 15 Model Files	August 16, 2022	Input: GAM RUN 21-020 MAG: Modeled Available Groundwater for the Gulf Coast Aquifer System in Groundwater Management Area 15	December 2024	Chicot, Evangeline, Burkeville Aquifers

6.1.2 Water Resources

The cumulative effects of implementing the recommended WMSs described in the 2026 SCTRWP are quantified through long-term simulation of natural hydrologic processes including groundwater flow, precipitation, streamflow, aquifer recharge, springflow, and evaporation because they are affected by human influences such as aquifer pumpage, reservoirs, and diversions. Figure 6-1 illustrates the connectivity of the various groundwater and surface water models, as well as the WMSs of the 2026 SCTRWP.

The 2026 SCTRWP recognizes and honors all laws and existing permits applicable to water use for the state and regional water planning areas and, in the case of groundwater, recognizes and takes into account the programs and rules of groundwater conservation districts (GCDs) within the South Central Texas Water Planning Region, as well as Texas Water Development Board (TWDB) rules and guidance for regional water planning.

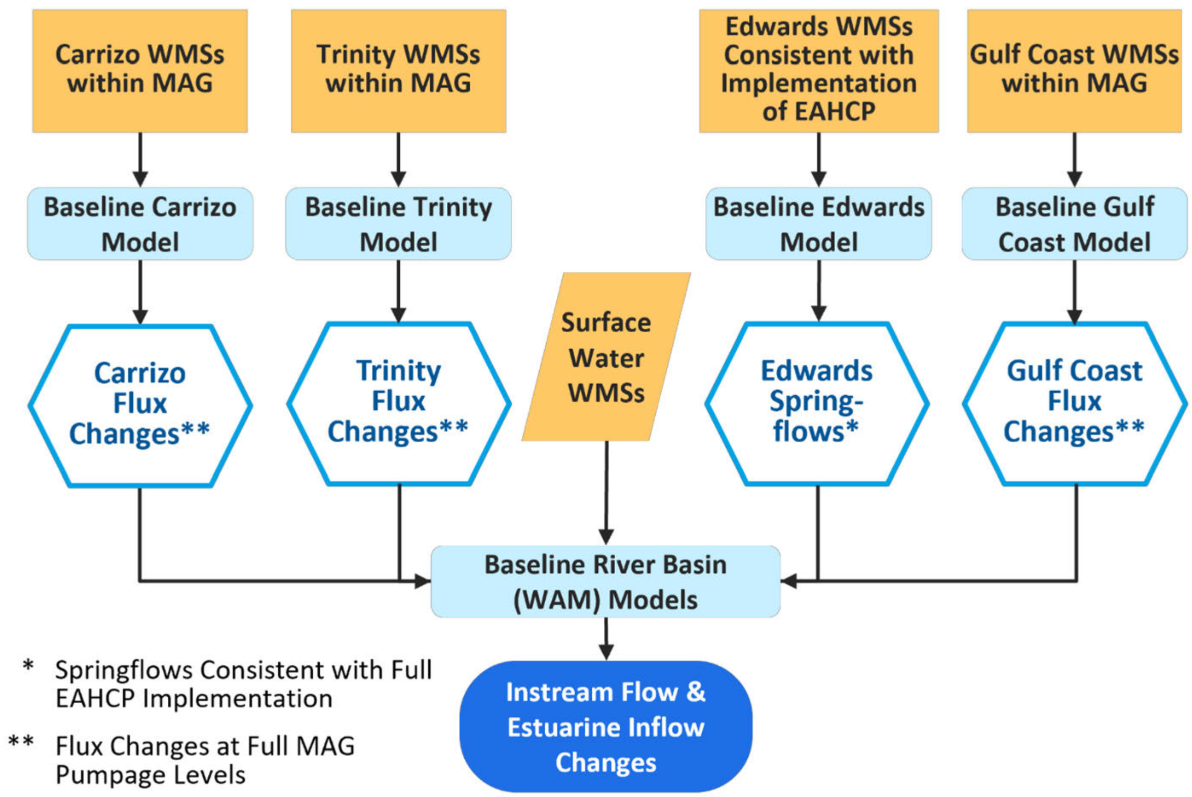

Figure 6-1 Flowchart for Assessment of Cumulative Effects of Regional Water Plan Implementation on Water Resources

6.1.2.1 Groundwater and Springs

Cumulative effects of plan implementation for the Edwards-Balcones Fault Zone (BFZ) Aquifer are based on full implementation of the Edwards Aquifer Habitat Conservation Plan (EAHCP), and for the Carrizo-Wilcox, Gulf Coast, and Trinity Aquifers are based on simulated impacts of the full implementation of the modeled available groundwater (MAGs) within each Groundwater Management Area (GMA). Each of these is described separately below.

The EAHCP was approved in 2013 by the U.S. Fish and Wildlife Service (USFWS). The 2026 SCTRWP assumes full implementation of the EAHCP. Furthermore, the SCTRWPG agreed that springflows associated with EAHCP implementation be used in evaluating existing supplies and potentially feasible surface WMSs for the 2026 SCTRWP.

The EAHCP includes four flow protection measures: Voluntary Irrigation Suspension Program Option (VISPO), Conservation Program, Use of San Antonio Water System (SAWS) Aquifer Storage and Recovery (ASR) with Tiered Leases and Pumping Off-Set, and Stage V Reductions. As of the issuance of this plan, each of these measures has been implemented to some degree. Figure 6-2 illustrates the effects of each measure on springflow at Comal and San Marcos Springs and reflects a May 2019 update to the EAHCP, which approves an adaptive management action that increases the forbearance in the VISPO program to 41,795 acre-feet per year (acft/yr) [1]. The green bars on Figure 6-2 represent SAWS forbearance in excess of the original forbearance amounts shown in the Interlocal Agreement between Edwards Aquifer Authority (EAA) and SAWS for use of the ASR facility for springflow protection, and the red bars represent SAWS forbearance less than the original forbearance amounts shown in the Interlocal Agreement.

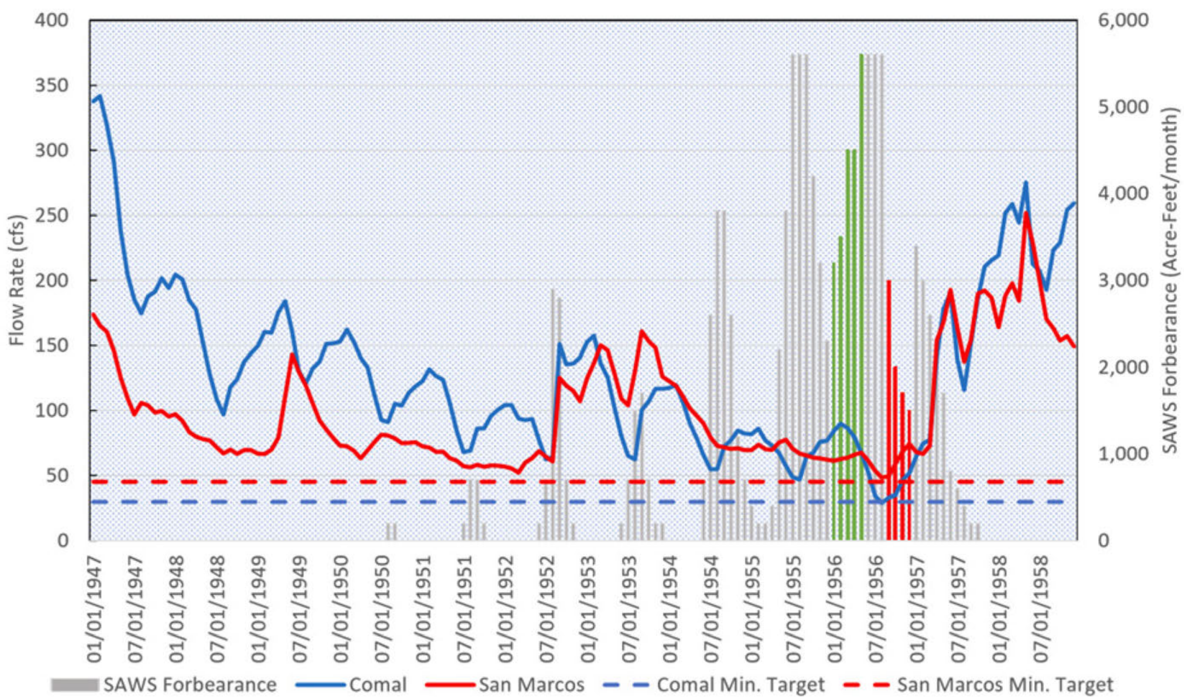

Figure 6-2 Comal and San Marcos Springs in Drought of Record

6.1.2.1.1 Effects of Pumpage on Aquifers

The long-term cumulative effects of recommended WMSs in the 2026 SCTRWP on the Trinity, Carrizo-Wilcox, and Gulf Coast Aquifers presented herein are based on model simulations performed by the TWDB in determining the MAG consistent with the Desired Future Condition (DFC) of the aquifers. For this analysis, it was assumed that the MAGs were fully implemented/produced, and therefore, the analysis was performed on the final simulations conducted by the TWDB for each aquifer to determine the MAGs. Drawdowns and hydrographs presented are all based on these model simulation results. In

[1] One acft is approximately 325,851 gallons.

considering the effects of full MAG utilization for these three aquifers, the SCTRWPG recognizes that actual withdrawals may increase more slowly through time as local and export uses grow to full permitted or MAG levels.

6.1.2.1.1.1 Trinity Aquifer

The 2026 SCTRWP includes twelve recommended WMSs with source water from the Trinity Aquifer: Groundwater Conversions, seven Fresh Groundwater Development, three Brackish Groundwater Development, and New Braunfels Utilities (NBU) Trinity Well Field Expansion. Figure 6-3 illustrates hydrographs for representative Trinity Aquifer wells in Kendall and Bexar Counties for pumping consistent with full utilization of the MAG. Figure 6-4 illustrates maximum predicted drawdowns in the Trinity Aquifer associated with full utilization of the MAG from 2010 to 2080.

6.1.2.1.1.2 Carrizo-Wilcox Aquifer

The 2026 SCTRWP includes multiple recommended WMSs with source water from the Carrizo-Wilcox Aquifer. Table 6-2 lists these WMSs in the Carrizo-Wilcox Aquifer by county. Figure 6-5 illustrates hydrographs for representative Carrizo-Wilcox Aquifer wells in Gonzales and Wilson Counties for pumping consistent with full utilization of the MAG. Figure 6-6 and Figure 6-7 illustrate predicted drawdowns in the Carrizo and Upper Wilcox Aquifers associated with full utilization of the MAG for 2010 to 2080.

Table 6-2 Carrizo-Wilcox Water Management Strategies

Water Management Strategy	Source County/Counties
Nine (9) Fresh Groundwater Development	Various
Three (3) Brackish Groundwater Development	Various
ARWA Project (Phase 2)	Caldwell
CRWA Brackish Carrizo-Wilcox Project	Guadalupe and Wilson
CRWA Wells Ranch (Phase 3)	Guadalupe
CVLGC Carrizo Project	Wilson
GBRA WaterSECURE	Gonzales
SAWS Expanded Local Carrizo Project	Bexar
SAWS Expanded Brackish Wilcox Project	Wilson
SAWS Regional Wilcox Project	Wilson
SSLGC Expanded Brackish Wilcox Project	Gonzales
SSLGC Expanded Carrizo Project	Guadalupe

6.1.2.1.1.3 Gulf Coast Aquifer System

The 2026 SCTRWP includes two recommended WMSs with source water from the Gulf Coast Aquifer System: Victoria Groundwater-Surface Water Exchange and Fresh Groundwater Development for Victoria County-Other. Figure 6-8 illustrates hydrographs for representative Gulf Coast Aquifer System wells in Goliad and Victoria Counties for pumping consistent with full utilization of the MAG. Figure 6-9, Figure 6-10, and Figure 6-11 illustrate predicted drawdowns in the Jasper, Evangeline, and Chicot Aquifers (the three main aquifer units within the Gulf Coast Aquifer System) associated with full utilization of the MAG for 2000 to 2080.

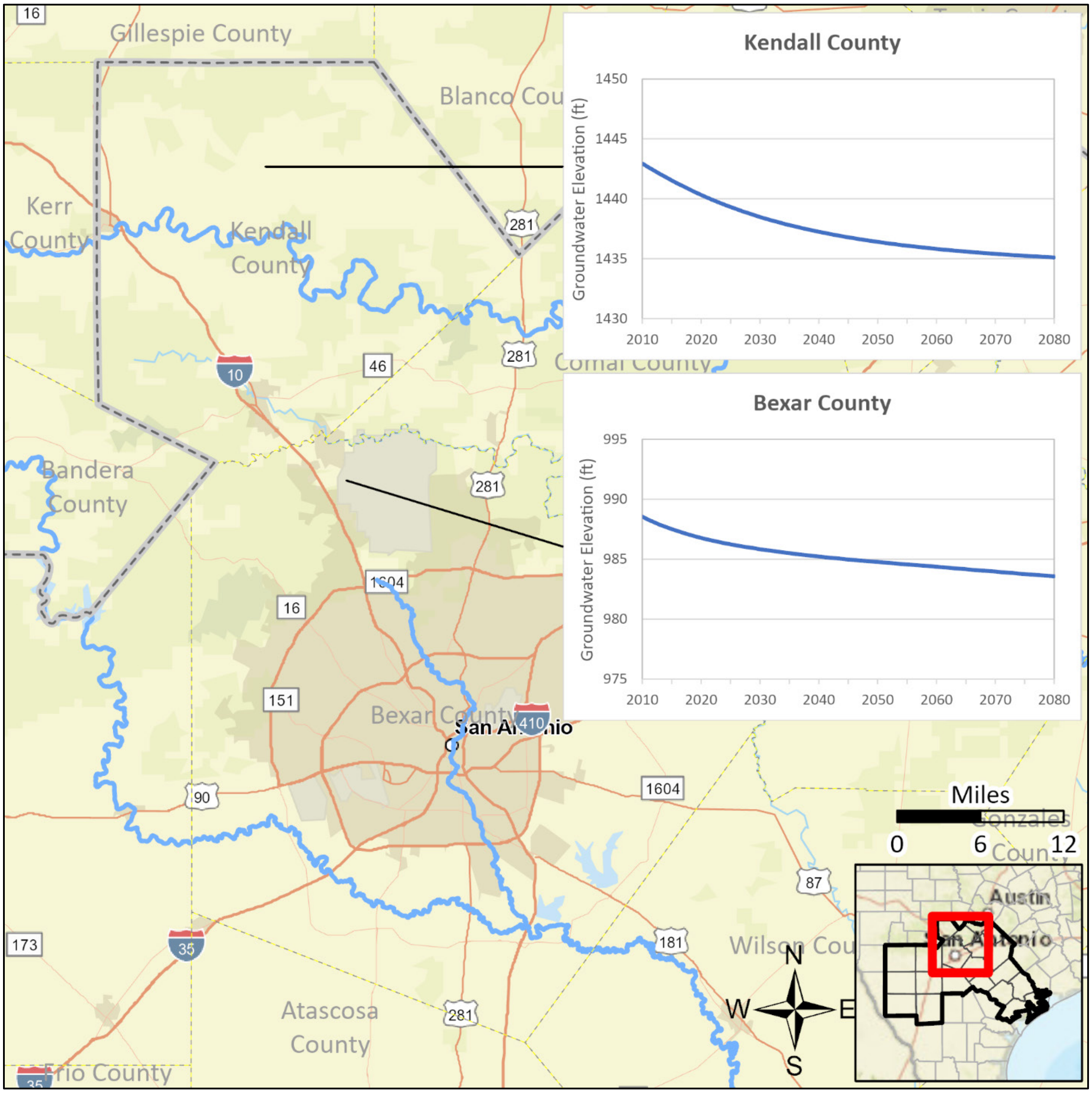

Figure 6-3 Trinity Aquifer Well Hydrographs

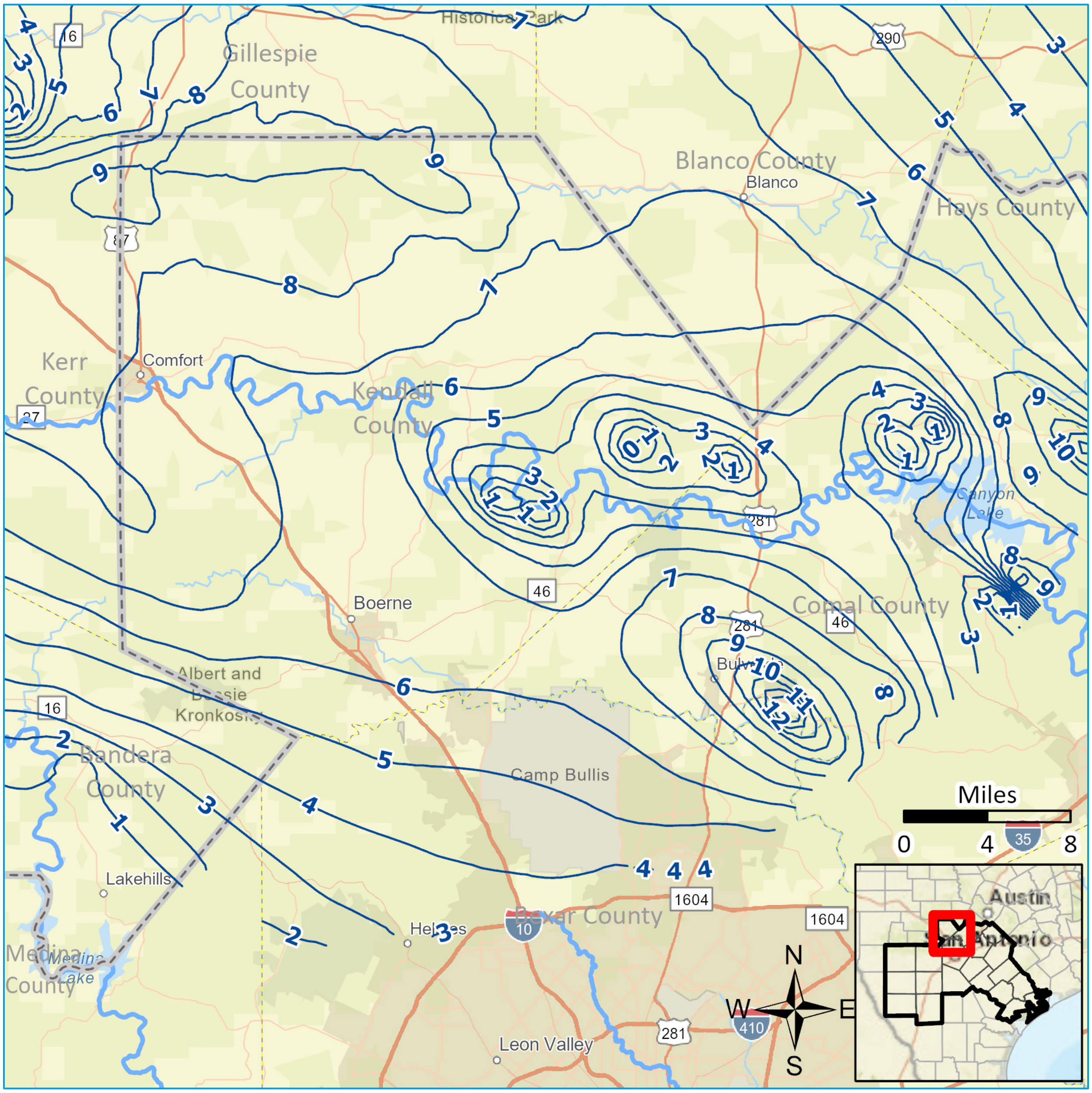

Figure 6-4 Trinity Aquifer Drawdown (feet) from 2010 to 2060

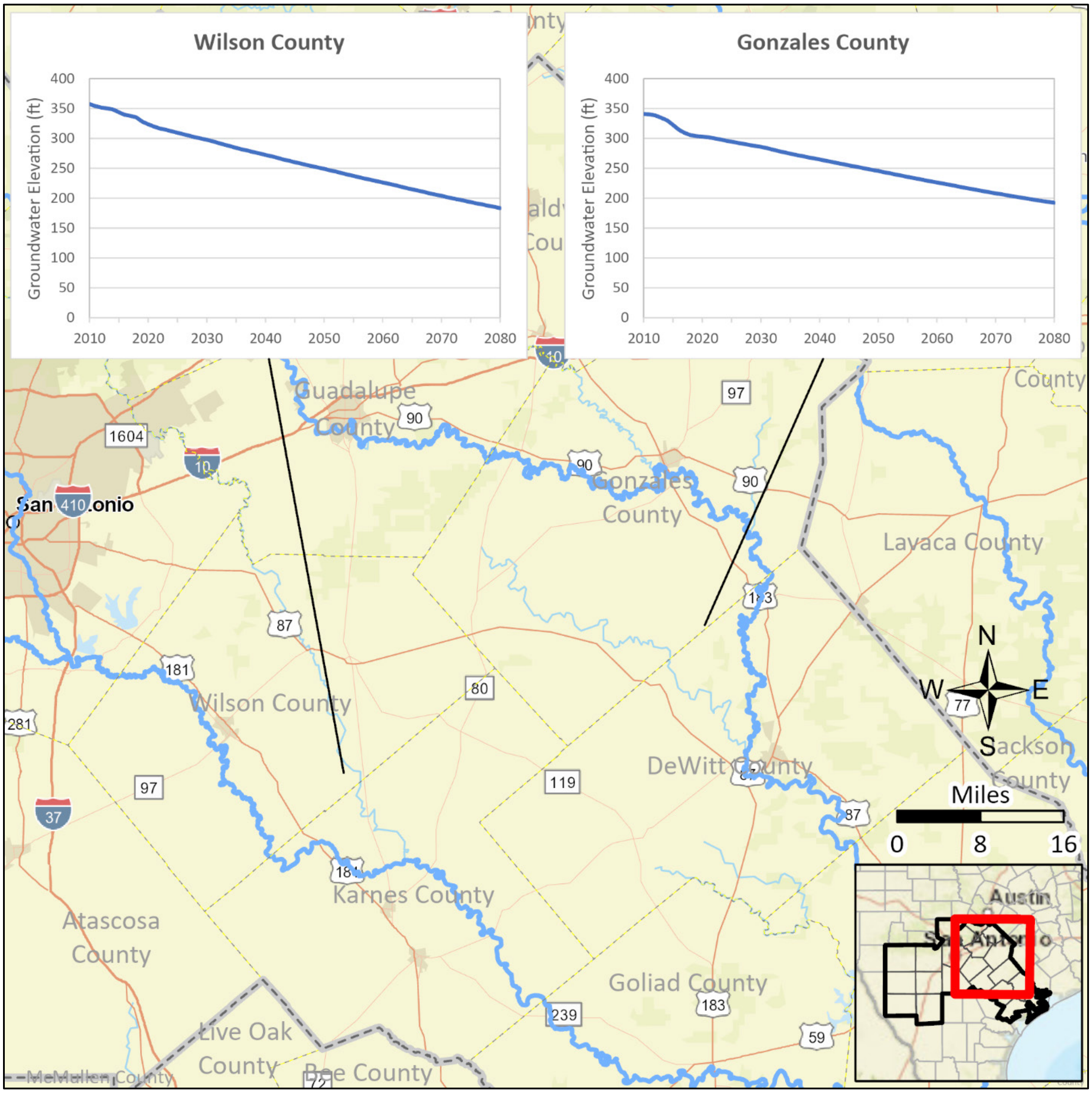

Figure 6-5 Carrizo-Wilcox Aquifer Well Hydrographs

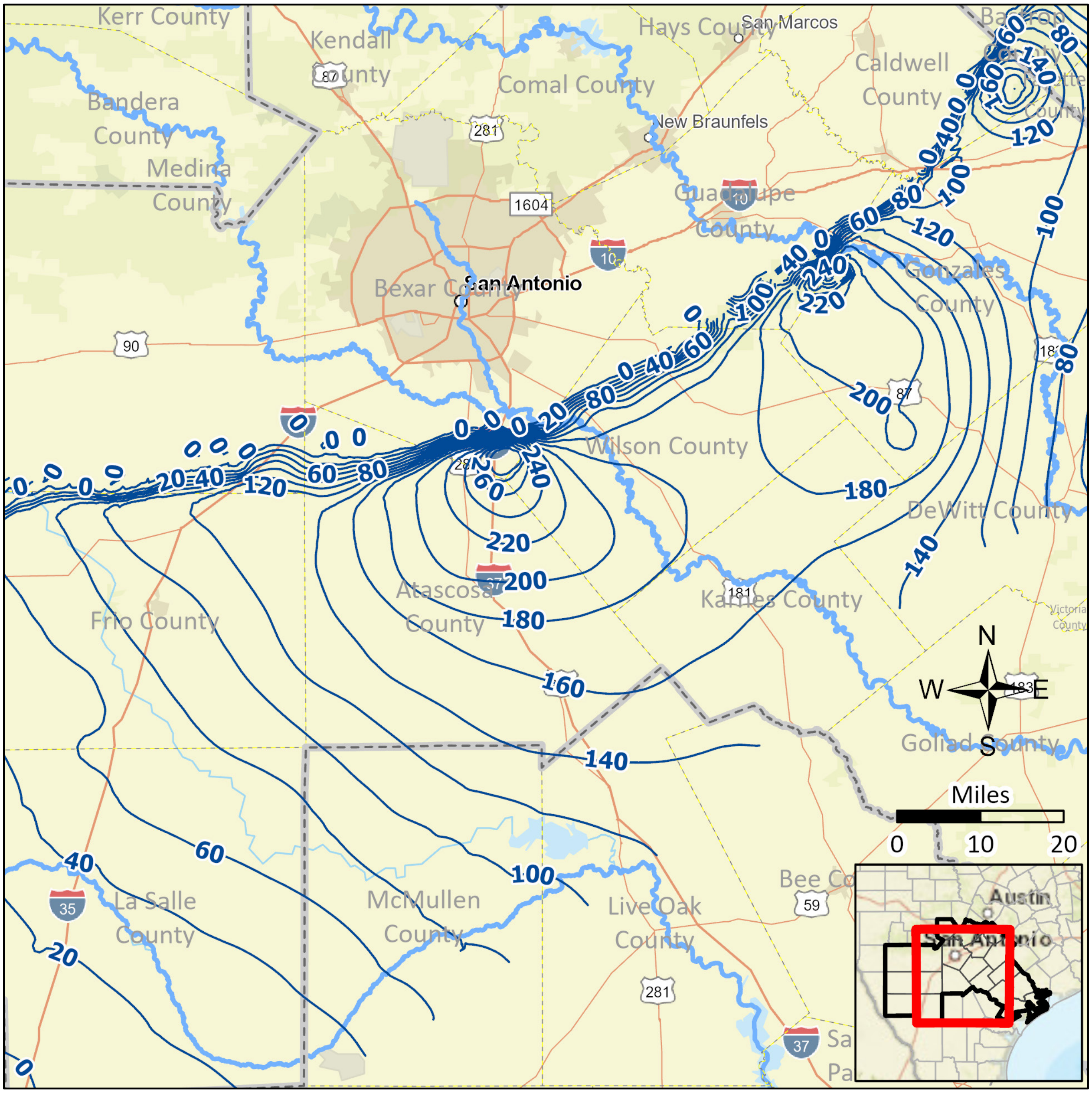

Figure 6-6 **Carrizo Aquifer Drawdown (feet) from 2010 to 2080**

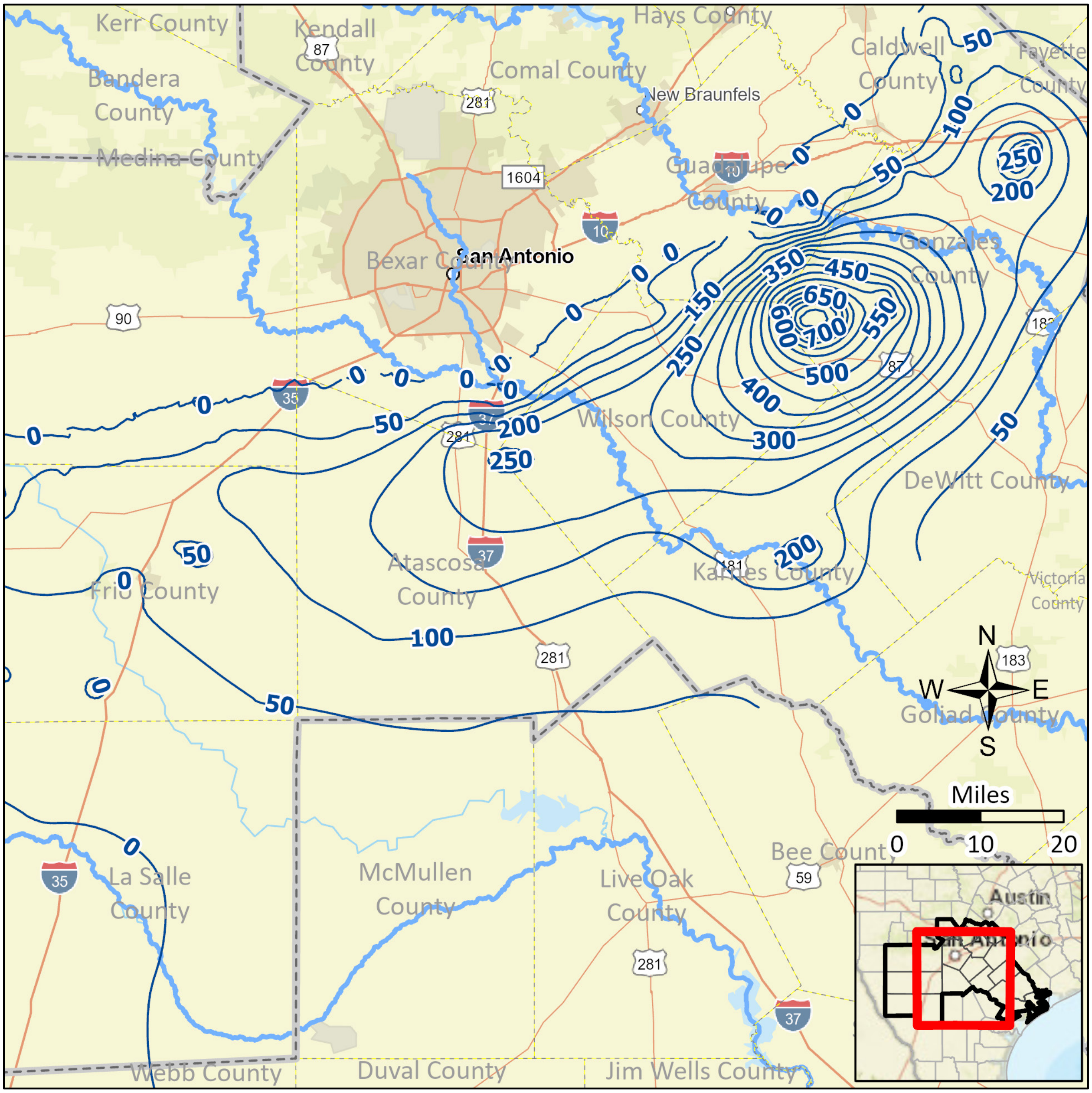

Figure 6-7 Upper Wilcox Aquifer Drawdown (feet) from 2010 to 2080

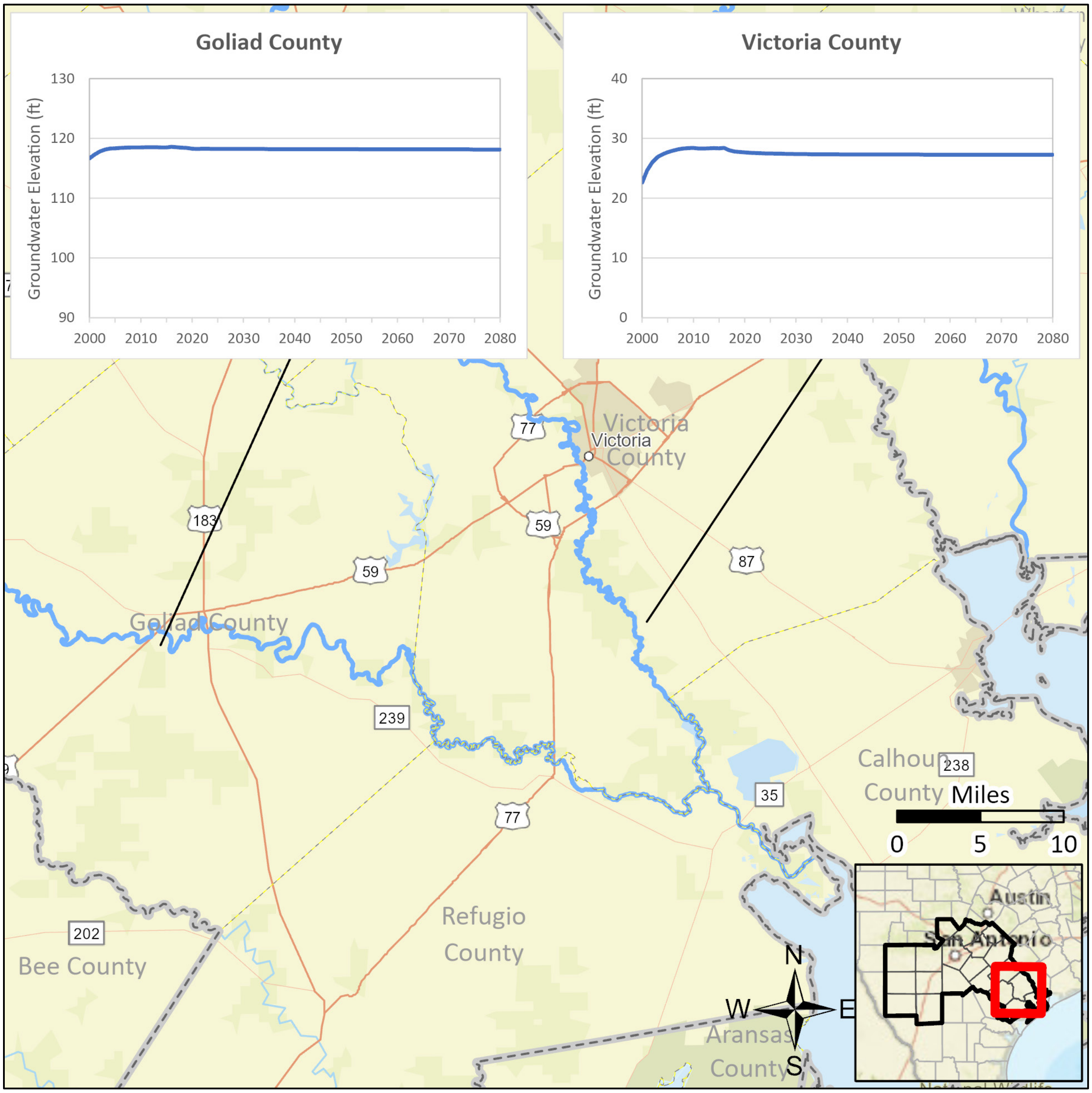

Figure 6-8 Gulf Coast Aquifer Well Hydrographs from 2000 to 2080

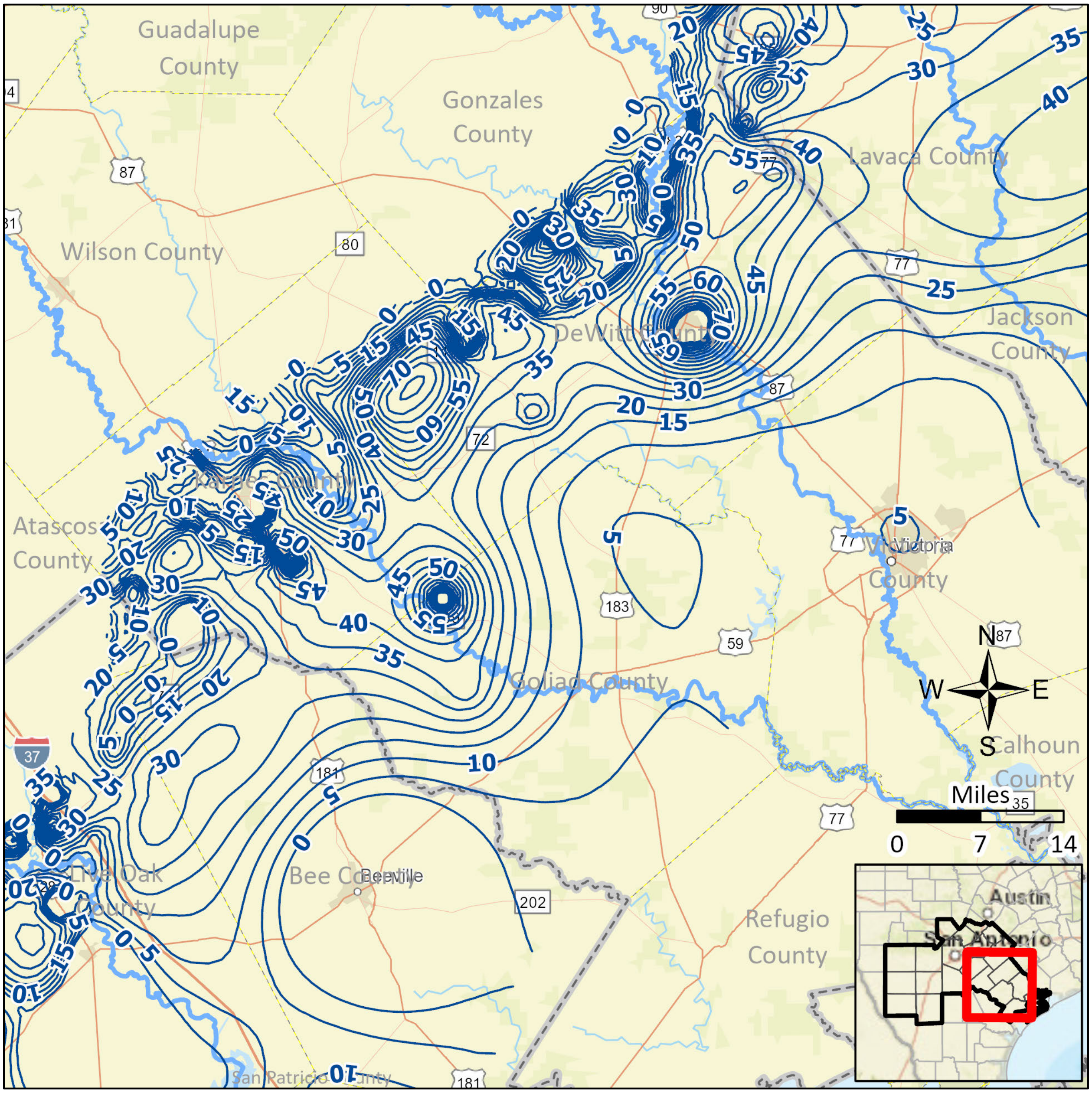

Figure 6-9 Jasper Aquifer Drawdown (feet) from 2000 to 2080

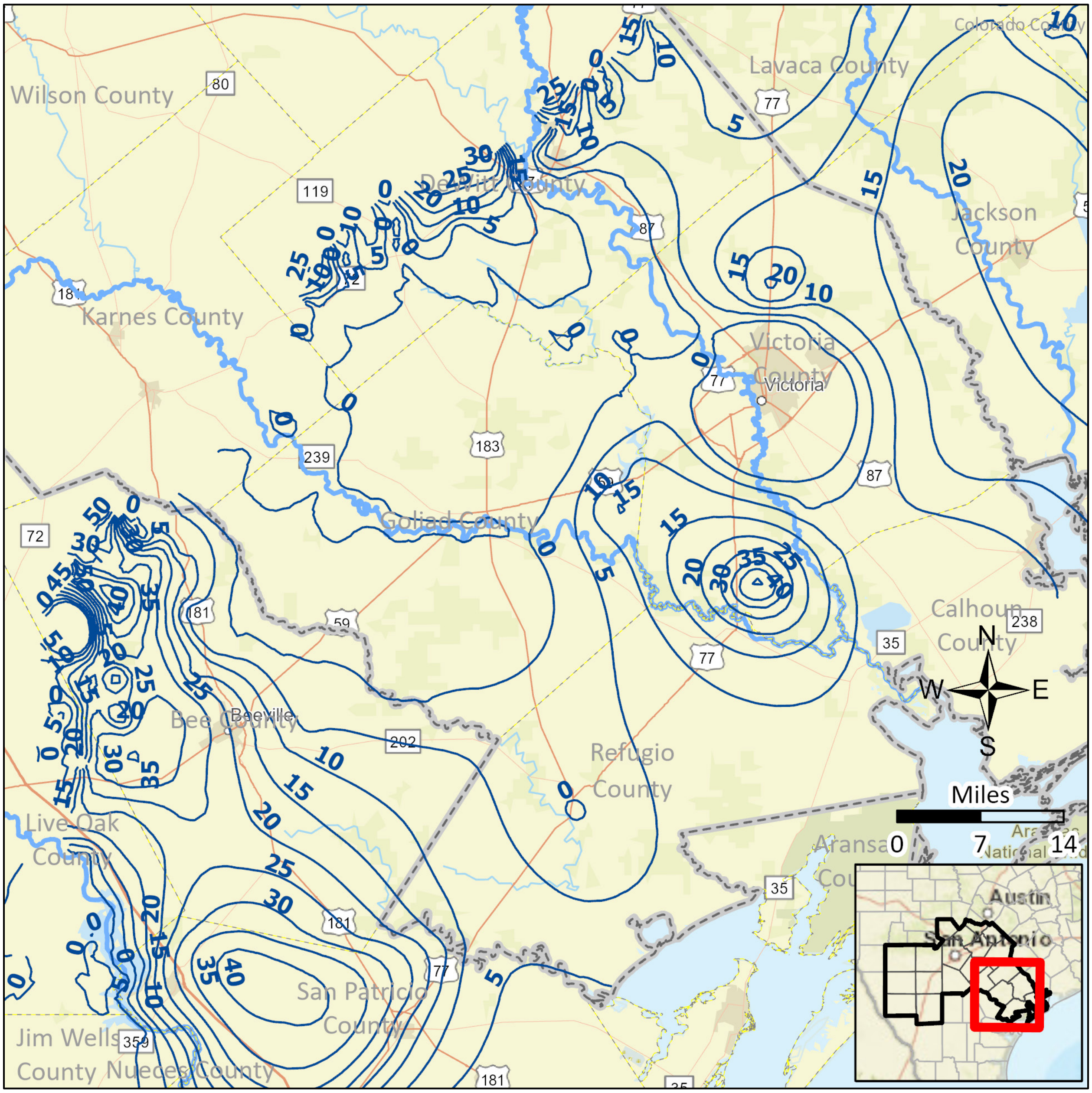

Figure 6-10 Evangeline Aquifer Drawdown (feet) from 2000 to 2080

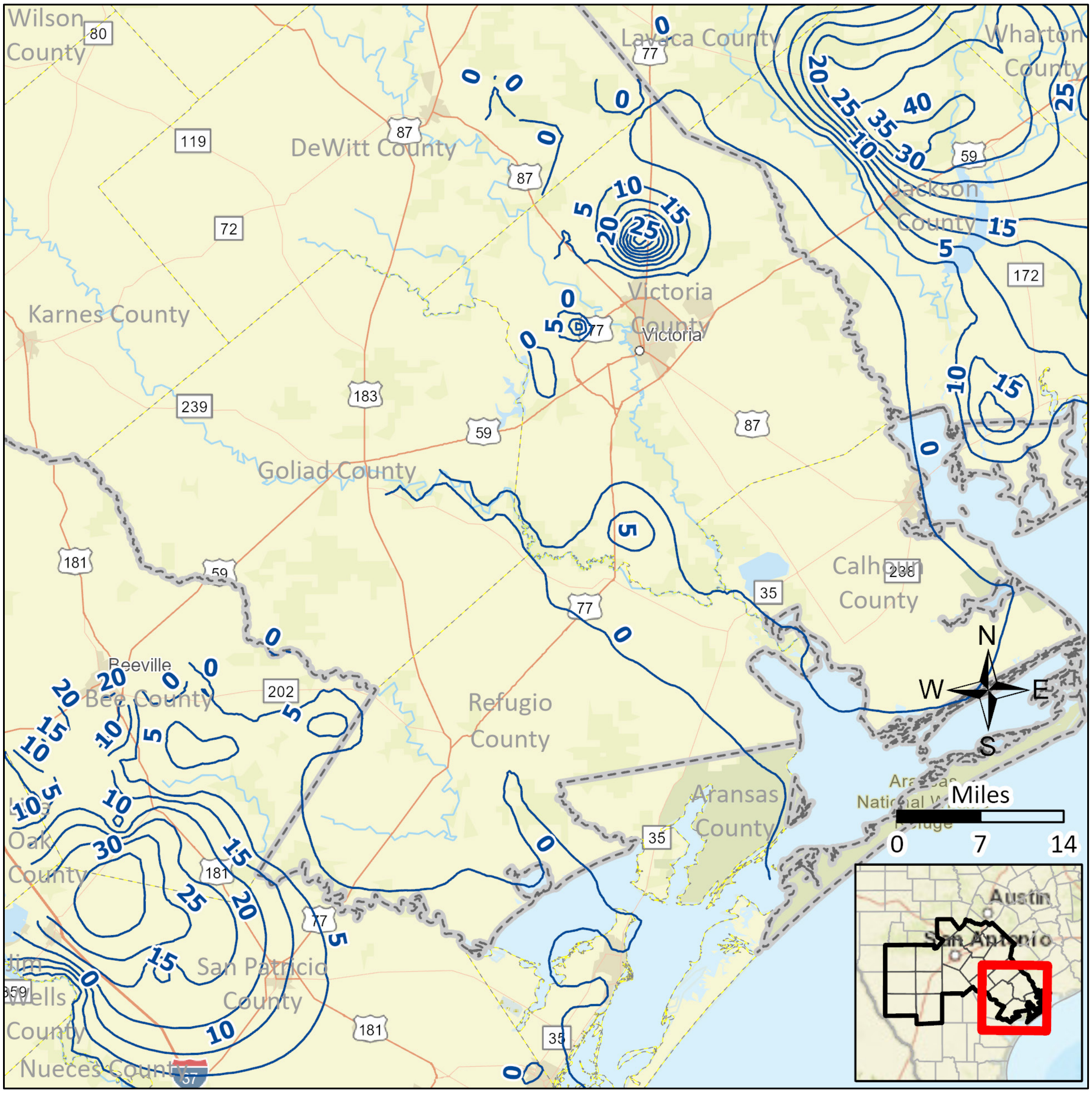

Figure 6-11 **Chicot Aquifer Drawdown (feet) from 2000 to 2080**

6.1.2.1.2 Effects of Aquifer Pumpage on Streamflow

In the 2026 SCTRWP, increases in groundwater pumpage are expected to outpace long-term recharge rates, which inevitably lead to aquifer-wide drawdowns. In many ways, GCDs have accounted and planned for this through the setting of DFCs, which translate to the MAG values used in developing the 2026 SCTRWP. With declining groundwater levels, surface water-groundwater interactions (or fluxes) change over time. For example, if an aquifer currently contributes flux (or base flow) to a stream where the aquifer outcrops and long-term groundwater production associated with a recommended WMS results in regional drawdown and reduced flux contribution to the stream, then streamflows will be reduced. These streamflow reductions would be expected to occur gradually over time and manifest at diffuse locations within the stream segment traversing the aquifer outcrop.

Groundwater Availability Models (GAMs) consistent with the MAG pumpage for the Trinity, Carrizo-Wilcox, and Gulf Coast Aquifers were used to extract the effects of long-term MAG pumpage on surface water-groundwater fluxes and estimate maximum expected streamflow changes, measured in cubic feet per second (cfs). Table 6-3 summarizes the maximum predicted effects of MAG levels of pumpage, consistent with recommended WMSs in the 2026 SCTRWP, on long-term surface water-groundwater fluxes and streamflow during the planning period. Negative values indicate water is flowing FROM the aquifer TO the stream (i.e., a gaining stream). Positive values indicate water is flowing TO the aquifer FROM the stream (i.e., a losing stream). Streamflow Change is the difference between the Baseline Flux and the Flux with full implementation of the 2026 SCTRWP. These streamflow reductions associated with MAG levels of pumpage have been included in the Guadalupe-San Antonio Water Availability Model for simulation of associated effects on instream flows at selected locations and freshwater inflows to the Guadalupe Estuary. Streamflow reductions shown in Table 6-3 may be mitigated somewhat by the positive effects of recommended ASR projects by GBRA (Carrizo Aquifer, San Marcos River), New Braunfels (Trinity Aquifer, Guadalupe River), and Victoria (Gulf Coast Aquifer, Guadalupe River).

Table 6-3 Cumulative Effects Analysis of Surface Water-Groundwater Flux Changes (cfs)

Aquifer	Watershed	Baseline Flux	Flux with Plan	Streamflow Change
Trinity	Cibolo Creek	-5.1	-4.4	-0.7
Trinity	Guadalupe River	-17.1	-16.6	-0.5
Trinity	Blanco River	14.5	14.9	-0.4
Carrizo-Wilcox	San Antonio River	21.3	22.6	-1.3
Carrizo-Wilcox	Cibolo Creek	4.1	5.5	-1.4
Carrizo-Wilcox	Guadalupe River	11.1	20	-8.9
Carrizo-Wilcox	San Marcos River	3.4	11.8	-8.4
Gulf Coast	San Antonio River	-24.5	-24.5	0.0
Gulf Coast	Guadalupe River	2.2	2.3	-0.1

6.1.2.2 Effects of Water Management Strategies on Instream Flows and Freshwater Inflows to Bays and Estuaries

Potential cumulative effects of implementing the 2026 SCTRWP on instream flows and freshwater inflows to bays and estuaries have been assessed for seven locations in the Guadalupe-San Antonio River Basin, as shown on Figure 6-12. Cumulative effects for stream and estuary locations in the Nueces River Basin have not been assessed, as there are no recommended WMSs in the 2026 SCTRWP expected to significantly affect flows in the Nueces River Basin or freshwater inflows to the Nueces Estuary

1. Guadalupe River above Comal River @ New Braunfels
2. San Marcos River @ Luling
3. Guadalupe River @ Victoria
4. San Antonio River near Falls City
5. San Antonio River @ Goliad
6. Guadalupe River @ Saltwater Barrier near Tivoli
7. Guadalupe Estuary

Figure 6-12 Flow Assessment Locations

The cumulative effects of implementation of the 2026 SCTRWP at selected locations in the Guadalupe – San Antonio River Basin are summarized on Figure 6-13 through Figure 6-28 and are further described in subsequent sections. The “Baseline (Year 2080)” bars and flow curves for the Guadalupe-San Antonio basin include full implementation of the EAHCP, effects of surface water-groundwater flux changes shown in Table 6-3, full utilization of existing water rights, and no return flows from treated wastewater effluent discharges. The “With Regional Water Plan (Year 2080)” bars and flow curves are representative of the simulated cumulative effects of the 2026 SCTRWP on flows, with inclusion of all recommended WMSs. The “Environmental Flow Standard” flow curve shows the applicable environmental flow standards, in accordance with 30 TAC Section 298.

6.1.2.2.1 Guadalupe River Above Comal River at New Braunfels

Streamflows in the Guadalupe River above the Comal River at New Braunfels (Figure 6-13 and Figure 6-14) are not expected to change significantly during the planning period. The figure shows that the streamflows with and without the implementation of WMS are at or above the environmental flow standards.

Since there is no established environmental flow standard at the Guadalupe River above Comal River at New Braunfels, a pulse flow translation calculation was used to shift the environmental flow requirements upstream using the established regime at the Guadalupe River at Gonzales. The environmental flows on Figure 6-14 are shown for informational purposes only.

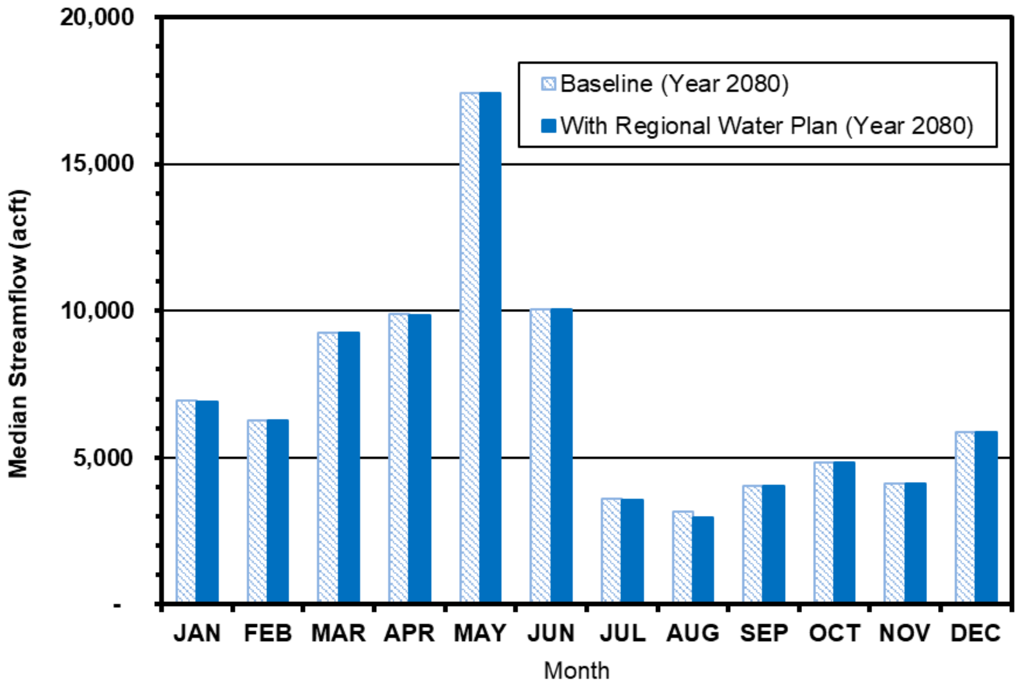

Figure 6-13 Monthly Median Streamflows for the Guadalupe River Above Comal River at New Braunfels

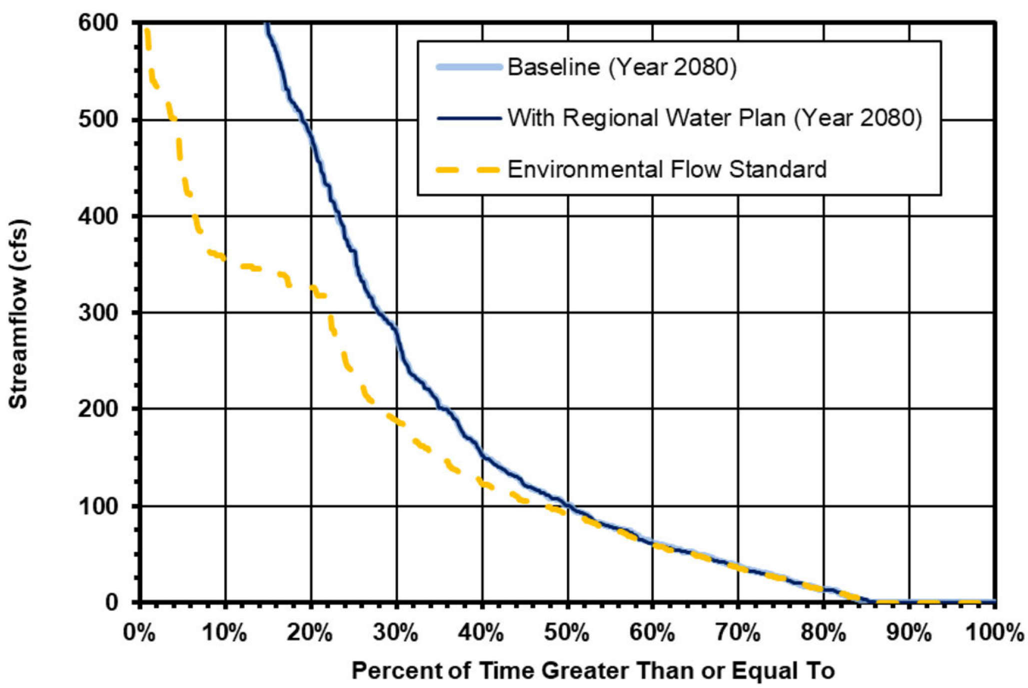

Figure 6-14 Flow Curves for the Guadalupe River Above Comal River at New Braunfels

6.1.2.2.2 San Marcos River at Luling

For the San Marcos River at Luling (Figure 6-15 and Figure 6-16), streamflows are expected to show little to no change with implementation of the 2026 SCTRWP. The environmental flows on Figure 6-16 are shown for informational purposes only.

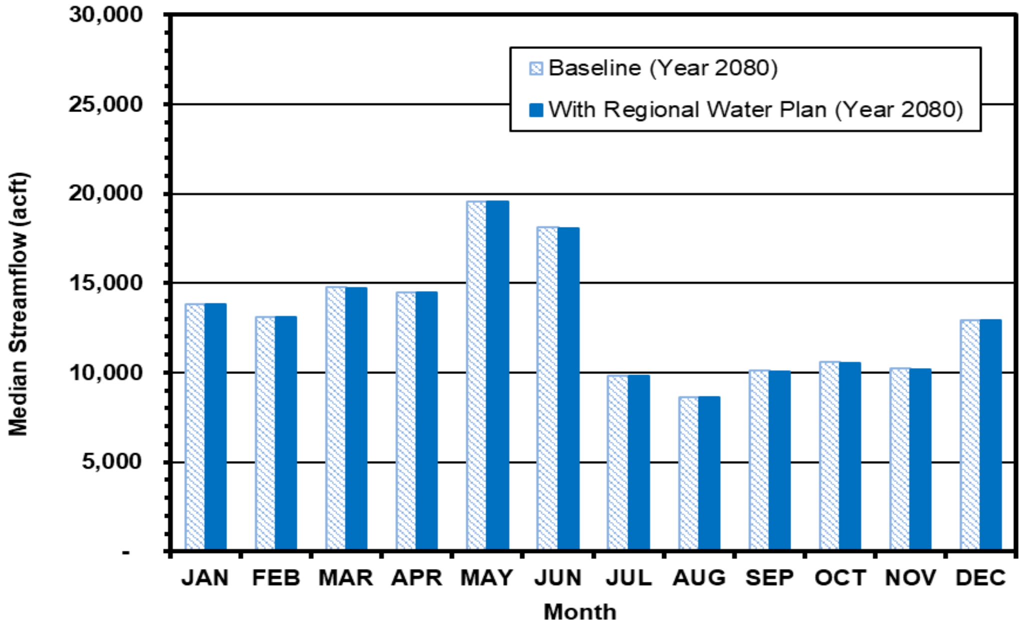

Figure 6-15 Monthly Median Streamflows for the San Marcos River at Luling

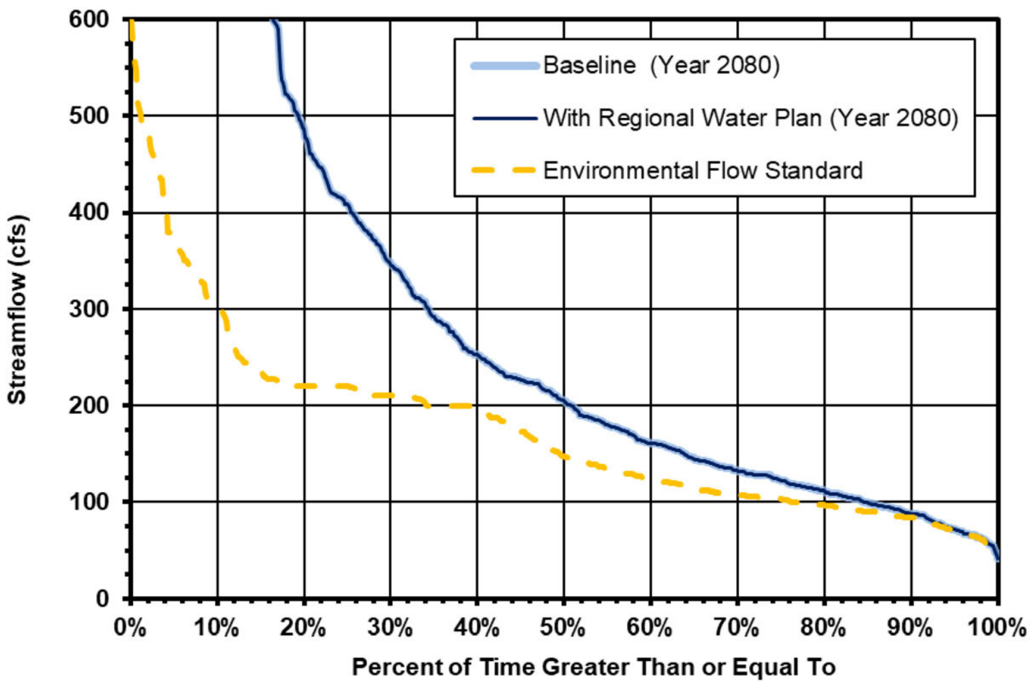

Figure 6-16 Flow Curves for the San Marcos River at Luling

6.1.2.2.3 Guadalupe River at Victoria

Guadalupe River at Victoria (Figure 6-17 and Figure 6-18) streamflows with full implementation of the 2026 SCTRWP in 2080 are expected to be similar or slightly lower compared to the Baseline (Year 2080). The small variations may be due to decreases in surface water-groundwater flux associated with several groundwater strategies in the Trinity and Carrizo-Wilcox Aquifers. Note that the GBRA Mid Basin water right, Permit 12378, is included in the Baseline simulation and the Plan simulation as a component of the WaterSECURE WMS. Differences in modeling Permit 12378 as a stand-alone right in the Baseline versus as a component of the Recommended WMS may also contribute to differences in streamflow. Streamflows in the lower portion of the flow regime remain largely unchanged with implementation of the 2026 SCTRWP. The environmental flows on Figure 6-18 are shown for informational purposes only.

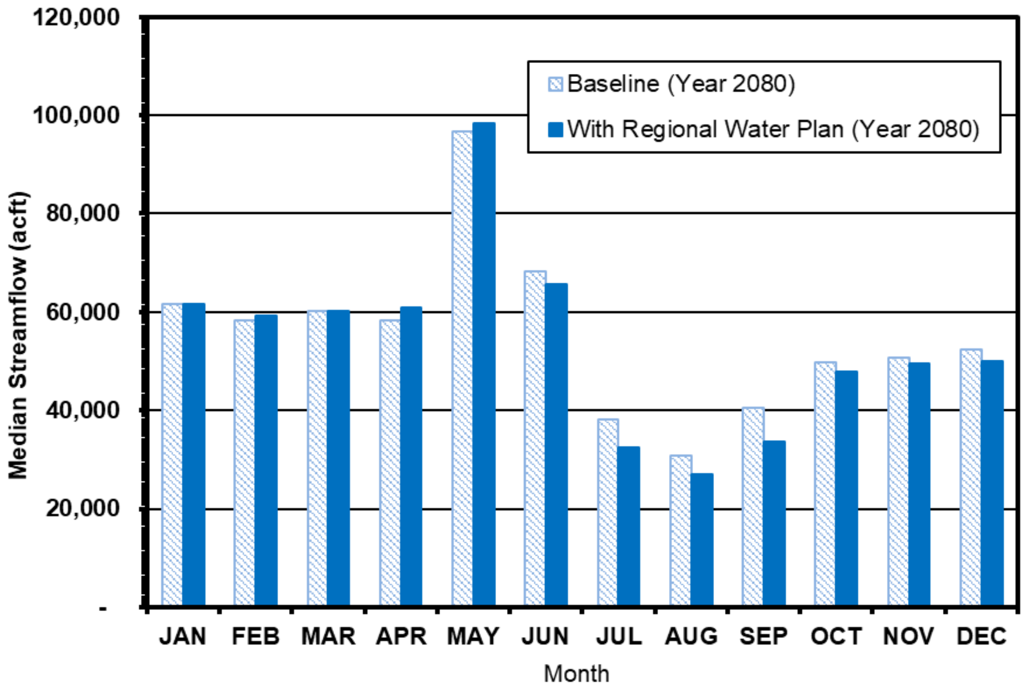

Figure 6-17 Monthly Median Streamflows for the Guadalupe River at Victoria

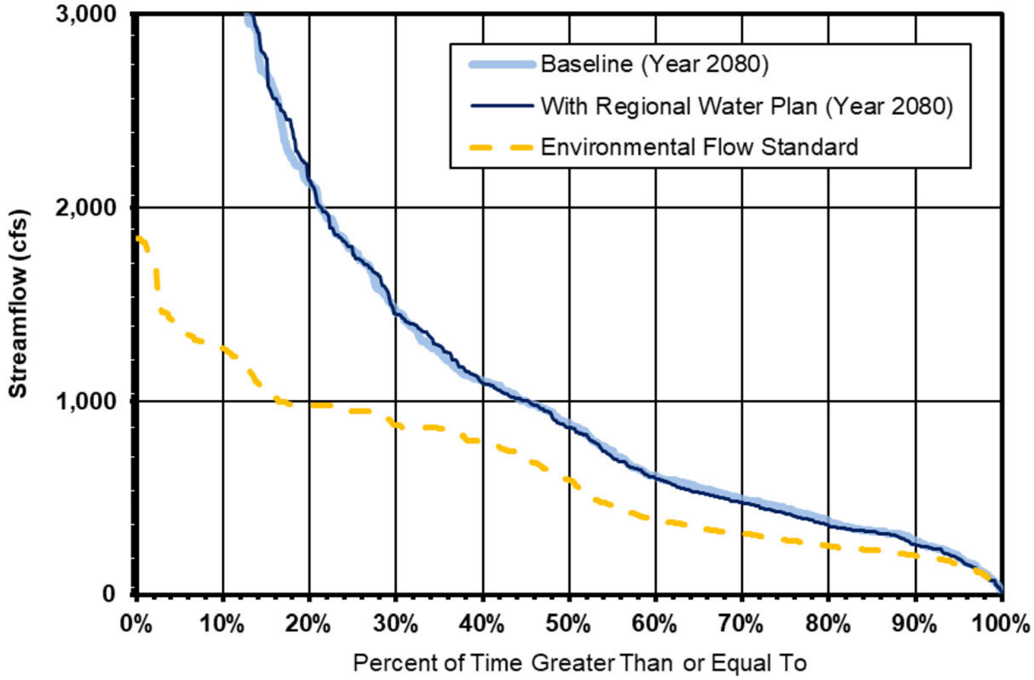

Figure 6-18 Flow Curves for the Guadalupe River at Victoria

6.1.2.2.4 San Antonio River Near Falls City

Comparisons indicate that streamflows with full implementation of the 2026 SCTRWP in 2080 at the San Antonio River at Falls City (Figure 6-19 and Figure 6-20) are expected to remain generally unchanged for the highest 80 percent (%) of streamflows and will slightly decrease during low flow periods. The environmental flows on Figure 6-20 are shown for informational purposes only.

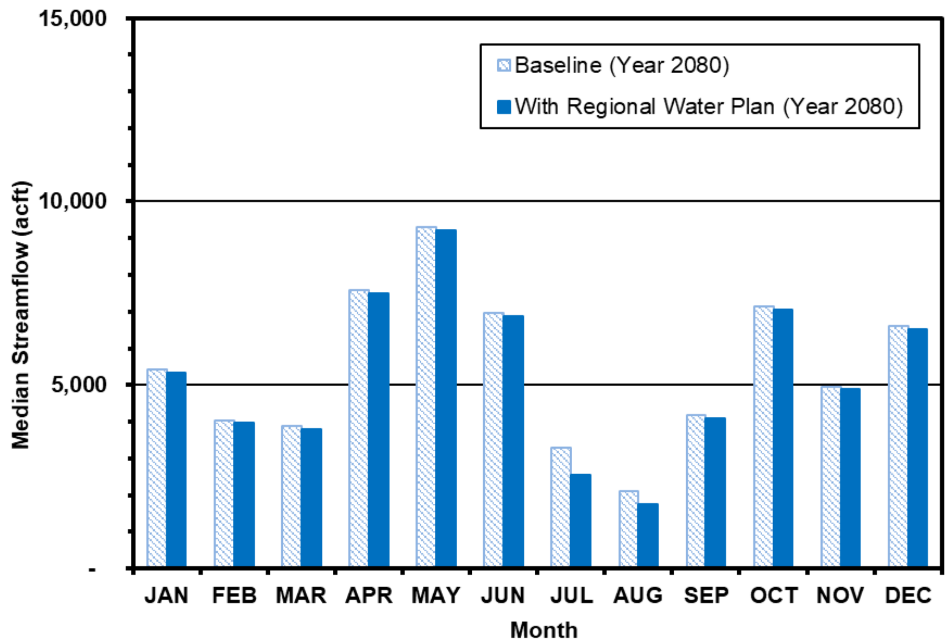

Figure 6-19 Monthly Median Streamflows for the San Antonio River Near Falls City

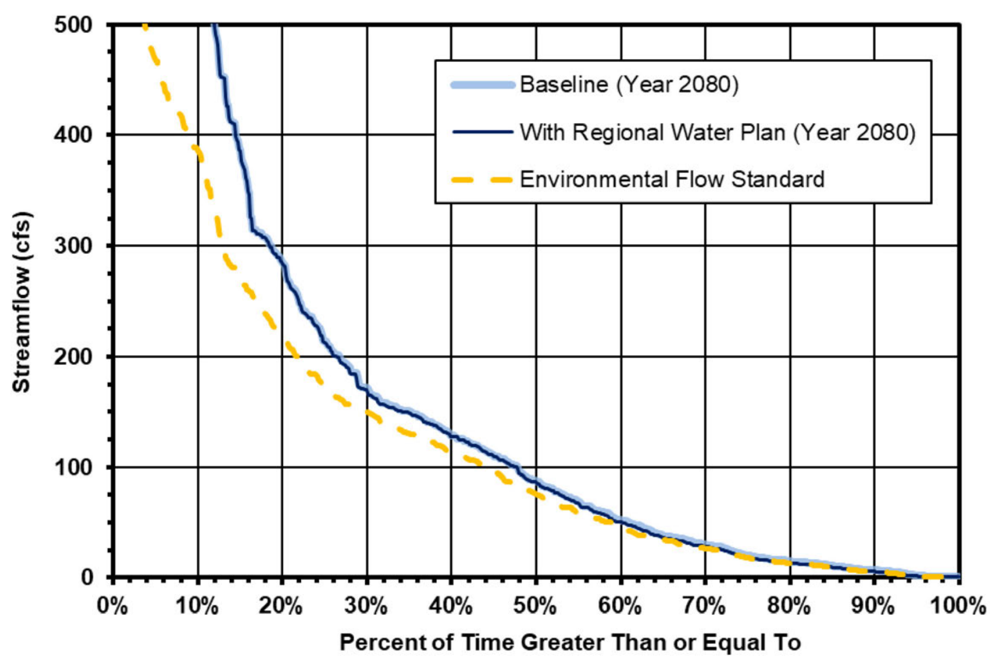

Figure 6-20 Flow Curves for the San Antonio River Near Falls City

6.1.2.2.5 San Antonio River at Goliad

Comparisons indicate that streamflows with full implementation of the 2026 SCTRWP in 2080 at the San Antonio River at Goliad (Figure 6-21 and Figure 6-22) are expected to remain generally unchanged for the highest 80 percent (%) of streamflows and will slightly decrease during low flow periods.

WMSs affecting flows in the San Antonio River at Goliad include the CRWA Siesta Project. The decreases may also be due to anticipated decreases in the surface water-groundwater flux associated with several groundwater strategies in the Trinity, Carrizo-Wilcox, and Gulf Coast Aquifers. The environmental flows on Figure 6-22 are shown for informational purposes only.

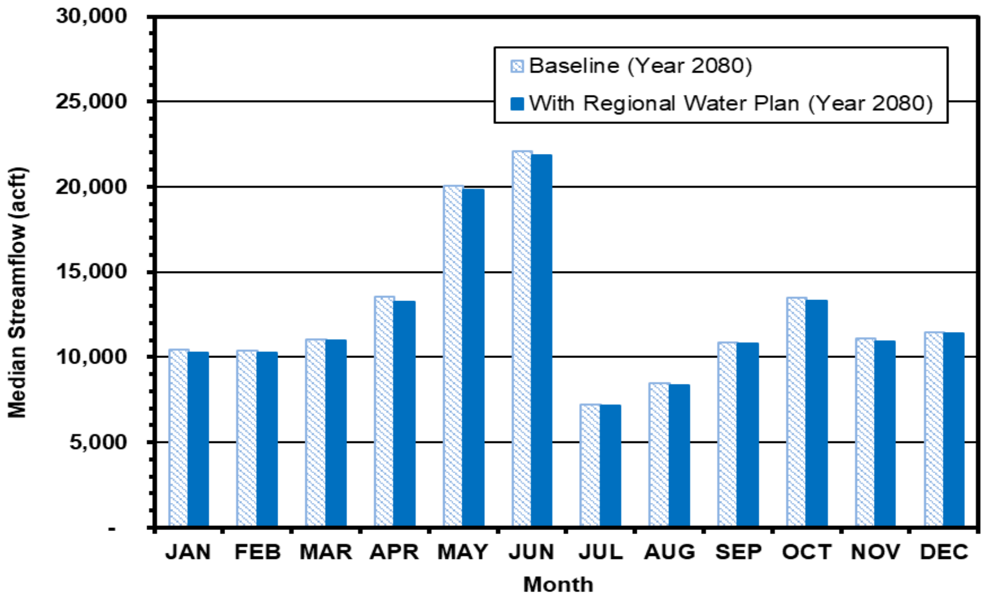

Figure 6-21 Monthly Median Streamflows for the San Antonio River at Goliad

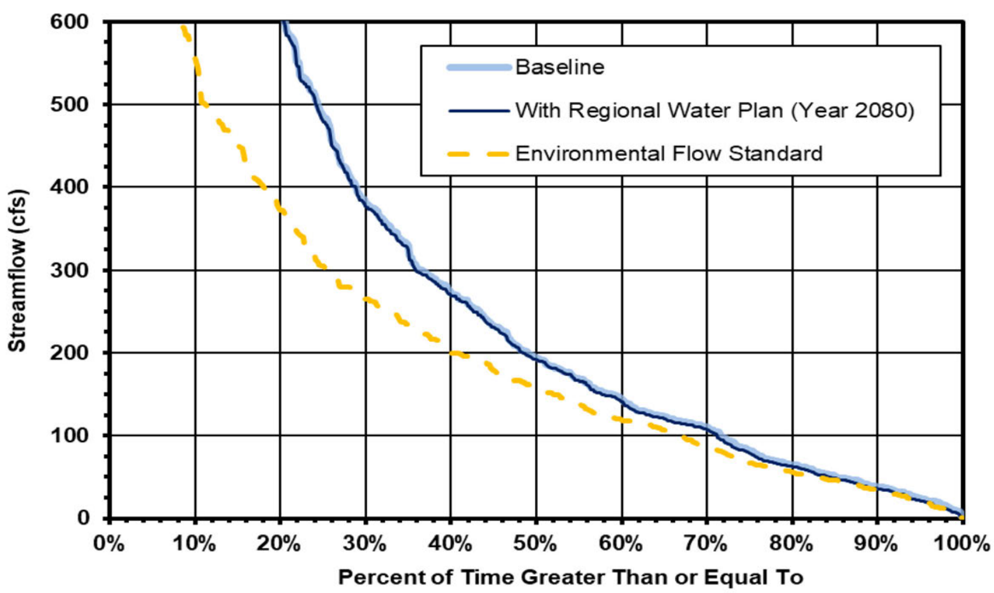

Figure 6-22 Flow Curves for the San Antonio River at Goliad

6.1.2.2.6 Guadalupe River at the Saltwater Barrier Near Tivoli

Streamflows/inflows for the Guadalupe River at the GBRA Diversion Dam and Saltwater Barrier near Tivoli (Figure 6-23 and Figure 6-24) generally decrease with full implementation of all recommended WMSs in the 2026 SCTRWP. There are no environmental flow standards shown on Figure 6-24 because no environmental flow standards are established for the control point near Tivoli, and there are no environmental flow standards downstream of Tivoli that could be used to translate the flow requirements upstream.

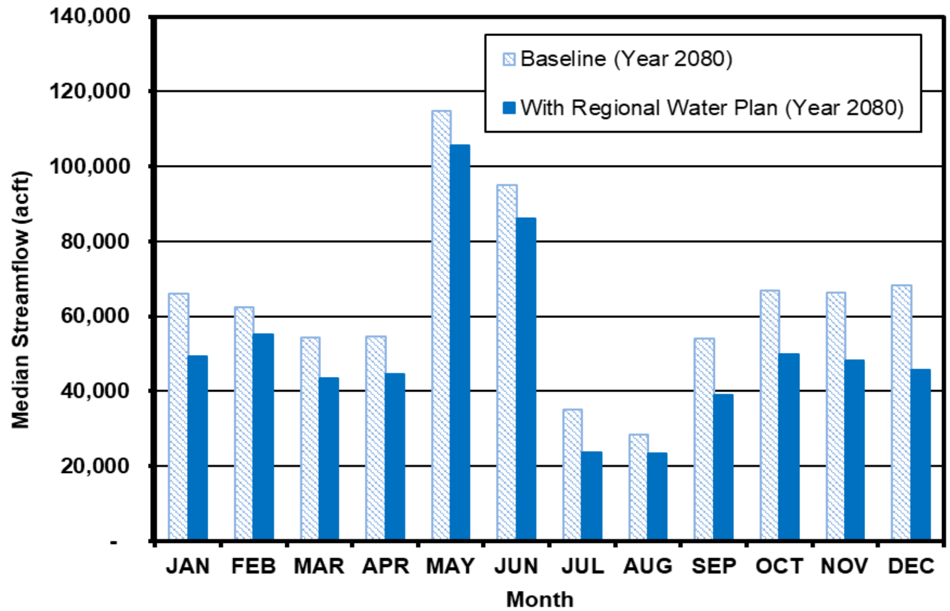

Figure 6-23 **Monthly Median Streamflows for the Guadalupe River at Diversion Dam and Saltwater Barrier Near Tivoli**

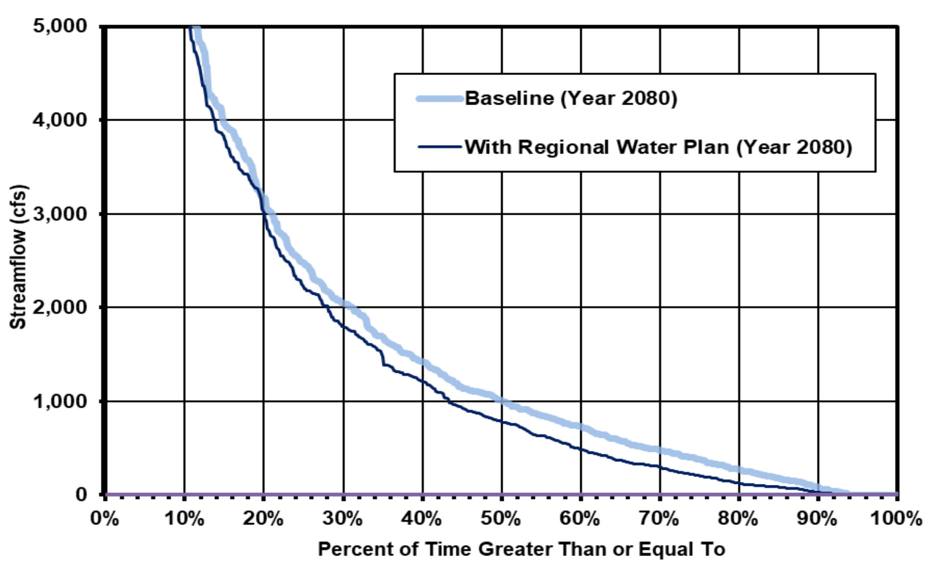

Figure 6-24 **Flow Curves for the Guadalupe River at Diversion Dam and Saltwater Barrier Near Tivoli**

6.1.2.2.7 Guadalupe Estuary

Streamflows/inflows for the Guadalupe Estuary (Figure 6-25 and Figure 6-26) generally decrease with full implementation of all recommended WMSs in the 2026 SCTRWP. The Guadalupe Estuary (San Antonio Bay and Estuary System) seasonal freshwater inflow standards for the spring and summer seasons are plotted on Figure 6-27 and Figure 6-28, respectively. Summaries of the anticipated modeled permitting frequency changes for the various inflow regimes are shown in Table 6-4 and Table 6-5 for the spring and summer seasons, respectively. The modeled permitting frequencies for the inflow flow regimes are all within the ranges specified in 30 TAC §298.380(a). Figure 6-27 and Figure 6-28 are shown for informational purposes only.

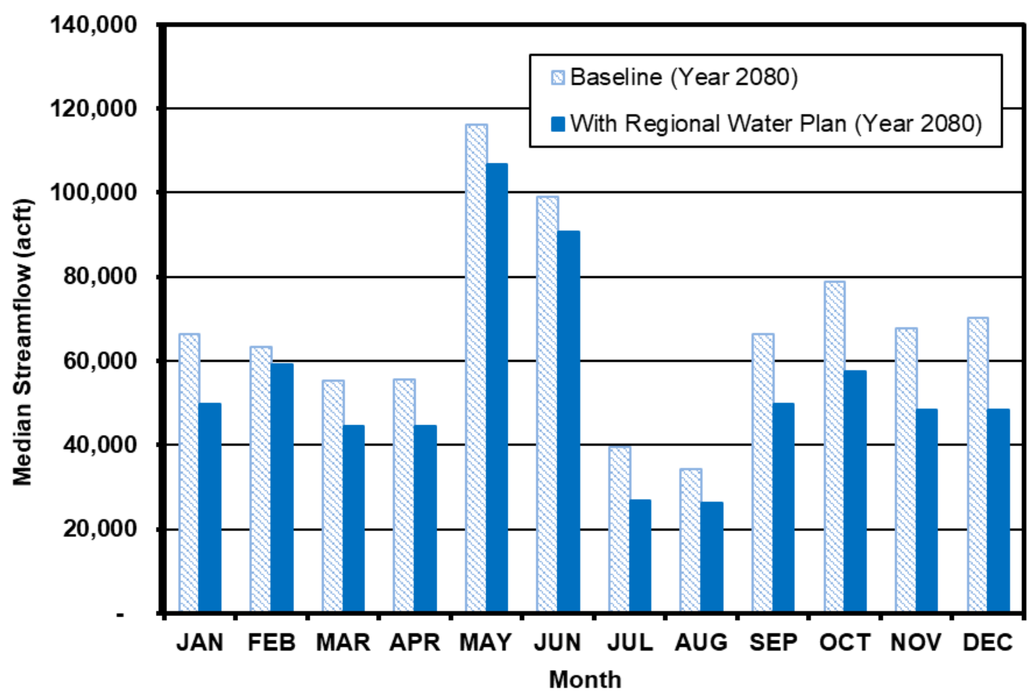

Figure 6-25 Monthly Median Streamflows for the Guadalupe Estuary

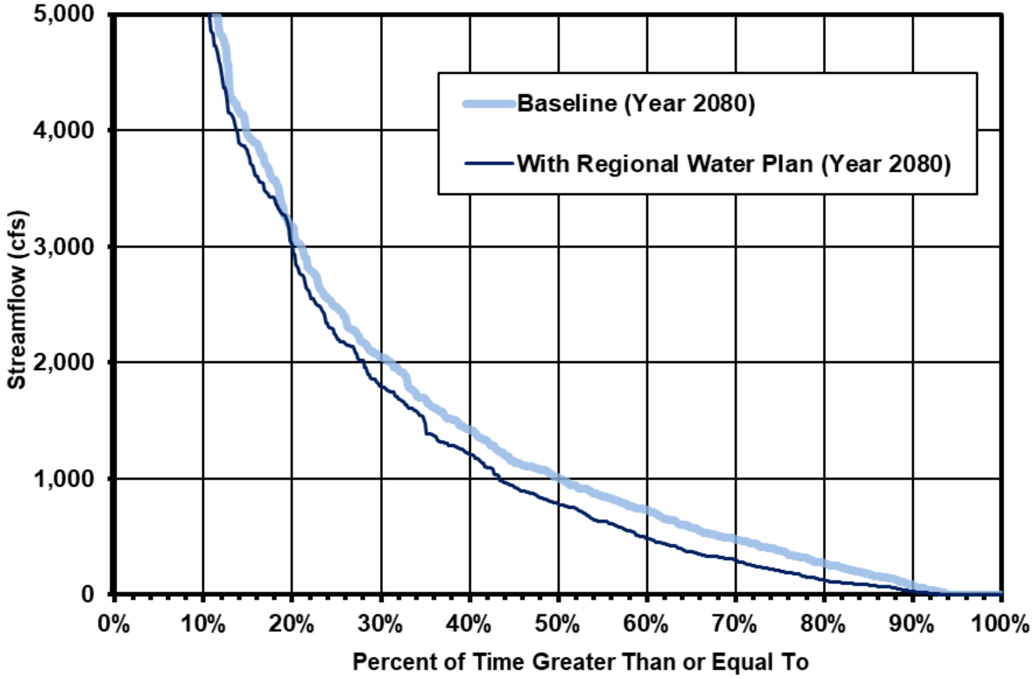

Figure 6-26 Flow Curves for the Guadalupe Estuary

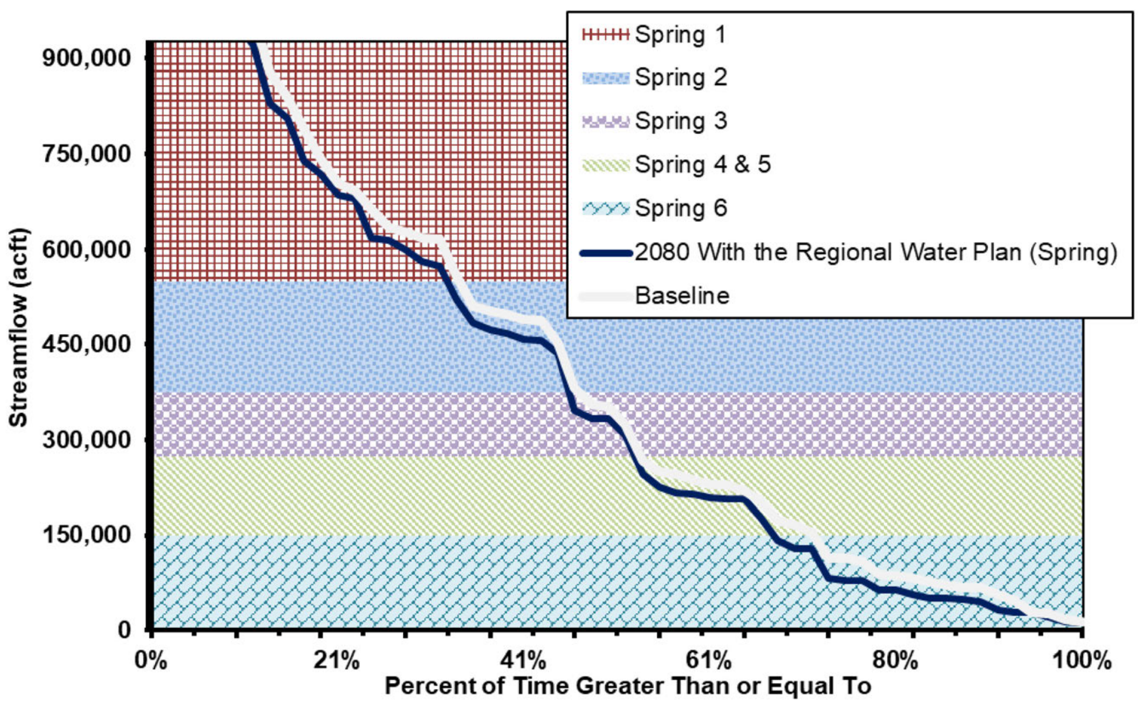

Figure 6-27 Spring Season Flow Curves for the Guadalupe Estuary

Table 6-4 Guadalupe Estuary – Spring Season Environmental Flow Standard Permitting Frequencies

Inflow Regime	Modeled Permitting Frequency Change	Guadalupe Bay System Freshwater Inflow Standard for Spring
Spring 1	Δ = -0.2%	shall not be decreased by more than 5%
Spring 2	Δ = 0.3%	shall not be decreased by more than 5%
Spring 2 and 3	Δ = 0.7%	shall not be decreased by more than 5%
Spring 4 and 5	52.5% of total years with Plan	shall not be increased to more than 67% of the total years
Spring 6	Δ = 4.2%	shall not be increased by more than 8%

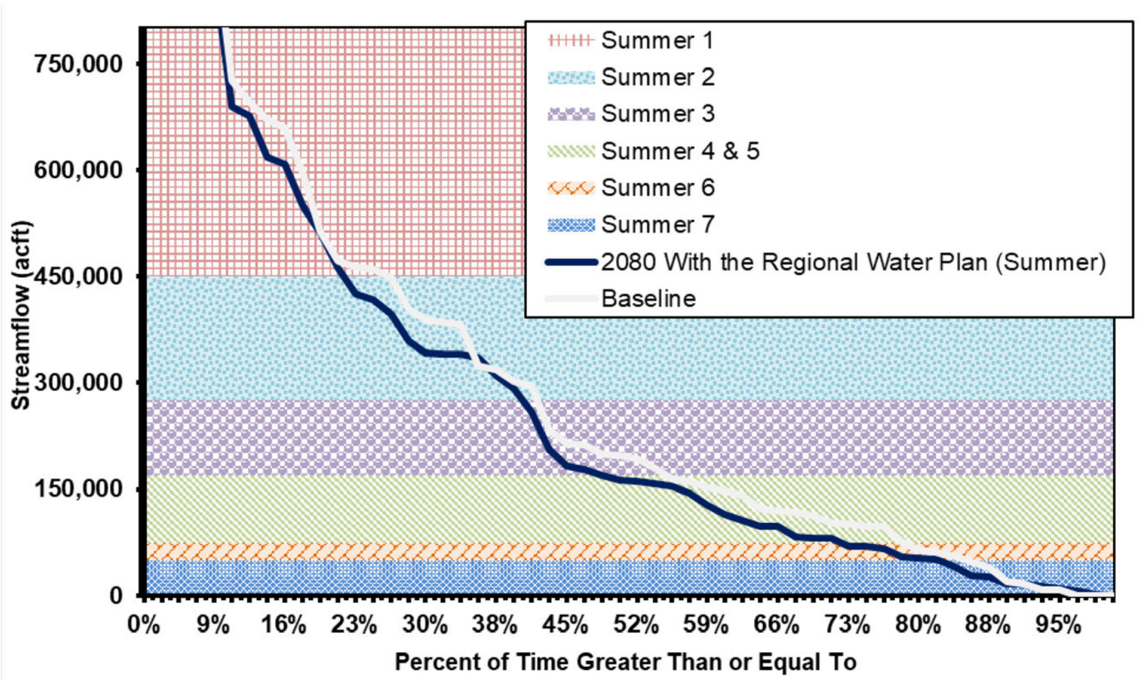

Figure 6-28 Summer Season Flow Curves for the Guadalupe Estuary

Table 6-5 Guadalupe Estuary - Summer Season Environmental Flow Standard Permitting Frequencies

Inflow Regime	Modeled Permitting Frequency Change	Guadalupe Bay System Freshwater Inflow Standard for Summer
Summer 1	Δ = -4.1	shall not be decreased by more than 5%
Summer 2	Δ = 3.1%	shall not be decreased by more than 5%
Summer 1 and 2	Δ = -1.0%	shall not be decreased by more than 5%
Summer 4 and 5	0.0%	shall not be increased to more than 10%
Summer 7	Δ = 2.9%	shall not be increased by more than 8%

6.1.2.3 Effects of Water Management Strategies on Stream Segments Designated as Having Unique Ecological Value

As recommended by the SCTRWPG in the 2011, 2016, and 2021 SCTRWPs, the legislature designated five Region L river and stream segments in 2015 as having unique ecological value (Figure 6-29), as follows:

1. The Nueces River from the northern boundary of Region L (downstream) to United States Geological Survey (USGS) gauge #08190000 (at Laguna);
2. The Frio River from the northern boundary of Region L (downstream) to USGS gauge #08195000 (at Concan);
3. The Sabinal River from the northern boundary of Region L (downstream) to its intersection with State Highway 187 (located approximately 2.7 miles upstream of USGS gauge #08198000 near Sabinal);
4. The San Marcos River extending from a point 0.4 miles upstream from its intersection with State Highway Loop 82 (in San Marcos) to its intersection with Interstate Highway 35; and
5. The Comal River from its intersection with East Klingemann Street in New Braunfels to its confluence with the Guadalupe River.

Implementation of the 2026 SCTRWP is not expected to have an effect on the Nueces, Frio, and Sabinal River segments designated as having unique ecological value, as no WMSs are recommended within or upstream of these segments. As shown on Figure 6-2, implementation of the 2026 SCTRWP, including full implementation of the EAHCP, is expected to increase long-term average spring discharges, which should serve to preserve or enhance the unique ecological value of the designated Comal River and San Marcos River segments.

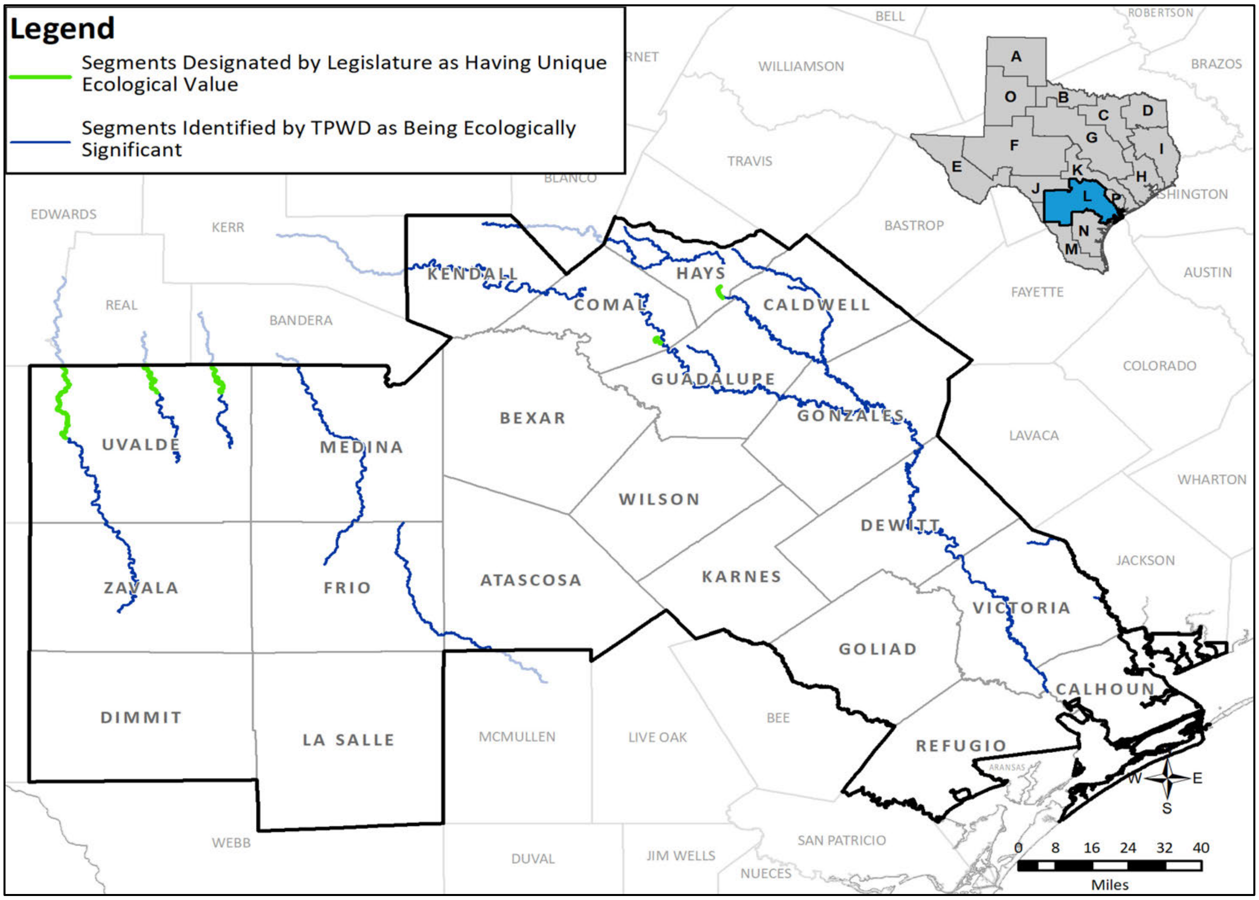

Figure 6-29 Ecologically Significant Stream and River Segments for Region L

6.1.2.4 Impacts of Water Management Strategies on Key Water Quality Parameters

In accordance with 31 TAC Section 357.40(b)(5), the SCTRWPG must consider the major impacts of recommended WMSs on key parameters of water quality. Furthermore, the SCTRWP must include a comparison of conditions with the recommended WMSs to current conditions using best available data (31 TAC Section 357.34(d)(8).

The SCTRWPG has selected the following water quality parameters to be considered in a qualitative water quality analysis:

- Chlorides;
- Sulfates;
- Total Dissolved Solids (TDS);
- Dissolved Oxygen (DO);
- pH Range;
- Indicator Bacteria;
- Temperature; and
- Nitrates.

Potential water quality impacts considered herein are associated with source and receiving water characteristics, treatment requirements, blending compatibility, and treated effluent quality and quantity. For the purposes of this general assessment, it is assumed that wastewater treatment standards and plant performance will continue to improve over time. Other applicable assumptions are consistent with those described in Chapter 6.1 regarding cumulative effects of RWP implementation.

Table 6-6 identifies water quality parameters that are potentially affected by types of WMSs. As it is understood that any future wastewater discharges, potable water deliveries, and/or recycled water use will be in compliance with Texas Commission on Environmental Quality (TCEQ) requirements, water quality impact scores presented herein may be viewed as relative indicators of concern or risk among water quality parameters potentially affecting or affected by a project.

Table 6-6 Impacts of Recommended Water Management Strategy Types on Key Parameters of Water Quality

Water Quality Parameter	Expanded Surface Water	New Reservoirs	Groundwater-Surface Water	Expanded Groundwater	ASR	Indirect Reuse	Voluntary Redistribution	Water Conservation	Direct Potable Reuse	Brush Management
TDS	●	●	●	●		●	●	●		●
DO	●	●		●		●	●			●
pH	●	●	●	●		●	●			
Bacteria	●	●		●		●	●			
Temperature	●	●	●	●		●	●			●
Nitrates	●	●		●		●	●	●		

Individual WMSs are expected to have minor, if any, impacts on water quality. However, cumulative impacts of multiple strategies, combined with external factors such as extreme weather conditions could result in effects on aquatic species and habitats. For example, many fish and freshwater mussel species are sensitive to changes in DO, temperature, salinity, and ammonia nitrogen. All of these parameters may be exacerbated in low flow and drought conditions. Rare and protected species tend to be the most sensitive to water quality impacts.

The SCTRWPG has addressed the potential effects of 2026 SCTRWP implementation on recreation and aquatic life through application of the environmental flow standards adopted by the TCEQ in the technical evaluation of surface WMSs involving new appropriations. The cumulative effects analyses (Chapter 6.1) and environmental assessment (Chapter 6.2) also provide information relevant to potential effects of plan implementation on recreation and aquatic life.

These strategies could potentially impact domestic water use and agricultural water use: Drought Management, Carrizo Conversions, Edwards Transfers, Recycled Water Programs, Surface Water Rights, Expanded Local Carrizo for SAWS, CRWA Wells Ranch Project, Carrizo Aquifer for CVLGC, GBRA Lower Basin New Appropriation, and/or Regional Carrizo for SSLGC Project Expansion. Some strategies may provide benefits to domestic use, such as rainwater harvesting and municipal water conservation. Strategies such as GBRA Water Secure and Brush Management may benefit agricultural water use.

6.1.3 Agricultural Resources

Agricultural resources may be impacted by the 2026 SCTRWP through the conversion of agricultural land uses to well fields, water treatment facilities, pipelines, or other appurtenant structures. Additionally, the redistribution of water from rural and agricultural areas would reduce the amount of water available for irrigation and livestock purposes.

6.1.3.1 Impacts on Agricultural Resources

To evaluate potential impacts on agricultural resources, construction impacts for each of the WMSs were estimated based on the acreage of agricultural land impacted according to TPWD mapping. Table 6-7 summarizes these impacts for Recommended WMSs. WMSs with an "N/A" do not have conceptual geographic location information and a resulting agricultural acreage impact. Impacts are described for each of these WMSs in Section 5.2. Overall, construction activities for the combined WMS have the potential to affect 82,694 acres of agricultural land, including 52,685 acres of land mapped by TPWD as row crops, 13,524 acres of land mapped as tame/disturbance grassland, 26,455 acres mapped as coastal prairie and 30 acres mapped as sandyland grassland, which may include areas used for grazing and hay production.

Table 6-7 Summary of Potential Agricultural Acreage Impacts for Water Management Strategies

No.	Water Management Strategy	Potential Agricultural Acreage Impacts (No. of Acres)
1	Municipal Water Conservation	N/A
2	Non-municipal Water Conservation	N/A
3	Drought Management	N/A
4	Edwards Transfers	N/A
5	Fresh Groundwater Development	N/A
6	Brackish Groundwater Development	N/A
7	Groundwater Conversions	N/A
8	Facilities Expansion	N/A
9	Recycled Water	N/A
10	Brush Management	N/A
11	Rainwater Harvesting	N/A
12	Surface Water Rights	N/A
13	Balancing Storage	N/A
14	ARWA Carrizo-Wilcox Project (Phase 2)	89
15	ARWA DPR Project (Phase 3)	139

No.	Water Management Strategy	Potential Agricultural Acreage Impacts (No. of Acres)
16	CRWA Expanded Brackish Carrizo-Wilcox Project	5
17	CRWA Siesta Project	35
18	CRWA Wells Ranch (Phase 3) Project	28
19	CVLGC Carrizo Project	976
20	GBRA Lower Basin New Appropriation	29,748
21	GBRA WaterSECURE	36,551
22	Medina County Regional ASR	3,284
23	NBU ASR	1,714
24	NBU Trinity Well Field Expansion	0
25	SAWS Expanded Local Carrizo Project	1,270
26	SAWS Expanded Brackish Groundwater Project	184
27	SAWS Regional Wilcox Project	2,973
28	SSLGC Expanded Brackish Wilcox Project	21
29	SSLGC Expanded Carrizo Project	155
30	Victoria ASR	5,521
31	Victoria Groundwater-Surface Water Exchange	1
32	Weather Modification	N/A

6.1.3.2 Impacts of Voluntary Redistribution of Water from Rural and Agricultural Areas

The 2026 SCTRWP considered voluntary transfer or redistribution of water resources to meet projected needs. Voluntary redistribution is the acquisition of water by willing buyers from willing sellers, subject to conditions of existing groundwater management plans and rules of GCDs, in the case of groundwater supplies, and subject to existing surface water permits and water available from such permits (refer to subchapter 3.3 for descriptions of methods used in determining quantities of groundwater and surface water available to meet projected water demands in the 2026 SCTRWP). Voluntary transfers of water include the underlying principles that (1) a local area's projected needs are met before consideration is given to movement of water from rural and agricultural areas to meet projected needs at more distant locations; (2) compensation will be made to water owners for water to meet projected needs of others; and (3) an evaluation is made of the social and economic impacts of voluntary transfers of water from rural and agricultural areas.

In the development of the SCTRWP, the following principles were followed: (1) water conservation has been the first WMS recommended to meet projected needs (shortages) of water user groups (WUGs); and (2) all other recommended WMSs including movement of water from rural and agricultural areas must be based on the voluntary transfer concept and principles. The WMSs of the 2026 SCTRWP were selected and sized in compliance with DFCs and MAG so as to limit impacts upon the supplies of water projected to be needed for use in rural and agricultural areas. As such, for the 2026 SCTRWP, no WMSs were identified that would utilize redistribution of water from rural and agricultural areas through conversions.

As such, for the 2026 SCTRWP, no WMSs were identified that would utilize redistribution of water from rural and agricultural areas through conversions.

Implementation of redistribution could result in (1) drawdown of the water table, increasing local area pump lifts in the aquifer areas from which groundwater would be obtained; and would (2) provide payments to landowners for groundwater and to holders of surface water permits for use of surface water at rates negotiated between buyer and seller. Voluntary redistribution of water from rural and agricultural areas is likely to result in reduction of areas engaged in active crop production, and/or changes in crop species and productivity. In addition, implementation of voluntary transfer or redistribution of water resources would be expected to result in construction and associated expenditures in local areas where such projects are constructed, but neither the economic benefits of such expenditures, nor the subsequent economic development that might result from such expenditures, are estimated in this plan.

6.1.4 Natural Resources

6.1.4.1 Regional Environment

Region L spans southern Texas from Hays and Caldwell Counties in the north to the Guadalupe Estuary on the Gulf Coast, to the headwaters of the Nueces River in Uvalde County. The region exhibits a unique biological diversity as a consequence of its location in an area of transition between major vegetational and faunal regions to the north, east, and south (respectively, the Balconian, Texan, and Tamaulipan) [2], and its position astride migration corridors important to numerous bird, bat, and insect populations. Locally, the prairie and coastal ecoregions circumscribe sets of habitats, plants, and animals distinct from those of the Central Texas Plateau and the more tropical affinities of the Southern Texas Plains. The major population centers in Region L are located along the eastern and southern margins of the Edwards Plateau, where a series of rugged, wooded canyons are traversed by clear, spring fed streams intimately associated with the cavernous limestone Edwards Aquifer that provides the present major water supply for the region.

Omernik [3] utilized criteria that included topography, climate, vegetation type, and land use characteristics to divide the United States into ecological regions, or ecoregions, that exhibit more or less distinct sets of physical habitats and species. According to updated classification based on Omernik's criteria, Region L includes parts of five Ecoregions: the Edwards Plateau, Southern Texas Plains, Texas Blackland Prairies, East Central Texas Plains, and the Western Gulf Coastal Plains [4]. Focusing specifically on Texas, and excluding explicit land use criteria, Gould [5] delineated 10 vegetational areas, which generally correspond to the portions of Omernik's Ecoregions that extend into the state. The corresponding names for the vegetational areas found in Region L are the Edwards

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[2] Blair, W. Frank, "The Biotic Provinces of Texas," Texas Journal of Science 2(1):93-117, 1950.
[3] Omernik, James M., "Ecoregions of the Conterminous United States," Annals of the Association of American Geographers, 77(1) pp. 118-125, 1987.
[4] Griffith, G.E., Bryce, S.A., Omernik, J.M., Comstock, J.A., Rogers, A.C., Harrison, B., Hatch, S.L., and Bezanson, D., 2004, Ecoregions of Texas (color poster with map, descriptive text, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:2,3000,000).
[5] Gould, F.W. 1975. The Grasses of Texas. Texas A&M University Press, College Station, Texas.

Plateau, South Texas Plains, Blackland Prairies, Post Oak Savannah, and the Gulf Prairies and Marshes (Figure 6-30).

The Edwards Plateau vegetational area encompasses approximately 24 million acres of tall or mid-grass understory and a brushy, savanna-type overstory complex. Soils are generally shallow over limestone or caliche. Prevalent woody species include live oak (*Quercus virginiana*) and other oaks (*Q. fusiformis*, *Q. buckleyi*, *Q sinuata* var. *breviloba*), ashe junipers (*Juniperus ashei*), cedar elm (*Ulmus crassifolia*), mesquite (*Prosopis* sp.), various species of acacia (*Acacia* sp.), and sumacs (*Rhus* ssp., including the prairie flame-leaf (*Rhus copallina* var. *lanceolata*). The most important climax grasses of this area include switchgrass (*Panicum virgatum*), several species of bluestem (*Schizachyrium* and *Andropogon* spp.), gramas (*Bouteloua* spp.), Indiangrass (*Sorghastrum nutans*), Canadian wild rye (*Elymus canadensis*), buffalograss (*Buchloe dactyloides*), and curly mesquite (*Hilaria belangeri*) [6].

As a result of land management practices since European settlement, the proportion of juniper and mesquite have increased into this presumed climax of largely grassland or savannah, except on the steeper slopes, which have continually supported dense cedar-oak woodlands. Bald cypress (*Taxodium distichum*) occurs along perennial streams and rivers, while pecan (*Carya illinoinensis*), Arizona and little walnut (*Juglans major, J. microcarpa*), hackberry (*Celtis laevigata*), black and sandbar willow (*Salix nigra, S. interior*), and eastern cottonwood (*Populus deltoides*) are more widely distributed in riparian areas of both perennial and intermittent streams. Cultivated fields are generally in the relatively broad, level stream valleys where deeper alluvial soils have accumulated [7]. Upland agriculture consists primarily of livestock grazing and harvest of cedar and oak for fence posts and firewood, respectively.

The South Texas Plains vegetational area encompasses approximately 20 million acres of level to rolling topography, with elevations ranging from 1,000 ft-mean sea level (msl) to about sea level. Soil types cover a wide range, from clays to sandy loams, creating variations in soil drainage and moisture-holding capacities. Although there are large areas of cultivated land, most of the area is still used as rangeland. The South Texas Plains region originally supported a grassland or savannah climax vegetation.[8] However, long periods of grazing and the reduction of fire have affected these plant communities and led to an increase of woody plant species within the area. Species which have increased in the area include honey mesquite (*Prosopis glandulosa*), post oak (*Q. stellata*), live oak, several acacias (*Acacia* spp.), and members of the cactus family (Cactaceae). Distinct differences in climax plant communities and successional patterns occur on the many range sites that are found in this region.

Elevations in the Blackland Prairies vegetational area range from 300 to 800 ft-msl. Uniform, dark-colored calcareous clays, which are interspersed with gray acid sandy loams, constitute the fertile blackland soils. According to Thomas, most of this region is, or has been, under cultivation, although there are some excellent native hay meadows and a few unplowed ranches remaining [9]. The characteristic vegetation of the Blackland Prairies, which includes little bluestem (*Schizachyrium scoparium*) as the climax dominant grass species of the region, is considered to be a true prairie. Big bluestem (*Andropogon gerardi*), Indiangrass, switchgrass, sideoats grama (*Bouteloua curtipendula*), hairy grama (*B. hirsuta*), tall dropseed (*Sporobolus asper*), silver bluestem (*Bothriochloa saccharoides*),

[6] Correll, D.S., and M.C. Johnston, "Manual of Vascular Plants of Texas," Texas Research Foundation, Renner, Texas, 1979.
[7] Ibid.
[8] Thomas, G.W, Op. Cit., 1975.
[9] Thomas, G.W, "Texas Plants – An Ecological Summary," In: F.W. Gould. 1975. Texas Plants – a Checklist and Ecological Summary. Texas Agricultural Experiment Station, MP-585/Rev., College Station, Texas, 1975.

and Texas wintergrass (*Nasella leucotricha*) are other important grasses found in the region [10]. If heavy grazing is allowed, Texas wintergrass, buffalograss, Texas grama (*Bouteloua rigidiseta*), smutgrass (*Sporobolus indicus*), and many annuals may increase or invade the prairies, causing deterioration of the native communities [11]. Other locally invasive species include mesquite in the southern portion of the Blackland Prairies, and post oak and blackjack oak in areas that include medium to light-textured soils. Grasses that have been used to seed improved pastures within the Blackland Prairies include dallisgrass (*Paspalum dilatatum*), common and coastal bermudagrass (*Cynodon dactylon*), and some native species.

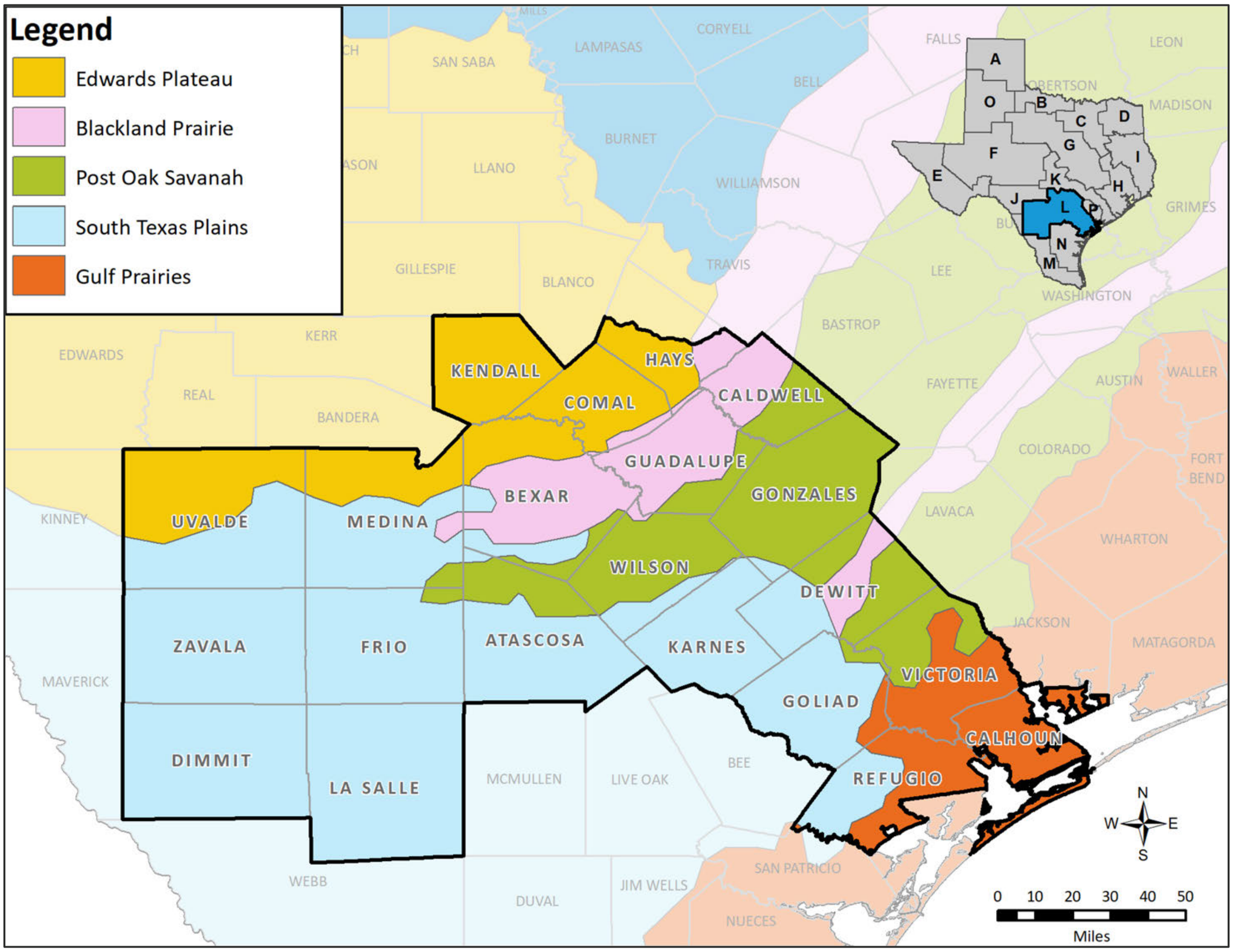

Figure 6-30 Gould's Vegetational Areas within Region L

The Post Oak Savannah vegetational area, which covers approximately 8.5 million acres, consists of gently rolling or hilly country, with elevations ranging from 300 to 800 ft-msl. Upland soils of the region include light-colored acid sandy loams or sands. Bottomland soils contain light brown to dark gray acidic soils, with textures which range from sandy loams to clays. This area is characterized by pasturelands which include frequent stands of woodland and occasional areas of cropland. The dominant species of the Post Oak Savannah is post oak, which occurs in open stands with a ground cover of grasses [12]. Other

[10] Correll, D.S., and M.C. Johnston, Op. Cit., 1979.
[11] Ibid.
[12] Ibid.

associated species include blackjack oak (*Quercus marilandica*), black hickory (*Carya texana*), cedar elm (*Ulmus crassifolia*), and eastern redcedar (*Juniperus virginiana*). This vegetation type is considered to be either a part of the Eastern Deciduous Forest association or as part of the Prairie association [13, 14, 15, 16]. During the last few decades, many areas of open savannah have been converted into dense woodland stands of post oak and winged elm (*Ulmus alata*). This has occurred as a result of overgrazing, abandonment from cultivation, and removal of fire. Grazing is the major land use of both upland and bottomland sites within this vegetation type. Large acreages of both upland and bottomland forests have been cleared for grazing and most of these are in tame pasture.

The Gulf Prairies and Marshes vegetational area of Texas consists of about 9,500,000 acres. This nearly level, slowly drained plain is less than 150 ft-msl in elevation and is cut by sluggish rivers, creeks, bayous, and sloughs. Habitats include coastal salt marshes, dunes, prairies, river bottoms, and freshwater ponds. Soil types include acid sands, sandy loams, and clays. The upland prairie soils tend to be heavier textured acid clays or clay loams. Much of the region is fertile farmland or pastureland. The climax vegetation of the region is mostly tall grass prairie or post oak savannah [17]. Principal grasses are big bluestem, little bluestem, seacoast bluestem (*S. scoparium* var. *litoralis*), Indiangrass, eastern gamma grass (*Tripsacum dactyloides*), Texas wintergrass, switchgrass, and gulf cordgrass (*Spartina* spp.). Seashore saltgrass (*Distichlis spicata*) occurs on moist saline sites within the area. Since the region is used heavily for ranching and agriculture, this extensive disturbance has allowed invader species, such as mesquite, huisache (*Acacia smallii*), prickly pear (*Opuntia* spp.), acacia (*Acacia* spp.), ragweed (*Ambrosia psilostachya*), broomweed (*Xanthocephalum* spp.) and others to become well established [18, 19]. Heavy grazing and/or abandoned farmland has changed the predominant grasses to species such as broomsedge (*Andropogon virginicus*), smutgrass, and threeawns (*Aristida* spp.), and introduced bermudagrass, fescue (*Festuca* spp.), and dallisgrass.

Within this area, large acreages of both upland and bottomland forests have been cleared for grazing, and much of this land is planted with domestic grasses. Major creek and river floodplains may retain more or less well-developed hardwood forests, but upland areas are generally cleared for cultivation or pasturage. However, uplands support scattered, dense, shrubby thickets of oak, huisache, and mesquite and occasional freshwater marshes in relict drainages. Principal tree and shrub species normally observed in upland areas include live oak, post oak, cedar elm, hackberry, honey mesquite, huisache, and yaupon (*Ilex vomitoria*) [20, 21, 22].

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[13] Tharp, B.C., "The Vegetation of Texas," Texas Acad. Sci., Anson Jones Press, Houston, 1939.

[14] Braun, E.L., "Deciduous Forests of Eastern North America," Hafner Publishing Co., Inc., New York, 1950.

[15] Weaver, J.E. and F.E. Clements, "Plant Ecology," 2nd Ed. McGraw-Hill Book Co., New York, 1938.

[16] Daubenmire, Rexford, "Plant Geography with Special Reference to North America," Academic Press, New York, 1978.

[17] Correll, D.S., and M.C. Johnston, Op. Cit., 1979.

[18] Johnston, M.C., "The Vascular Plants of Texas, A List Updating the Manual of the Vascular Plants of Texas," Austin, Texas, 1988.

[19] Thomas, G.W, Op. Cit., 1975.

[20] U.S. Bureau of Reclamation, "Palmetto Bend Project – Texas Final Environmental Impact Statement," Bureau of Reclamation, U.S. Department of the Interior, 1974.

[21] Soil Conservation Service, "Soil Survey of Calhoun County, Texas," Soil Conservation Service, Temple, Texas, 1978.

[22] Texas Department of Water Resources, "Land Use/Land Cover Maps of Texas," Austin, Texas. LP-62, 1977, Reprinted 1978.

In addition to the physiographic and biological diversity of Region L, it is also the location of a unique, region-wide geologic feature called the Edwards Aquifer. The Edwards Aquifer, together with the karst geology of its recharge zone and the remaining major perennial springs, constitute a unique set of habitats in which a significant concentration of isolated, endemic species has developed. The porous to cavernous limestones and dolomites making up the Edwards Aquifer are also a significant groundwater source that presently for City of San Antonio and numerous other users. The Edwards Aquifer is the only underground aquatic habitat in Texas in which vertebrate species live [23], and it supports a surprisingly diverse ecosystem. The aquifer has three parts: the drainage or catchment area (contribution zone), the recharge zone, and the reservoir zone (artesian zone). Input to the aquifer comes from rainfall over the watershed as a whole, but recharge occurs primarily in the beds of streams atop or traversing the recharge zone. The recharge zone consists of a band of fractured and cavernous limestone (karst geology) through which surface water enters the aquifer. In addition to the aquatic fauna of the aquifer, the karst limestones in the upland portions of the recharge and contributing zones also harbor a number of endemic, terrestrial cave species.

Where rivers flowing across the plateau have carved deep canyons and exposed the base of the Edwards Limestone, spring fed streams arise and flow south and eastward over the less permeable older formations to the recharge zone, at the base of which a set of large springs (e.g., Leona, San Antonio, Comal, and San Marcos Springs) emerge that support still more species of limited distribution. In addition to their importance as water supplies, the large springs and their associated rivers are also of regional economic importance as scenic and recreational destinations.

Species listed by the federal or state governments as endangered or threatened, species that are candidates for listing as endangered and threatened, and species of greatest conservation need (SGCN) as designated by the TPWD are listed in Appendix 5D and discussed in terms of the potential impacts of each WMS in Section 5.2 of the 2026 SCTRWP (Volume 2). Many of the listed endangered species are associated with the canyons, caves, and springs on the eastern and southern edges of the Edwards Plateau (Hays and Comal Counties, and northern Bexar County) and in the wetland and brackish environments of Calhoun and Refugio Counties.

Listed species tend to fall into one of two broad categories. One category includes widespread, but rare, species whose populations do not appear to be dependent on specific habitat resources that are (at this time) in limited supply (e.g., foraging, and nesting areas). These include many of the birds, such as the eagles and hawks that suffered population declines as a result of persistent pesticide toxicity, and Whooping Cranes that were decimated by market hunting. Other listed species tend to be rare because their habitat requirements are met in only a few locations. This second category includes migratory songbirds with specific nesting requirements (e.g., Golden-cheeked Warbler) and reaches the extremes of endemism in the spring and cave species found along the edges of the Edwards Plateau in Bexar, Comal, Guadalupe, and Hays Counties.

In addition to listed threatened and endangered species, several non-native invasive aquatic species pose significant risk to ecosystems and water projects within Region L. These species include the zebra mussel (*Dreissena polymorpha*), apple snail (*Pomacea* sp.), tilapia (*Oreochromis aurea*), and sailfin

[23] Edwards, Robert J., Glen Longley, Randy Moss, John Ward, Ray Mathews, and Bruce Stewart, “A Classification of Texas Aquatic Communities with Special Consideration toward the Conservation of Endangered and Threatened Taxa,” Vol. 41, No. 3, The Texas Journal of Science, University of Texas at Austin, Austin, Texas, 1989.

catfish (*Pterygoplichthys disjunctivus*). These non-native invasive species can consume native aquatic vegetation, compete with native species for food items, and disrupt habitat for native species.

The zebra mussel is native to Eurasia and made its way to North America around 1988, when it was first detected in Lake Saint Claire, Michigan. This species is a broadcast spawner with potential to attach itself on many surfaces in lakes and rivers, including boats, anchors, docks, and machinery. The microscopic larval stage (called veligers) is easily transported in bilge water, ballast water, live wells, and other methods of moving water overland from infested areas to other waterways [24]. Once thought to be thermally limited to cold water, the species appears to adapt quickly, and it is unclear whether there will be any limit to the southern limit of their range expansion in North America [25].

The zebra mussel is a filter feeder with propensity for reaching extremely high densities, with proven ability to clarify water of infested waterways and negatively impact native species by effectively removing plankton at the base of the food chain [26]. Zebra mussels create millions of dollars in damage per year to hydroelectric powerplants and water-processing infrastructure, with an estimated price tag of $3.1 billion from 1991-2001. Zebra mussels may also create taste and odor issues in the affected waterbody [27].

The zebra mussel was confirmed within Lake Texoma in April 2009 and has since spread south to other parts of Texas. The species was first detected in Lake Belton in 2013 and has continued its steady progression south. TPWD indicates 21 Texas lakes are classified as infested (established, reproducing populations); including Canyon Lake in Comal County [28]. TPWD currently identifies zebra mussel positive lakes (adults or larvae are detected) at nine locations, including Lakes Dunlap, McQueeney, and Placid in Guadalupe County. TPWD maintains a regularly updated webpage with map showing lakes with positive zebra mussel identifications and maps, located at https://tpwd.texas.gov/huntwild/wild/species/exotic/zebramusselmap.phtml.

A more recent invasive species in Region L, the apple snail is a large (up to 15cm), aquatic gastropod originally from Argentina. Apple snails are voracious predators of aquatic plants and may reach significant densities, thereby stripping the local ecosystem of plant life. Additionally, apple snails are known to carry rat lungworm (*Angiostongylus cantonensis*), a parasite that infects humans and other mammals [29]. Severe infections from the parasite may cause eosinophilic meningitis and scar the brain. Apple snails were first documented in Texas in 1990 and have primarily remained in the southeastern part of the state, mostly around Houston [30]. However, 105 apple snails and many egg sacs were

[24] Churchill, C.J. and S. Baldys. 2012. USGS zebra mussel monitoring program for North Texas— Fact sheet 2012-3077. Prepared for U.S. Department of Interior and U.S. Geological Survey. Available online at: https://pubs.usgs.gov/fs/2012/3077/pdf/fs2012-3077.pdf. Accessed August 2020

[25] Olson, J., J.J. Robertson, T.M. Swannack, R.F. McMahon, W.H. Nowlin, and A.N. Schwalb. 2018. Dispersal of zebra mussels, Dreissena polymorpha, downstream of an invaded reservoir. Aquatic Invasions, 13(2): 199-209.

[26] Ibid.

[27] Churchill and Baldys. 2012.

[28] Texas Parks and Wildlife Department (TPWD). 2020. The zebra mussel threat— Updated July 2020. Available online at: https://tpwd.texas.gov/huntwild/wild/species/exotic/zebramusselmap.phtml. Accessed August 2020.

[29] Ibid.

[30] Texas Invasive Species Institute (TISI). 2014. Apple snail— *Pomacea maculata.* Available online at: http://www.tsusinvasives.org/home/database/pomacea-maculata Accessed August 2020.

discovered when the San Antonio River was drained along the River Walk at the end of October 2019 [31]. This may represent a significant range expansion for the species within Texas. The apple snails lay bright pink egg masses above the waterline, which is often the first indication a waterbody is infested [32].

Other aquatic invasive species of concern include tilapia (*Oreochromis aurea*) and sailfin catfish (*Pterygoplichthys disjunctivus*). These non-native invasive species can compete with native species for food items and disrupt habitat for native species.

In support of the regional water planning process, TPWD screened Texas rivers and streams for reaches or segments that support significant biological resources or functions, or whose continued flows were deemed critical to the maintenance of a downstream resource or public property. The TPWD used available studies, existing data, and in-house expertise to evaluate a segment's ecological importance based on factors related to biological or hydrologic function, presence of riparian conservation areas, high water quality or exceptional aquatic life or high aesthetic value, and threatened or endangered species or unique communities. Stream reaches identified by TPWD as Ecologically Significant River and Stream Segments in Region L are listed, along with the listing criteria employed in the identification process, in a TPWD report [33]. Table 6-8 summarizes the segments and the ecological importance identified by the TPWD. Segment locations are shown on Figure 6-29. Five of these river or stream segments were recommended by the SCTRWPG to be designated by the Texas Legislature as having unique ecological value. In 2015, the Texas Legislature designated the recommended stream segments as having unique ecological value.

Table 6-8 Ecologically Significant River and Stream Segments Identified by TPWD in the South Central Texas Regional Water Planning Area

Segment Name	Biological Function	Hydrologic Function	Riparian Conservation	Water Quality Aquatic Life/Uses	Endangered or Threatened Species or Unique Communities
Aransas River	Extensive estuarine wetland habitat	Water quality and flood attenuation performed by estuarine and freshwater wetlands.			Reddish egret (ST), piping plover (FT, ST), white-faced ibis (ST), and wood stork (ST)
Arenosa Creek				Ecoregion stream	
Blanco River		Edwards and Trinity Aquifers Discharge	Blanco State Park	Overall use	Blanco blind salamander (ST)
Carpers Creek				Ecoregion stream	Diverse benthic macroinvertebrat e community

[31] Patton, M.C. 2020. *Texans encouraged to report sighting of giant apple snails*. KSAT. San Antonio, Texas. Published May 19, 2020.
[32] Texas Invasives Database (TID). 2019. *Pomacea maculate*— Apple snail. Available online at: https://www.texasinvasives.org/animal_database/detail.php?symbol=15 Accessed August 2020.
[33] Texas Parks and Wildlife Department (TPWD). 2005. Ecologically Significant River and Stream Segments of Region L (South Central) Regional Water Planning Area. WRTS-2005-01.

Segment Name	Biological Function	Hydrologic Function	Riparian Conservation	Water Quality Aquatic Life/Uses	Endangered or Threatened Species or Unique Communities
Comal River	Significant overall habitat value	Edwards Aquifer Discharge	Landa Park	High water quality and exceptional aquatic life use	Fountain darter (FE/SE), Comal Springs riffle beetle (FE), Comal Springs dryopid beetle (FE), Peck's Cave amphipod (FE/SE), and Comal blind salamander (ST).
Cypress Creek		Trinity Aquifer Discharge, Edwards Aquifer Contributing Zone		Overall use	
Frio River	Texas Natural River Systems Nominee	Edwards Aquifer Recharge and Discharge	Garner State Park	Overall use, aesthetic value	Multiple spring-dependent listed species
Garcitas Creek	Estuarine wetlands display significant overall habitat value			Ecoregion stream	One of few locales where the Texas palmetto occurs naturally
Geronimo Creek				Ecoregion stream	
Guadalupe River, Upper		Edwards Aquifer Discharge	Guadalupe River State Park	Overall use, #2 scenic river in Texas	
Guadalupe River, Middle					Contains two of only four known remaining populations of the Golden orb (C, ST)
Guadalupe River, Lower	Freshwater and marine wetlands display significant overall habitat value		Victoria Municipal Park, Guadalupe Delta WMA	Overall use	Whooping crane (FE, SE), unique and extensive marsh communities
Honey Creek	Significant overall habitat value.	Groundwater discharge and recharge.	Honey Creek State Natural Area		Presence of several species of concern
Mission River	Freshwater and marine wetlands provide significant overall habitat value	Water quality and flood attenuation performed by estuarine and freshwater wetlands.			

Segment Name	Biological Function	Hydrologic Function	Riparian Conservation	Water Quality Aquatic Life/Uses	Endangered or Threatened Species or Unique Communities
Nueces River	Texas Natural River System nominee	Edwards Aquifer Recharge and Discharge		Aesthetic, Top 100 Texas Natural Areas List	Multiple spring-dependent species
Sabinal River	Texas Natural River System nominee	Edwards Aquifer Recharge and Discharge		Aesthetic	Multiple spring-dependent species
San Marcos River, Upper	Significant overall habitat value.	Edwards Aquifer Discharge	Multiple University and City parks, San Marcos River State Scientific Area	Overall use	Fountain darter (FE/SE), Texas blind salamander (FE/SE), San Marcos salamander (FT/ST), Texas wild rice (FE/SE) and Comal Springs riffle beetle (FE).
San Marcos River, Lower			Palmetto State Park		Significant due to presence of the American eel and the Golden orb (C, ST)
San Miguel Creek				Ecoregion stream	
West Nueces River		Edwards Aquifer Discharge and Recharge			Multiple spring-dependent species
West Verde Creek		Edwards Aquifer Discharge and Recharge	Hill County State Natural Area		Multiple spring-dependent species

FE=Federally Endangered
FT=Federally Threatened
C=Federal Candidate Species
SE=State Endangered
ST=State Threatened
Source: Norris, Chad W., Daniel W. Moulton, Albert El-Hage and David Bradsby. 2005. *Ecologically Significant River & Stream Segments of Region L (South Central) Regional Water Planning Area*. Texas Parks and Wildlife Department, Austin, Texas.

6.1.4.2 Environmental Impacts

The environmental impacts of implementation of WMSs in the 2026 SCTRWP were evaluated for construction effects and operational effects. Construction effects are generally due to temporary or permanent disturbances of vegetation and soils, although in specific locations and circumstances, waste disposal, construction in aquatic habitats, noise, or airborne particulates may also be important factors. Operational effects may include, but is not limited to, impacts to vegetation, habitats, or endangered species through ongoing maintenance practices or changes in streamflows, water quality, or groundwater availability from ongoing project operations. The potential environmental effects of each WMS were evaluated individually, and the results are summarized in Section 5.2 of the 2026 SCTRWP

(Volume 2). Individual WMSs may each result in negligible or minor construction or operational impacts, but, taken as a whole, the entire suite of WMSs may result in more substantial impacts to specific resources. The evaluation in this section focuses on the cumulative impact of all recommended WMSs included in the 2026 SCTRWP.

It should be noted that the information available for analysis of potential impacts of WMSs has changed substantially since similar analyses were performed for regional water plans prior to 2016. Earlier analyses were heavily dependent on paper maps and the transfer of information by hand to those maps. Lengths of pipelines and reservoir areas were also determined by measurements on available maps of variable scale. For the 2016 and 2026 SCTRWPs, information used to evaluate potential environmental impacts resulting from WMSs was primarily produced using Geographic Information Systems (GIS) shapefiles and recent aerial photography. This method of analysis allows for a more site-specific evaluation of the potential issues associated with a specific WMS. Much of the baseline data used to perform the analyses are readily available in GIS shapefiles, including TPWD vegetation mapping, stream and wetland data, soil map units, etc. In addition, recent aerial photography of the project areas provides an opportunity to evaluate potential habitat impacts based on the actual vegetation type that exists within the project areas rather than a large-scale evaluation of general vegetation types.

The environmental assessments of individual WMSs should be regarded as high-level preliminary reviews in the sense that neither environmental nor engineering site-specific studies have been performed to verify the published data used, finalize facility locations and operational routines, and identify locations where risks to environmental resources can be avoided or minimized and compensation for unavoidable impacts can be proposed. Most of the facilities evaluated herein have been designed and located only in a conceptual sense; the actual locations of intakes, pipeline rights-of-way, reservoirs, and other project features will not be finally determined until site-specific field studies and land acquisition programs have been completed. As each individual WMS undergoes detailed designs and environmental permitting, many, if not most, of the potential impacts discussed in the respective WMSs evaluations can be avoided or significantly mitigated by relocation of project elements or changes in construction methods (for example, directional drilling under streams for pipeline construction). This is particularly the case with respect to facilities such as pipelines and individual well pads and less so for reservoirs, for which there may be limited suitable sites.

Potential adverse terrestrial environmental and cultural resources impacts are minimized in the 2026 SCTRWP by the recommendation of strategies that maximize the efficient use of existing surface water resources, or which develop groundwater supplies, including brackish groundwater. These WMSs avoid the extensive habitat conversions and streamflow changes that can accompany comparable new surface water development. The estimated new firm water supplies provided by the WMSs recommended in the 2026 SCTRWP are included in the impact summary tables (Table 6-9 through Table 6-14).

Proposed facilities for the recommended WMSs may include facilities with relatively small footprints, such as wells or pump stations, or those with larger footprints, such as major pipelines or storage reservoirs. As previously discussed, facility construction involves both temporary and permanent impacts. However, there is typically flexibility in the siting of facilities that can avoid or minimize environmental impacts. Table 6-9 summarizes the types of potential environmental and cultural impacts associated with the various facility types.

Table 6-9 Potential Impacts of Different Types of Project Components

Facility Type	Potential Temporary Impacts	Potential Permanent or Long-term Impacts
Well Fields	• Construction: soil disturbance, noise, dust • Disturbance of buried archaeological sites	• Well pad clearing • Groundwater drawdown
Pump Stations; Water Treatment Plants	• Construction: soil disturbance, noise, dust • Disturbance of buried archaeological sites	• Conversion of native vegetation or agricultural areas to industrial land use • Treated water outfalls: water quality changes
Pipelines	• Construction: soil disturbance, noise, dust • Disturbance of buried archaeological sites • Soil erosion/sedimentation of streams • Trenching of stream crossings: dewatering of construction area or temporary stream diversions	• Long-term maintenance (e.g., mowing), conversion of vegetation community • Introduction of non-native plant species
Intakes/ Outfalls	• Construction: soil disturbance, noise, dust • Disturbance of buried archaeological sites • Soil erosion/sedimentation of streams • Dewatering of construction area	• Water quality changes • Water quantity/flow changes
Reservoirs	• Construction: soil disturbance, noise, dust • Disturbance of buried archaeological sites • Soil erosion/sedimentation of streams	• Loss of native woody or herbaceous vegetation • Loss of agricultural area

In conjunction with applicable environmental regulatory and permitting requirements, field studies conducted prior to design and easement procurement can substantially reduce the potential to adversely affect unique habitats, endangered species, historic and prehistoric sites, and other resources that are present only at specific locations. For example, where sensitive resources at stream crossings cannot be adequately protected or avoided, horizontal directional drilling can be considered as a construction option to avoid disturbance of aquatic habitats.

Five recommended strategies, the GBRA New Appropriation (Lower Basin), GBRA WaterSECURE, NBU ASR Project, Medina County ASR and Victoria ASR Project include off-channel reservoirs or ASR facilities that will be used to ensure firm supplies throughout a drought comparable to the most severe on record. This water supply storage is necessary because the existing water rights and the unappropriated water are either not physically present during low flow periods or are unavailable due to the demands of senior water rights or environmental flow needs. Protection of senior water rights and compliance with environmental flow standards effectively minimizes effects of these projects on low streamflows. Several of the recommended WMSs include transmission pipelines that traverse several ecologically distinct regions, which can increase the number of habitat types affected by the project and thereby increase the potential for adverse effects to particular species.

The WMSs that include development of large amounts of groundwater may reduce the potential environmental and cultural resources impacts compared to development of similar volumes of surface water. However, local residents of the areas that would be affected have expressed concerns about declining well levels and potential impacts to springs and streamflows. Development of a large amount of groundwater from the Carrizo-Wilcox Aquifer will result in some reductions in streamflow in both the San Antonio and Guadalupe Rivers and in inflows to the Guadalupe Estuary. Groundwater drawdowns may also affect seasonal flow in streams systems that include groundwater contributions.

The location and extent of potential disturbances to environmental and cultural resources are based on the descriptions and environmental assessments of the WMSs in Chapter 5.2 (Volume 2). Pipeline routes were produced digitally, and pipeline lengths and areas were calculated using ArcMap GIS software. A 100 foot wide construction corridor was assumed for all pipelines. Areas of reservoirs and ancillary facilities such as water treatment plants, pump stations, storage units, and wells were based on conceptual designs developed for the RWP.

For recommended WMSs, the environmental impacts assessment was completed using a matrix approach to perform a series of parallel evaluations of each WMS for its potential to impact the following resource categories:

- Endangered and Threatened Species;
- Vegetation and Land Use;
- Water Quality and Aquatic Habitats; and
- Cultural Resources.

The impacts assessment approach is described for each resource category in the following sections.

6.1.4.2.1 Endangered and Threatened Species

The potential impacts of the individual WMSs were first evaluated with respect to state- or federally listed endangered and threatened species, federal candidate species, and state species of concern using a two-part index system.

First, each WMS was evaluated with respect to its potential impact on the species present by assigning a numerical value from 0 to 2 according to the relative size of project habitat impacts:

- 0 - No or negligible habitat impacts;
- 1 - Minimal habitat impacts; or
- 2 - Moderate or greater potential habitat impacts.

Second, the number of federal- or state-listed, or proposed listed, endangered and threatened species or candidate species with potential habitat impacts was tabulated for each WMS. This analysis was based on current county species lists produced by TPWD and USFWS.

The habitat and species impact assessment scores are listed, and the overall endangered and threatened species impact values for each of the State Water Plans are presented in Table 6-10.

As was observed in the 2016 and 2021 SCTRWP analyses, higher species impact scores are associated with projects requiring long pipelines and multi-county projects, as well as projects that include reservoir construction.

Table 6-10 Summary of Potential Impacts to Endangered, Threatened, and Species of Greatest Conservation Need from Water Management Strategies

No.	Water Management Strategy	Habitat Impact Score	Potential Species Impact Score
1	Municipal Water Conservation	N/A	N/A
2	Non-municipal Water Conservation	N/A	N/A
3	Drought Management	N/A	N/A
4	Edwards Transfers	N/A	N/A
5	Fresh Groundwater Development	N/A	N/A
6	Brackish Groundwater Development	N/A	N/A
7	Groundwater Conversions	N/A	N/A
8	Facilities Expansion	N/A	N/A
9	Recycled Water	N/A	N/A
10	Brush Management	N/A	N/A
11	Rainwater Harvesting	N/A	N/A
12	Surface Water Rights	N/A	N/A
13	Balancing Storage	N/A	N/A
14	ARWA Carrizo-Wilcox Project (Phase 2)	2	8
15	ARWA DPR Project (Phase 3)	2	8
16	CRWA Expanded Brackish Carrizo-Wilcox Project	2	4
17	CRWA Siesta Project	1	5
18	CRWA Wells Ranch (Phase 3) Project	1	5
19	CVLGC Carrizo Project	2	10
20	GBRA Lower Basin New Appropriation	2	13
21	GBRA WaterSECURE	2	21
22	Medina County Regional ASR	2	5
23	NBU ASR	1	2
24	NBU Trinity Well Field Expansion	1	7
25	SAWS Expanded Local Carrizo Project	1	6
26	SAWS Expanded Brackish Groundwater Project	1	6
27	SAWS Regional Wilcox Project	2	7
28	SSLGC Expanded Brackish Wilcox Project	1	9
29	SSLGC Expanded Carrizo Project	1	9

No.	Water Management Strategy	Habitat Impact Score	Potential Species Impact Score
30	Victoria ASR	1	3
31	Victoria Groundwater-Surface Water Exchange	1	2
32	Weather Modification	N/A	N/A

6.1.4.2.2 Vegetation and Land Use

To evaluate potential impacts on vegetation and wildlife habitats and land use, each of the WMSs was evaluated based on the area of each habitat type disturbed by construction activities and the level of potential impacts on those resources. The potential level, or severity, of impacts to vegetation and land use was evaluated by assigning an expected impact score:

- 0 - No or negligible vegetation impacts, or mostly affecting existing urban area;
- 1 - Low to moderate impacts = low level of permanent vegetation loss and/or vegetation conversion of pipeline corridors; or
- 2 - Moderate to high impacts = habitat is permanently removed through inundation or construction.

The impact score of each type of disturbance was then multiplied by the estimated area in acres of non-urban vegetation impacts. Adjusted impact values are summed for the habitats potentially affected by each WMS, and overall vegetation and habitat scores are shown in Table 6-11.

Table 6-11 Summary of Potential Impacts to Vegetation and Land Use

No.	Water Management Strategy	Potential Habitat Impact Score
1	Municipal Water Conservation	N/A
2	Non-municipal Water Conservation	N/A
3	Drought Management	N/A
4	Edwards Transfers	N/A
5	Fresh Groundwater Development	N/A
6	Brackish Groundwater Development	N/A
7	Groundwater Conversions	N/A
8	Facilities Expansion	N/A
9	Recycled Water	N/A
10	Brush Management	N/A
11	Rainwater Harvesting	N/A
12	Surface Water Rights	N/A
13	Balancing Storage	N/A

No.	Water Management Strategy	Potential Habitat Impact Score
14	ARWA Carrizo-Wilcox Project (Phase 2)	2
15	ARWA DPR Project (Phase 3)	2
16	CRWA Expanded Brackish Carrizo-Wilcox Project	2
17	CRWA Siesta Project	1
18	CRWA Wells Ranch (Phase 3) Project	1
19	CVLGC Carrizo Project	2
20	GBRA Lower Basin New Appropriation	2
21	GBRA WaterSECURE	2
22	Medina County Regional ASR	2
23	NBU ASR	2
24	NBU Trinity Well Field Expansion	2
25	SAWS Expanded Local Carrizo Project	1
26	SAWS Expanded Brackish Groundwater Project	1
27	SAWS Regional Wilcox Project	2
28	SSLGC Expanded Brackish Wilcox Project	2
29	SSLGC Expanded Carrizo Project	2
30	Victoria ASR	1
31	Victoria Groundwater-Surface Water Exchange	1
32	Weather Modification	N/A

6.1.4.2.3 Water Quality and Aquatic Habitats

Potential impacts to water quality and aquatic habitats were assessed in two ways: (1) direct impacts to streams during construction of pipeline crossings and/or intake or outfall structures; and (2) potential impacts to stream flow regimes.

For construction impacts, the general level of potential project impacts, both temporary and permanent, was assigned a rating as follows:

- 0 - No stream impacts;
- 1 - Low to moderate impacts; or
- 2 - Moderate to high impacts.

This rating was multiplied by a factor representing the number of potential stream crossings and intake or outfall structures:

- 0 - No stream crossings or structures;
- 1 - From 1 to 25 potential crossings and structures;
- 2 - From 26 to 50 potential crossings and structures;
- 3 - From 51 to 75 potential crossings and structures; or
- 4 - 76 or more potential crossings and structures.

Results of the construction impacts analysis are provided in Table 6-12.

Table 6-12 Summary of Potential Stream Construction Impacts

No.	Water Management Strategy	Potential Stream Construction Impact Score
1	Municipal Water Conservation	N/A
2	Non-municipal Water Conservation	N/A
3	Drought Management	N/A
4	Edwards Transfers	N/A
5	Fresh Groundwater Development	N/A
6	Brackish Groundwater Development	N/A
7	Groundwater Conversions	N/A
8	Facilities Expansion	N/A
9	Recycled Water	N/A
10	Brush Management	N/A
11	Rainwater Harvesting	N/A
12	Surface Water Rights	N/A
13	Balancing Storage	N/A
14	ARWA Carrizo-Wilcox Project (Phase 2)	4
15	ARWA DPR Project (Phase 3)	2
16	CRWA Expanded Brackish Carrizo-Wilcox Project	2
17	CRWA Siesta Project	3
18	CRWA Wells Ranch (Phase 3) Project	2
19	CVLGC Carrizo Project	5
20	GBRA Lower Basin New Appropriation	3
21	GBRA WaterSECURE	6
22	Medina County Regional ASR	2

No.	Water Management Strategy	Potential Stream Construction Impact Score
23	NBU ASR	1
24	NBU Trinity Well Field Expansion	0
25	SAWS Expanded Local Carrizo Project	2
26	SAWS Expanded Brackish Groundwater Project	2
27	SAWS Regional Wilcox Project	4
28	SSLGC Expanded Brackish Wilcox Project	4
29	SSLGC Expanded Carrizo Project	4
30	Victoria ASR	1
31	Victoria Groundwater-Surface Water Exchange	1
32	Weather Modification	N/A

For potential stream flow and water quality impacts, the general level of potential project impacts, both temporary and permanent, was assigned a rating as follows:

- 0 - No stream impacts;
- 1 - Low to moderate impacts; or
- 2 - Moderate to high impacts.

This rating was multiplied by a factor representing types of potential stream and water quality impacts, as presented in Chapter 6.1.1.3. For this factor, a point was assigned for each of the following:

- Potential streamflow reductions;
- Potential alterations to streamflow hydrograph (e.g., seasonal alterations);
- Potential changes to bay inflows; and
- Increased groundwater use in the Trinity or Carrizo-Wilcox aquifers.

Results of the stream flow and water quality impacts analysis are provided in Table 6-13.

Table 6-13 Summary of Potential Stream Flow/Water Quality Impacts

No.	Water Management Strategy	Potential Stream Flow/ Water Quality Impact Score
1	Municipal Water Conservation	N/A
2	Non-municipal Water Conservation	N/A
3	Drought Management	N/A
4	Edwards Transfers	N/A
5	Fresh Groundwater Development	N/A
6	Brackish Groundwater Development	N/A

No.	Water Management Strategy	Potential Stream Flow/ Water Quality Impact Score
7	Groundwater Conversions	N/A
8	Facilities Expansion	N/A
9	Recycled Water	N/A
10	Brush Management	N/A
11	Rainwater Harvesting	N/A
12	Surface Water Rights	N/A
13	Balancing Storage	N/A
14	ARWA Carrizo-Wilcox Project (Phase 2)	2
15	ARWA DPR Project (Phase 3)	1
16	CRWA Expanded Brackish Carrizo-Wilcox Project	1
17	CRWA Siesta Project	3
18	CRWA Wells Ranch (Phase 3) Project	1
19	CVLGC Carrizo Project	2
20	GBRA Lower Basin New Appropriation	5
21	GBRA WaterSECURE	5
22	Medina County Regional ASR	2
23	NBU ASR	1
24	NBU Trinity Well Field Expansion	1
25	SAWS Expanded Local Carrizo Project	1
26	SAWS Expanded Brackish Groundwater Project	1
27	SAWS Regional Wilcox Project	1
28	SSLGC Expanded Brackish Wilcox Project	2
29	SSLGC Expanded Carrizo Project	2
30	Victoria ASR	2
31	Victoria Groundwater-Surface Water Exchange	1
32	Weather Modification	N/A

6.1.4.2.4 Cultural Resources

As outlined in Chapter 5.2, a cultural resources probability model was conducted for individual WMSs based on conceptual project site locations. Results of the potential cultural resources impact scores are summarized in Table 6-14. The impact scores were assigned a rating as follows:

- 0 - No or negligible impacts;
- 1 - Minimal and/or temporary impacts, mostly expansions to existing facilities; minor study and permitting requirements; or
- 2 - Moderate potential impacts, may include new transmission lines, moderate study, and permitting requirements.

The impact rating score was then multiplied by the number of proposed WMS projects to yield an overall potential impact score.

Table 6-14 Summary of Potential Impacts to Cultural Resources from Water Management Strategies

No.	Water Management Strategy	Potential Cultural Resources Impact Score
1	Municipal Water Conservation	N/A
2	Non-municipal Water Conservation	N/A
3	Drought Management	N/A
4	Edwards Transfers	N/A
5	Fresh Groundwater Development	N/A
6	Brackish Groundwater Development	N/A
7	Groundwater Conversions	N/A
8	Facilities Expansion	N/A
9	Recycled Water	N/A
10	Brush Management	N/A
11	Rainwater Harvesting	N/A
12	Surface Water Rights	N/A
13	Balancing Storage	N/A
14	ARWA Carrizo-Wilcox Project (Phase 2)	72
15	ARWA DPR Project (Phase 3)	103
16	CRWA Expanded Brackish Carrizo-Wilcox Project	31
17	CRWA Siesta Project	95
18	CRWA Wells Ranch (Phase 3) Project	57
19	CVLGC Carrizo Project	105
20	GBRA Lower Basin New Appropriation	242

No.	Water Management Strategy	Potential Cultural Resources Impact Score
21	GBRA WaterSECURE	1,233
22	Medina County Regional ASR	144
23	NBU ASR	132
24	NBU Trinity Well Field Expansion	219
25	SAWS Expanded Local Carrizo Project	61
26	SAWS Expanded Brackish Groundwater Project	174
27	SAWS Regional Wilcox Project	292
28	SSLGC Expanded Brackish Wilcox Project	59
29	SSLGC Expanded Carrizo Project	109
30	Victoria ASR	1,566
31	Victoria Groundwater-Surface Water Exchange	0
32	Weather Modification	N/A

6.1.5 Effects on Navigation

None of the WMSs recommended for implementation in the 2026 SCTRWP are expected to have any direct effects on navigation.

6.1.6 Environmental Benefits and Concerns

The SCTRWPG has identified the following potentially significant environmental benefits and concerns associated with the implementation of the 2026 SCTRWP.

6.1.6.1 Environmental Benefits

- Emphasis on conservation, drought management, reuse, groundwater development, and use of existing surface water rights avoids or delays projects with greater impacts.
- Implementation of the EAHCP and development of non-Edwards supplies contribute to springflow maintenance and endangered species protection.
- Plan avoids impacts associated with development of new mainstem reservoirs.
- Increased reliance on ASR facilitates storage during wet periods for use during dry periods without evaporation and terrestrial habitat losses.
- Increased reliance on brackish groundwater resources, potentially reducing reliance on fresh groundwater.
- Projects are not expected to have adverse effects on the Nueces, Frio, and Sabinal River segments designated as having unique ecological value.
- Projects will not exceed environmental flow standards.

6.1.6.2 Environmental Concerns

- Reductions in instream flows and freshwater inflows to bays and estuaries associated with surface water supply and direct consumptive reuse projects.
- Projects located in stream segments identified by TPWD as ecologically significant.
- Effects on small springs and reductions in flux entering streams from aquifers associated with groundwater development.
- Identified environmental impacts are likely to be exacerbated by increasing frequency of extreme weather events and droughts.

6.2 Social and Economic Impacts of Not Meeting Identified Water Needs

Identified water needs are potential water supply shortages based on the difference between projected water demands and existing water supplies. Identified water needs are presented in Chapter 4 of the 2026 SCTRWP. Title 31 of the TAC §357.4(a) requires that the social and economic impacts of not meeting regional identified water needs be evaluated by the SCTRWPG. The TWDB completes these analyses for RWPGs. The TWDB anticipates providing the socioeconomic impact report in August of 2025 for inclusion in the Final Regional Water Plan. The TWDB will perform the required analyses for the 2026 SCTRWP, and the estimated socioeconomic impacts of not meeting projected water shortages which will be presented in Appendix 6A.

6.3 Descriptions of Unmet Needs

Unmet needs are the portion of an identified water need that is not met by recommended WMSs. In accordance with TWDB rules in 31 TAC §357.50(j), RWPGs must provide a summary of any unmet water needs in the plan and provide adequate justification for any unmet municipal needs included in the final adopted SCTRWP.

The 2026 SCTRWP includes unmet needs for the irrigation, manufacturing, mining, municipal, and steam-electric power use sectors. The 2026 SCTRWP did not recommend WMSs to meet some needs for manufacturing, mining, and steam-electric power, as strategies to meet those needs may be cost-prohibitive or infeasible to implement. The SCTRWPG recommended conservation and drought management WMSs to meet irrigation needs. This is the first SCTRWP to include Non-Municipal Water Conservation and Irrigation Drought Management as Recommended WMSs. The WMSs arose from the SCTRWPG's collective desire to address significant unmet irrigation needs in previous regional water plans. For the 2026 SCTRWP, there are unmet municipal needs for Boerne and County-Other WUGs in Comal, Guadalupe, and Hays Counties.

Table 6-15 summarizes the needs that remain unmet in the 2026 SCTRWP after implementation of Recommended WMSs. WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The unmet needs shown in the WUG Unmet Needs report from the 2027 Regional and State Water Planning Database (DB27) are calculated by first deducting the WUG's split projected demand from the sum of its total existing water supply volumes and all associated Recommended WMS water volumes. If the WUG split has a greater future supply volume than projected demand in any given decade, this amount is considered a surplus volume. In order to display only unmet needs associated with the WUG split, these surplus volumes are shown as zero, and the unmet needs water volumes are shown as absolute values.

Table 6-15 Summary of Unmet Needs for the South Central Texas Region (acft/yr)

No.	Water User Group	County	2030	2040	2050	2060	2070	2080
1	Boerne	Kendall	0	0	0	0	903	3,114
2	County-Other, Comal	Comal	0	0	0	5,034	8,048	11,677
3	County-Other, Guadalupe	Guadalupe	0	0	0	107	259	426
4	County-Other, Hays	Hays	0	0	0	854	5,120	11,918
5	Irrigation, Calhoun	Calhoun	9,173	9,173	9,173	9,173	9,173	9,173
6	Irrigation, Dimmit	Dimmit	4,336	4,336	4,336	4,336	4,336	4,336
7	Irrigation, Goliad	Goliad	184	36	0	0	0	0
8	Irrigation, Guadalupe	Guadalupe	20	20	20	20	20	20
9	Irrigation, La Salle	La Salle	413	413	413	413	413	413
10	Irrigation, Medina	Medina	20,569	20,646	20,729	19,598	18,663	17,715
11	Irrigation, Uvalde	Uvalde	16,576	16,576	13,476	13,476	13,476	13,476
12	Irrigation, Victoria	Victoria	200	200	200	200	200	200
13	Irrigation, Zavala	Zavala	14,189	14,189	14,189	14,189	14,189	14,189
14	Manufacturing, Bexar	Bexar	16	338	673	1,020	1,381	1,755
15	Manufacturing, Caldwell	Caldwell	9	0	0	0	0	0
16	Manufacturing, Calhoun	Calhoun	0	28	1,981	4,153	6,405	8,741
17	Manufacturing, Kendall	Kendall	43	45	47	49	51	53
18	Manufacturing, Victoria	Victoria	38,960	40,419	41,932	43,501	45,128	46,815

No.	Water User Group	County	2030	2040	2050	2060	2070	2080
19	Manufacturing, Wilson	Wilson	5	7	9	11	14	17
20	Manufacturing, Zavala	Zavala	732	759	787	816	846	877
21	Mining, Atascosa	Atascosa	3,300	3,613	3,919	4,208	4,478	0
22	Mining, Comal	Comal	2,967	5,084	7,218	9,340	11,386	13,268
23	Mining, Dimmit	Dimmit	5,451	5,451	5,451	5,451	5,451	0
24	Mining, Frio	Frio	4,034	4,035	4,035	4,036	4,036	0
25	Mining, Gonzales	Gonzales	3,631	3,664	3,702	3,740	3,779	0
26	Mining, Guadalupe	Guadalupe	428	428	428	428	428	0
27	Mining, Karnes	Karnes	1,440	1,440	1,440	1,440	1,440	0
28	Mining, La Salle	La Salle	4,867	4,867	4,867	4,867	4,867	0
29	Mining, Medina	Medina	3,042	3,436	3,783	4,098	4,375	4,604
30	Mining, Uvalde	Uvalde	209	428	655	871	1,079	1,276
31	Mining, Victoria	Victoria	338	357	374	387	399	408
32	Mining, Zavala	Zavala	3,664	3,664	3,664	3,664	3,664	0
All	**Total**	**All**	**139,462**	**144,318**	**148,167**	**160,146**	**174,673**	**165,137**

6.3.1 Boerne

Boerne is located in southeastern Kendall County and exhibits needs in the 2070 and 2080 decades. The SCTRWPG coordinated with Boerne to discuss population, water demands, existing supplies, and water management strategies, including discussions regarding potential additional strategies to address unmet needs. All potentially feasible strategies were considered to meet Boerne's needs, including municipal water conservation, municipal drought management, recycled water, rainwater harvesting, and water purchase from another entity. All of the potentially feasible strategies were ultimately included as Recommended strategies in the 2026 SCTRWP; however, the volume of WMSs does not resolve the unmet needs beginning in 2070.

As discussed previously, municipal water conservation and drought management were both included as Recommended WMSs for Boerne in all decades of the planning horizon. The yields of the conservation and drought management WMSs (7,407 acft/yr) were developed using methodology selected by the SCTRWPG, as they reflect realistic and achievable goals. Boerne's 2030 GPCD (adjusted to include passive conservation savings) is 189 GPCD. After application of the Municipal Water Conservation WMS, their resulting GPCD in the 2080 decade would be 127 GPCD. Additional conservation efforts to address unmet needs may not be feasible. The Drought Management WMS applies a 10% reduction in outdoor residential landscape irrigation. Even applying a 30% reduction, which is the maximum value that can be applied using the TWDB's Drought Management Costing Tool, Boerne would still have unmet needs.

Based on discussions with Boerne, they indicate that the 2026 SCTRWP water demand projections exceed those of their internal planning data and that they will meet their needs. Because Boerne's planning information indicates that they have sufficient supplies to meet demands, they have elected to not include additional WMSs in the 2026 SCTRWP. In case of a repeat of the drought of record, Boerne responded that they will impose additional drought restrictions to meet public health, safety, and welfare needs during each planning decade with unmet needs. Other potential strategies to ensure public health, safety, and welfare needs may include implementation of new or existing emergency interconnections with other water providers, annexation by water providers with supply surplus, or purchase of hauled water via trucked water systems.

Should Boerne provide new project information, the 2026 SCTRWP may be amended to address unmet municipal needs before adoption of the next Initially Prepared Plan (IPP), anticipated to be in 2030.

6.3.2 County-Other, Comal

Comal County is located in the northern portion of the region. As discussed in Chapter 2 and Chapter 4, the municipal water demand projections and resulting needs in the northern portions of the region are projected to increase significantly over the planning horizon, especially along the Interstate Highway (IH-35) corridor. In particular, water demands for County-Other, Comal are projected to increase by 525% between 2030 and 2080.

County-Other WUGs are rural communities and water systems that fall below the municipal WUG thresholds (utilities less than 100 acft/yr annual retail sales or rural areas not served by a utility). All potentially feasible strategies were considered to meet the WUG's needs, including municipal water conservation (water use reduction), rainwater harvesting, fresh groundwater development, and water purchase from another entity. Most of the potentially feasible strategies were ultimately included as Recommended strategies in the 2026 SCTRWP; however, the volume of WMSs does not resolve the unmet needs beginning in 2060.

As discussed previously, municipal water conservation was included as a Recommended WMS for County-Other, Comal in all decades of the planning horizon. Due to the decentralized nature of County-Other WUGs and the reduced ability to create and enforce restrictions on outdoor residential landscape irrigation, the municipal drought management WMS was not identified as a potentially feasible strategy to meet needs. The yields of the conservation WMS were developed using methodology selected by the SCTRWPG, as they reflect realistic and achievable goals. Additional conservation and/or drought management WMSs were not recommended because it would be infeasible to develop aggressive conservation and drought management programs to meet all of the unmet needs for the County-Other WUG, as it is composed of primarily rural, dispersed, or small utilities.

Additional WMSs were not included in the 2026 SCTRWP for County-Other, Comal because remaining MAG availabilities from existing supply sources (Trinity Aquifer and Edwards-BFZ) are not sufficient to meet needs between 2060 and 2080. Furthermore, it may be cost-prohibitive to develop large-scale strategies that could resolve or meet unmet needs for County-Other because of its dispersed nature. Meeting public health, safety, and welfare needs during a repeat of the drought of record may include implementation of new or existing emergency interconnections with other water providers, annexation by water providers with supply surplus, or purchase of hauled water via trucked water systems.

Should small water providers or other entities provide new project information, the 2026 SCTRWP may be amended to address unmet municipal needs before adoption of the next IPP, anticipated to be in 2030.

6.3.3 County-Other, Guadalupe

Guadalupe County is located in the northern portion of the region. As discussed in Chapter 2 and Chapter 4, the municipal water demand projections and resulting needs in the northern portions of the region are projected to increase significantly over the planning horizon, especially along the IH-35 corridor. In particular, water demands for County-Other, Guadalupe are projected to increase by 457% between 2030 and 2080.

County-Other WUGs are rural communities and water systems that fall below the municipal WUG thresholds (utilities less than 100 acft/yr annual retail sales or rural areas not served by a utility). All potentially feasible strategies were considered to meet the WUG's needs, including municipal water conservation (water use reduction) and rainwater harvesting. All of the potentially feasible strategies were ultimately included as Recommended strategies in the 2026 SCTRWP; however, the volume of WMSs does not resolve the unmet needs beginning in 2060.

As discussed previously, municipal water conservation was included as a Recommended WMS for County-Other, Guadalupe in all decades of the planning horizon. Due to the decentralized nature of County-Other WUGs and the reduced ability to create and enforce restrictions on outdoor residential landscape irrigation, the municipal drought management WMS was not identified as a potentially feasible strategy to meet needs. The yields of the conservation WMS were developed using methodology selected by the SCTRWPG, as they reflect realistic and achievable goals. Additional conservation and/or drought management WMSs were not recommended because it would be infeasible to develop aggressive conservation and drought management programs to meet all of the unmet needs for the County-Other WUG, as it is composed of primarily rural, dispersed, or small utilities.

Additional WMSs were not included in the 2026 SCTRWP for County-Other, Guadalupe because it may be cost-prohibitive to develop large-scale strategies that could resolve or meet unmet needs for County-Other due to its dispersed nature. Meeting public health, safety, and welfare needs during a repeat of the drought of record may include implementation of new or existing emergency interconnections with other water providers, annexation by water providers with supply surplus, or purchase of hauled water via trucked water systems.

Should small water providers or other entities provide new project information, the 2026 SCTRWP may be amended to address unmet municipal needs before adoption of the next IPP, anticipated to be in 2030.

6.3.4 County-Other, Hays

Hays County is located in the northern portion of the region. As discussed in Chapter 2 and Chapter 4, the municipal water demand projections and resulting needs in the northern portions of the region are projected to increase significantly over the planning horizon, especially along the IH-35 corridor. In particular, water demands for County-Other, Hays are projected to increase by 1,005% between 2030 and 2080.

County-Other WUGs are rural communities and water systems that fall below the municipal WUG thresholds (utilities less than 100 acft/yr annual retail sales or rural areas not served by a utility). All potentially feasible strategies were considered to meet the WUG's needs, including municipal water conservation (water use reduction), rainwater harvesting, and water purchase from another entity. All of the potentially feasible strategies were ultimately included as Recommended strategies in the 2026 SCTRWP; however, the volume of WMSs does not resolve the unmet needs beginning in 2060.

As discussed previously, municipal water conservation was included as a Recommended WMS for County-Other, Hays in all decades of the planning horizon. Due to the decentralized nature of County-Other WUGs and the reduced ability to create and enforce restrictions on outdoor residential landscape irrigation, the municipal drought management WMS was not identified as a potentially feasible strategy to meet needs. The yields of the conservation WMS were developed using methodology selected by the SCTRWPG, as they reflect realistic and achievable goals. Additional conservation and/or drought management WMSs were not recommended because it would be infeasible to develop aggressive conservation and drought management programs to meet all of the unmet needs for the County-Other WUG, as it is composed of primarily rural, dispersed, or small utilities.

Additional WMSs were not included in the 2026 SCTRWP for County-Other, Hays because remaining MAG availabilities from existing supply sources (Trinity Aquifer and Edwards-BFZ) are not sufficient to meet needs between 2060 and 2080. Based on discussions with the Hays Trinity Groundwater Conservation District, volumes of groundwater available for new or amended permits is extremely limited and expected to reach zero before 2036. Hays County is split between Region L and the Lower Colorado Region (Region K). Based on interregional coordination, the Region K portion of County-Other Hays will also demonstrate unmet needs in the 2026 Lower Colorado Regional Water Plan.

Furthermore, it may be cost-prohibitive to develop large-scale strategies that could resolve or meet unmet needs for County-Other because of its dispersed nature. Meeting public health, safety, and welfare needs during a repeat of the drought of record may include implementation of new or existing emergency interconnections with other water providers, annexation by water providers with supply surplus, or purchase of hauled water via trucked water systems.

Should small water providers or other entities provide new project information, the 2026 SCTRWP may be amended to address unmet municipal needs before adoption of the next IPP, anticipated to be in 2030.

Appendix 6A: TWDB Socioeconomic Impacts of Projected Water Shortages for the South Central Texas (Region L) Regional Water Planning Area

This appendix will be added at a later date. The TWDB anticipates release of this report in late Summer 2025, prior to Final Plan Adoption.

INITIALLY PREPARED PLAN

CHAPTER 7: DROUGHT RESPONSE INFORMATION, ACTIVITIES, AND RECOMMENDATIONS

South Central Texas Regional Water Plan

B&V PROJECT NO. 411170

PREPARED FOR

South Central Texas Regional Water Planning Group

3 MARCH 2025

BLACK & VEATCH

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%	Percent
acft/yr	Acre-Feet per Year
amsl	Above Mean Sea Level
BFZ	Balcones Fault Zone
cfs	Cubic Feet per Second
DCP	Drought Contingency Plan
DWDOR	Drought Worse than the Drought of Record
EAA	Edwards Aquifer Authority
El	Elevation
ft-msl	Feet Mean Sea Level
GBRA	Guadalupe-Blanco River Authority
GSA	Guadalupe-San Antonio
HSD	Hybrid Synthetic Drought
EAHCP	Edwards Aquifer Habitat Conservation Plan
NOAA	National Oceanic and Atmospheric Administration
PDSI	Palmer Drought Severity Index
Region L	South Central Texas Region
RWP	Regional Water Plan
RWPG	Regional Water Planning Group
SAWS	San Antonio Water System
SCTRWP	South Central Texas Regional Water Plan
SCTRWPA	South Central Texas Regional Water Planning Area
SCTRWPG	South Central Texas Regional Water Planning Group
SUD	Special Utility District
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks and Wildlife Department
TWC	Texas Water Code
TWDB	Texas Water Development Board
USGS	United States Geological Survey
VISPO	Voluntary Irrigation Suspension Program Option
WAM	Water Availability Model
WCID	Water Control and Improvement District
WMS	Water Management Strategy
WSC	Water Supply Corporation

WUG	Water User Group
WWP	Wholesale Water Provider

7.0 Drought Response Information, Activities, and Recommendations

Droughts are of great importance to the planning and management of water resources in Texas. Although droughts can occur in all climatic zones, they have the greatest potential to become environmental disasters in dry or arid regions like Texas. It is not uncommon for mild droughts to occur over short periods of time in Texas; however, there is no concrete way to predict how long or severe a drought will be while it is occurring. The only defense available to drought-prone water user groups (WUGs), such as those in the South Central Texas (Region L) Regional Water Planning Area (SCTRWPA), is proper planning and preparation for worst-case scenarios. This requires understanding of drought patterns and the historical droughts in the region.

Over the last several decades, demands for water have increased significantly and are expected to continue growing in the SCTRWPA (refer to Chapter 2). With growing demand and the threat of climate change contributing to water scarcity, planning is even more important to prevent shortages, deterioration of water quality, and lifestyle/financial impacts on water suppliers and users. This chapter presents information on drought preparedness in the SCTRWPA, including regional droughts of record, current drought preparations and response, existing and potential emergency interconnects, emergency responses to local drought conditions, region-specific drought response recommendations, drought water management strategies (WMSs), and other drought-related considerations and recommendations.

7.1 Droughts of Record in the Regional Water Planning Area

One of the best tools in drought preparedness is a thorough understanding of the drought of record, or the worst drought to occur for an area during the available period of record. However, there are many ways that the "worst drought" can be defined (degree of dryness, agricultural impacts, socioeconomic impacts, effects of precipitation, etc.). Regional water planning focuses on hydrological drought, which is typically the type of drought associated with the largest shortfalls in surface and/or subsurface water supply. The frequency and severity of hydrological drought is often defined on a watershed or river basin scale, although it could be different from one area to the next, even within a planning region.

7.1.1 Current Drought of Record

In terms of severity and duration, the devastating drought of the 1950s is considered the drought of record for most of the state, including the South Central Texas Region. By 1956, 244 of the 254 counties were considered disaster areas. This drought lasted almost a decade in many places and affected not only Texas but other states throughout the nation as well. The 1950s drought has been used by water resource engineers and managers as a benchmark drought for water supply planning since the regional water planning process was implemented.

For the Guadalupe-San Antonio (GSA) River Basin within the SCTRWPA, the drought of the 1950s remains the drought of record. In the upper portions of the GSA River Basin, the 1950s drought started in summer of 1947 and continued into early 1957. In the lower basin area near the Gulf Coast, the drought was a 3-year period between 1954 and 1956.

Until recently, the 1950s drought was the drought of record for the Nueces River Basin as well. However, the 1990s drought was severe and prolonged enough that it is now considered the drought of record for the Nueces River Basin within the SCTRWPA.

7.1.2 Potential Droughts of Record

Although the 1950s and 1990s droughts are considered the drought of record for the GSA River Basin and the Nueces River Basin, respectively, there have been several droughts that have been considered as potential droughts of records. Two recent droughts, in 2008 and 2011, have been discussed, but not widely accepted, as potential new droughts of record for parts of the state.

In 2011, decreased precipitation led to substantial declines in streamflow throughout the state, resulting in severe drought. Record high temperatures also occurred June through August, leading to increased evaporation rates. The net evaporation was so high that by August 4, 2011, state climatologist John Nielson-Gammon declared 2011 to be the worst one-year drought on record in Texas [1]. The 2011 water year statewide annual precipitation was 11.27 inches, more than 2 inches below the previous record in 1956 of 13.91 inches. While the 2011 water year drought was severe and can provide helpful information to water planners and managers throughout the state, the duration of the 1950s and 1990s droughts combined with the overall severity in the South Central Texas Region suggests that these are still the best choices as the drought of record for regional planning purposes for the GSA River Basin and the Nueces River Basin, respectively.

7.1.3 Drought Indicators

7.1.3.1 Water Availability Modeling

Engineers and planners often use surface water models to demonstrate the effects of historical droughts on water supply. Surface water effects are more readily observed than groundwater effects, and reservoir supplies that were not built before historic droughts can be assessed using historic hydrology. The primary tool used to observe the performance of reservoirs and surface water supplies under historic drought conditions in the SCTRWPA is the Texas Commission on Environmental Quality (TCEQ) water availability model (WAM). The TCEQ has developed WAMs for individual river and coastal basins. For the SCTRWPA, the relevant WAMs include the GSA River Basin WAM, Nueces River Basin WAM, Lavaca-Guadalupe Coastal Basin WAM, San Antonio-Nueces Coastal Basin WAM, and Nueces-Rio Grande Coastal Basin WAM.

The GSA WAM is used for the 2026 South Central Texas Regional Water Plan (SCTRWP) to determine the available flow and firm yields for surface water projects and to observe the cumulative effects on the SCTRWPA. The GSA WAM includes hydrologic information from 1934 through 1989 and supports the use of the 1950s drought as the drought of record for all reservoirs within the SCTRWPA. The Nueces WAM includes hydrologic information from 1934 through 1996 and supports the use of the 1990s drought as the drought of record for all reservoirs within the SCTRWPA. However, the GSA WAM and Nueces WAM have not been updated to include hydrology and precipitation information to assess periods of drought after 1989 and 1996, respectively.

7.1.3.2 Drought Indices

Several drought indices have been developed to assess drought severity using climatic and other quantitative inputs, such as precipitation, temperature, streamflow, soil moisture, and groundwater and reservoir levels. The Palmer Drought Severity Index (PDSI) was one of the first comprehensive efforts

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[1] Winters, K.E. A historical perspective on precipitation, drought severity, and streamflow in Texas during 1951–56 and 2011. U.S. Geological Survey Scientific Investigations Report 2013–5113, p.1 http://pubs.usgs.gov/sir/2013/5113. 2013.

using precipitation and temperature for estimating the moisture of a region [2]. Index values range from as low as -10 for severe drought and up to +10 indicating wetter-than-normal conditions. As of the time of writing, PDSI information is available from the National Oceanic and Atmospheric Administration (NOAA) for climate regions across the country through 2023, which makes the PDSI a helpful tool for analyzing droughts that are not included in the TCEQ WAMs.

Most of the South Central Texas Region lies in Texas Climate Divisions 7 and 9, with small portions contained within Climate Divisions 6 and 8 (Figure 7-1). A graph of yearly PDSI values for Texas Climate Divisions 6, 7, 8, and 9 shows that while the 1908 drought and more recent drought in the early 21st century were severe, the drought of the 1950s was the most intense over a longer period of time, supporting the continued use of this drought as the drought of record for Region L (Figure 7-2 through Figure 7-5).

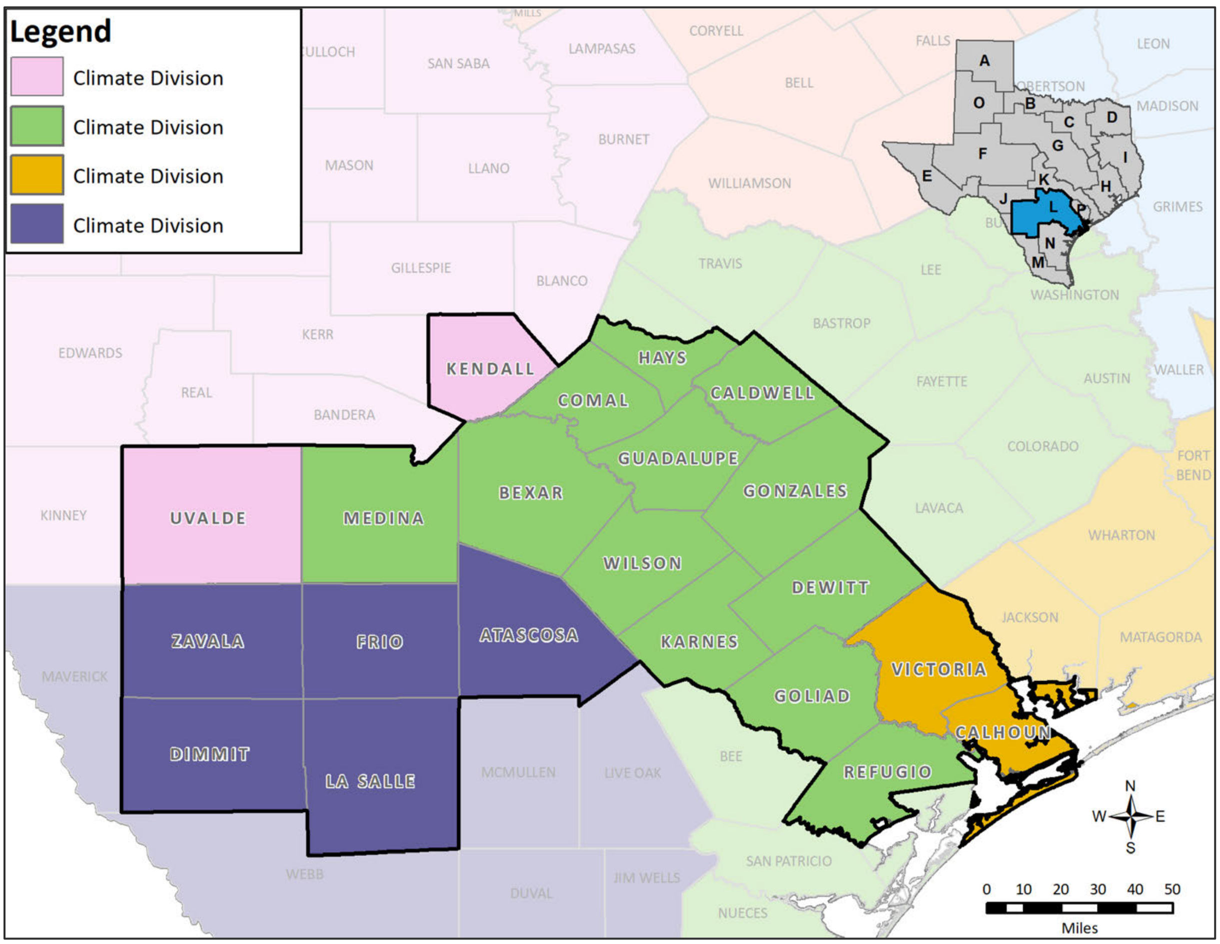

Figure 7-1 NOAA Climate Divisions in the South Central Texas Region

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[2] Historical Palmer Drought Indices, National Oceanic and Atmospheric Administration (NOAA). National Centers for Environmental Information. https://www.ncei.noaa.gov/access/monitoring/historical-palmers/overview

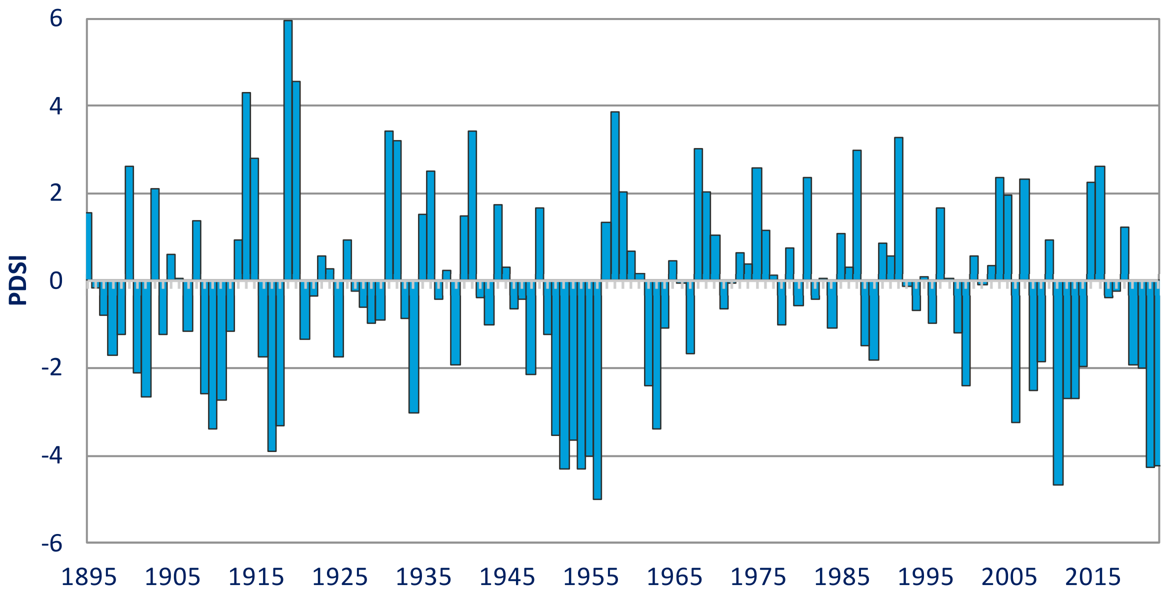

Figure 7-2 Palmer Drought Severity Index: Division 6

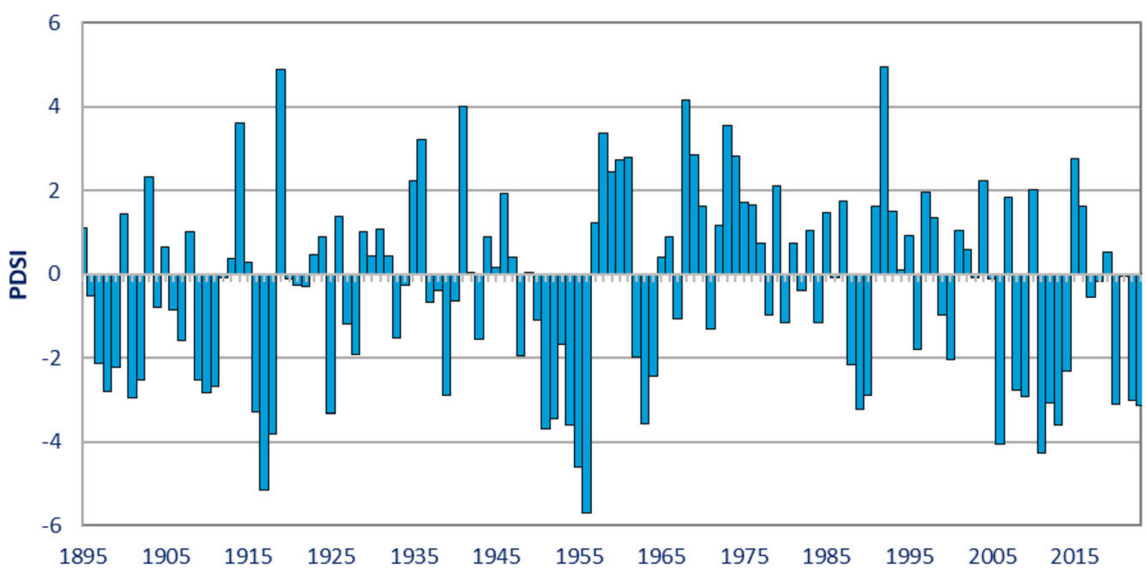

Figure 7-3 Palmer Drought Severity Index: Division 7

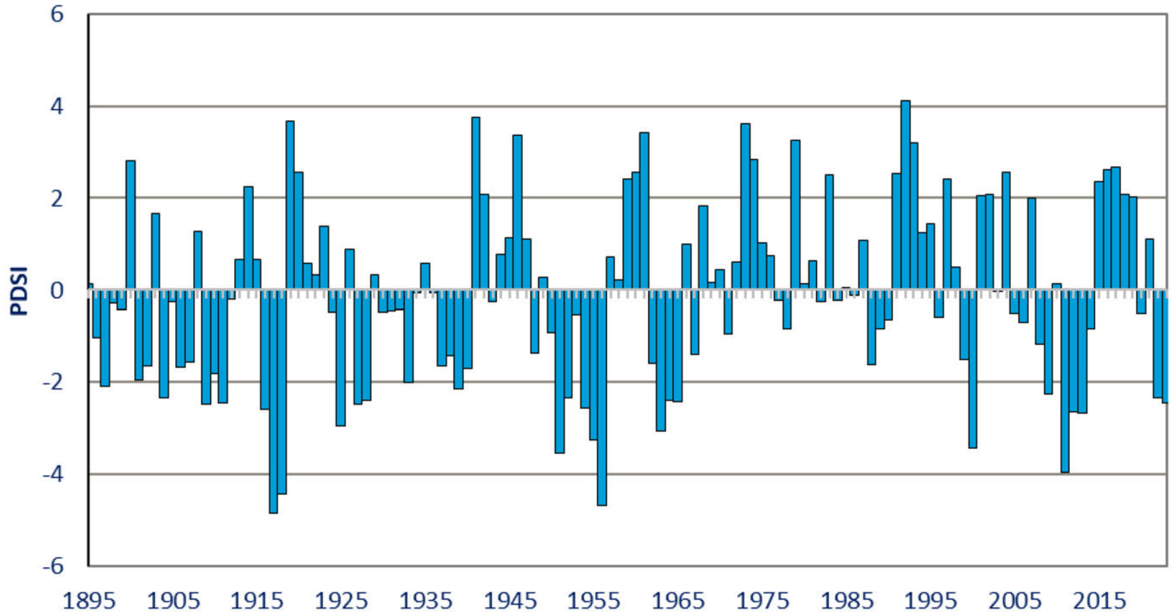

Figure 7-4 Palmer Drought Severity Index: Division 8

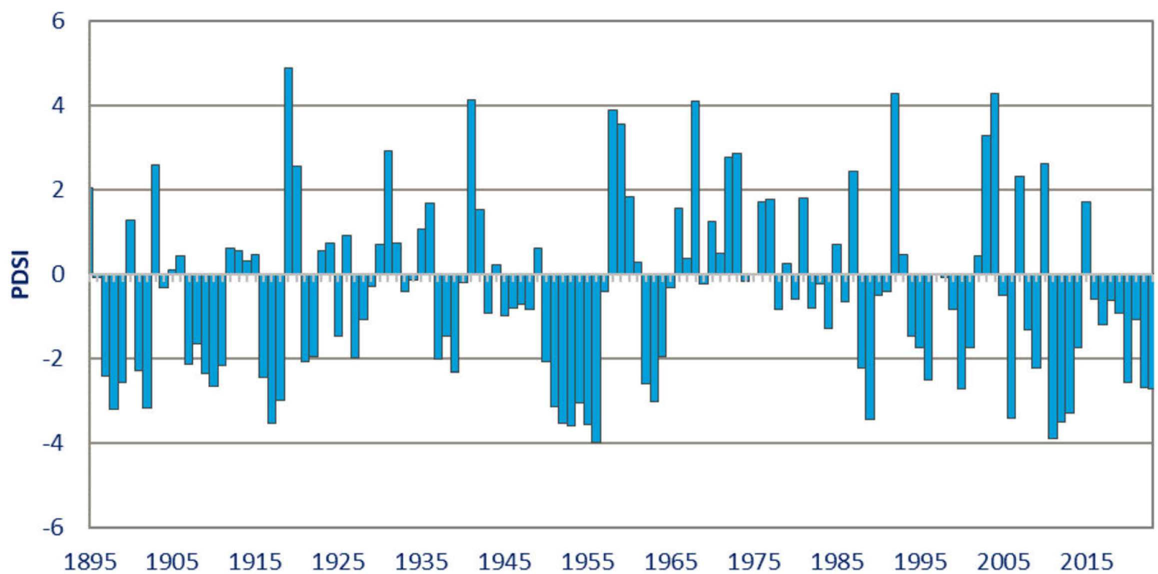

Figure 7-5 Palmer Drought Severity Index: Division 9

7.2 Uncertainty and Droughts Worse Than the Drought of Record

Regional Water Plans (RWPs) in Texas have historically considered and addressed water supply needs during a repeat of the drought of record. For the 6th cycle of regional water planning the Texas Water Development Board (TWDB) enables regional water planning groups (RWPGs) to choose to consider scenarios and/or qualitatively address uncertainty and a drought worse than the drought of record (DWDOR) in their region. For the 2026 RWPs, RWPGs must include a separate subsection that addresses planning for uncertainty and DWDOR. Specifically, the TWDB identified three items that must be addressed; the following sections describe the South Central Texas Regional Water Planning Group's (SCTRWPG) responses to each item.

7.2.1 Planning Factors Associated with Uncertainty

For the 2026 RWPs, the TWDB requires RWPs to include a summary of how the region incorporated planning for uncertainty in its RWP and the region's basis, or policy, for inclusion. This could include general discussion on planning factors, any drivers of uncertainty associated with those factors, and how the RWPG made planning decisions to acknowledge or address that uncertainty. If the RWP does not include any measures to address uncertainty, this subsection must include a statement to that effect.

The SCTRWPG incorporated planning for uncertainty and DWDOR by including data derived from water providers who used climate forecasting and variability tools to plan for DWDOR. For example, the 2026 SCTRWP includes data consistent with San Antonio Water System's (SAWS) 2024 Draft Water Management Plan, which applied a Hybrid Synthetic Drought (HSD) to estimate supplies, demands, and WMS firm yields. The HSD merged the drought of record conditions with the intensity of the 2011-2014 drought and is a reasonable approximation of climate-enhanced drought for the near-term since it already represents such an extreme condition.

The SCTRWPG recognizes that there is known, unquantified uncertainty associated with estimating population, water demands, hydrologic conditions, and WMS firm yields. On a region-wide basis, the SCTRWPG considered planning for uncertainty and DWDOR, such as incorporation of forecasting tools and climate models to evaluate supplies or application of a safety factor. However, the SCTRWPG chose not to plan for uncertainty or DWDOR on a regional scale at this time because forecasting tools have not been able to provide the resolution needed for water planning on a regional basis.

Instead, the SCTRWPG included a Legislative and Other Recommendation in Chapter 8 that recognizes that down-scaling of climate models is becoming more sophisticated, and the results are being considered in other planning efforts and models, such as WAMs. In Chapter 8, the SCTRWPG recommends that the:

1. Texas Legislature fund relevant studies and down-scaled regional models to incorporate available climate variability into the Regional Water Planning process; and
2. TWDB to reassess available climate models and consider incorporating them into Regional Water Planning.

7.2.2 Measures to Plan Beyond Meeting Needs During Drought of Record

For the 2026 RWPs, the TWDB requires RWPs to include a summary of the key assumptions, analyses, strategies, and projects that are already included in the 2026 RWP calculations and recommendations (if applicable) that go beyond just meeting identified water needs anticipated under a drought of record (i.e., those things that will provide some additional measure of protection to withstand a DWDOR such as use of safe-yield or inclusion of strategies that provide water volumes in excess of the identified water need, such as management supply factor, etc.).

The SCTRWPG considered incorporating planning measures that could address a DWDOR, such as a management supply (safety) factor to develop supplies in excess of projected needs. However, the SCTRWPG recognizes that supplies are understood best by the water suppliers and suggests that WUGs consider their demand projections, along with water supply volumes and reliability, to determine whether a safety factor or other planning measure would be appropriate to incorporate as a WUG-specific planning measure. Therefore, the SCTRWPG chose not to incorporate region-wide planning measures to address a DWDOR at this time.

7.2.3 Potential Measures and Responses Available During Droughts Worse Than the Drought of Record

For the 2026 RWPs, the TWDB requires RWPs to include a summary of the potential additional types of measures and responses that are not part of the recommendations in the 2026 RWP, but that would likely be available to certain water providers or users in the event of the near-term onset of a DWDOR.

In the event of a near-term onset of a DWDOR, WUGs and wholesale water providers (WWPs) within the SCTRWPA that do not have adequate management supplies could implement various measures and responses that would likely be available and capable of providing additional demand reductions or additional water supply capacities to withstand a DWDOR.

The following provides examples of demand management and water supply measures that WUGs or WWPs could implement during a DWDOR:

- Demand Management Measures:
  - For WUGs and WWPs that do not already have the Drought Management WMS included as a Recommended strategy in the SCTRWP: Implement Drought Management reductions associated with outdoor watering restrictions, conversion of irrigated crops to dry farming, or temporary suspension of water use.
  - For WUGs and WWPs with the Drought Management WMS included as a Recommended strategy in the SCTRWP: Implement additional drought management measures beyond those in the plan.
- Water Supply Measures:
  - Pursue new direct potable reuse to extend existing supplies.
  - Pursue a new groundwater well(s), given aquifer availability.
  - Pursue a new brackish groundwater well(s) with desalination, given aquifer availability.
  - Pursue a new plan to blend brackish groundwater with existing water supply without additional desalination.

- Implement efforts to mitigate water loss.
- Implement new or existing emergency interconnects with other water providers.
- Purchase hauled water via trucked water systems.

7.3 Current Drought Preparations and Response

7.3.1 Overall Current Drought Preparations in South Central Texas Region

All WUGs and WWPs in the South Central Texas Region prepare for drought by participating in the regional water planning process, which attempts to meet projected water demands during a drought of severity equivalent to the drought of record. WUGs and WWPs that provide accurate information to TWDB and consider recommendations accepted by the SCTRWPG should be able to supply water to customers throughout drought periods. In addition, all WWPs and most municipalities develop individual drought contingency plans (DCPs) or emergency action plans to be implemented at various stages of a drought. Common responses include restriction of irrigation practices to certain days and times, the limitation of vehicle washing to those times or to commercial providers, and prohibiting washing of impervious surfaces. Several DCPs include restrictions on irrigation for golf courses specifically, as well as other athletic fields. Less-common responses include surcharges for usage above a certain allotment.

Throughout Texas, including the GSA River Basin, water rights are issued under the prior appropriation system. Curtailment of water rights has become necessary in recent droughts. The South Texas Watermaster Program is responsible for managing surface water rights in an area in South Central Texas according to "run-of-the-river" rights. The program has jurisdiction over the GSA and Nueces River Basins, as well as the Lavaca River Basin. Six watermaster deputies patrol the fifty counties in the jurisdictional area and enforce compliance with water rights.

7.3.2 Drought Response Triggers and Actions

Through timely implementation of drought response measures, it is possible to meet the goals of a DCP by avoiding, minimizing, or mitigating risks and impacts of water shortages and drought. To accomplish this, DCPs are built around a collection of drought triggers and responses that are based on various drought stages. Generally, stages are similar for all DCPs but can vary from entity to entity. Stage I normally represents mild water shortage conditions, and the severity of the situation will increase through the stages until emergency water conditions are reached and, in some cases, a water allocation stage is determined.

The TWDB provided RWPGs a list of entities that submit DCPs in accordance with statutory requirements in Texas Water Code (TWC) §11.1272. The SCTRWPG gathered and reviewed DCPs from each WUG included in the TWDB's list to identify and describe the drought management measures for WWPs, WUGs, and County-Other suppliers. The SCTRWPG reviewed each DCP to consider the stage, trigger, and response information during development of the drought management WMS (refer to Section 5.2.3). The majority of DCPs in the SCTRWPA have a voluntary Stage I and mandatory Stage II and III categories. Most entities included a Stage IV, and a few entities specified a Stage V and/or Stage VI scenario. Target reductions, triggers, and responses are included for most stages. Drought management measures, represented by the drought triggers and responses in DCPs, are summarized for Region L entities in Appendix 7A.

In accordance with Title 31 of the Texas Administrative Code (TAC) §357.42(b)(2), the SCTRWPG considered whether there exist any unnecessary or counterproductive variations in drought response strategies. The SCTRWPG recognizes that each entity develops drought response measures and tailors them to their own unique circumstances and goals. In an effort to ensure that local water managers can continue to manage their local water supplies, the SCTRWPG chose to deem no variations in drought response strategies as unnecessary or counterproductive.

7.3.3 Regional Water Supplier Roles in Droughts

The TCEQ defines a DCP as "a strategy or combination of strategies for temporary supply and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies." The TCEQ requires all wholesale public water suppliers, retail public water suppliers serving 3,300 connections or more, and irrigation districts to submit DCPs. Public water suppliers serving fewer than 3,300 connections are required to have a DCP on file but are not required to submit it to TCEQ. In accordance with the requirements of 30 TAC §288(b), DCPs must be updated every five years and adopted by retail public water providers. According to a TCEQ handbook, the underlying philosophy of drought contingency planning includes the following:

- While often unpreventable, short-term water shortages and other water supply emergencies can be anticipated;
- The potential risks and impacts of drought or other emergency conditions can be considered and evaluated in advance of an actual event; and, most importantly; and
- Response measures and best management practices can be determined with implementation procedures defined, again in advance, to avoid, minimize, or mitigate the risks and impacts of drought-related shortages and other emergencies.

Model DCPs are available on TCEQ's website; however, it is not possible to create a model DCP that will adequately address local concerns throughout the State of Texas. The conditions that define a water shortage can be location-specific because most communities in the South Central Texas Region rely primarily on local water supplies. For example, some communities rely on reservoirs that are regularly operated at full conditions. In this case, a shortage could exist when the supplies are at 75 percent (%) capacity. Other reservoirs may rarely refill and be considered a concern at 25% capacity. Similarly, unique aquifer systems are considered at risk under location-specific conditions. While the approach to planning may be different among entities, all DCPs should include the following items:

- Specific, quantified targets for water use reductions;
- Drought response stages;
- Triggers to begin and end each stage;
- Supply management measures;
- Demand management measures;
- Descriptions of drought indicators;
- Notification procedures;
- Enforcement procedures;
- Procedures for granting exceptions;
- Public input to the plan;

- Ongoing public education;
- Adoption of plan; and
- Coordination with regional water planning group.

For water suppliers such as those in the SCTRWPA, the primary goal of DCP development is to have a plan that can ensure an uninterrupted supply of water in an amount that can satisfy essential human needs. A secondary but also important goal is to minimize negative impacts on quality of life, the economy, and the local environment. To meet these goals, action needs to be taken quickly, which is why an approved DCP needs to be in place before drought conditions occur.

In accordance with 30 TAC §288, most Region L entities have submitted DCPs to TCEQ for implementation when local shortages occur. May 1, 2024, was the most recent deadline for DCP submittals. The SCTRWPG obtained, reviewed, and considered DCPs for these WUGs and WWPs (Appendix 7A). These plans identify multiple triggers for initiation and termination of drought stages, responses to be implemented, and reduction targets for each stage. The plans also include information regarding public notification procedures and enforcement measures. Some WUGs or WWPs have included a method of granting a variance should the need arise.

7.4 Existing and Potential Emergency Interconnects

A goal of the regional planning process is to ensure a connected supply that meets or exceeds drought of record demands for the next 50 years. However, it is also important for regions to plan for emergency supplies in the event of a prolonged drought or an interruption/impairment of supply from an existing source. An emergency interconnection between two collaborating municipal water user groups (WUGs) can serve as an alternative means of providing emergency drinking water in lieu of trucking in supply or other expensive options. In accordance with 30 TAC §357 regional water planning guidelines, information was collected regarding existing emergency interconnections and potential future emergency interconnections that could be used in event of an emergency shortage of water.

High level information was collected regarding existing and potential emergency interconnections. In January 2020, a survey was emailed to WUGs in the SCTRWPA to request information regarding existing and future potential emergency interconnections. As part of the survey, where individual municipalities were asked to confirm or update interconnect information including the emergency water user and provider. Non-confidential information from the previous reports and surveys was compiled and used as the basis for information requests for the 2026 SCTRWP efforts.

In the South Central Texas Region, 51 existing emergency interconnections were identified among 39 WUGs, and seven potential emergency interconnects were identified. Of the 39 WUGs with existing interconnections, 30 WUGs had one interconnection, six WUGs had two interconnections, and three WUGs had three interconnections. Existing and potential emergency interconnection information for the SCTRWPA is summarized in Appendix 7B.

7.5 Drought Water Management Strategies

Regional water planning guidelines in 30 TAC §357.7(a)(7)(B) state, “Regional water plan development shall include an evaluation of all water management strategies the regional water planning group determines to be potentially feasible, including drought management measures including water demand management.” As defined here, drought management means the periodic activation of approved DCPs resulting in short-term demand reduction and/or rationing. This reduction in demand is then considered a "supply" source. Using this approach, an entity may make the conscious decision not to develop firm water supplies greater than or equal to projected water demands with the understanding that demands will have to be reduced or go unmet during times of drought. Using this rationale, an economic impact of not meeting projected water demands can be estimated and compared with the costs of other potentially feasible WMSs in terms of annual unit costs.

The methodology and results of this analysis for Municipal, Irrigation, and Livestock Drought Management WMSs can be found in more detail in Section 5.2.3.

7.5.1 Municipal Drought Management

The Municipal Drought Management WMS was applied to whole WUGs in all decades, regardless of split region, which exhibited municipal needs before the application of water management strategies in any decade in the planning horizon. For the 2026 planning cycle, the SCTRWPG selected 10% demand reduction for all applicable WUGs, unless otherwise specified. The volumetric yields of implementing the Municipal Drought Management WMS are summarized in Table 7-1, reported in acre-feet per year (acft/yr) [3].

The Municipal Drought Management WMS was included as a Recommended strategy for all municipal WUGs, except for County-Other WUGs. Due to the decentralized nature of County-Other WUGs and the reduced ability to create and enforce restrictions on outdoor residential landscape irrigation, the Municipal Drought Management WMS was not identified as a potentially feasible strategy to meet needs.

Table 7-1 Yield for the Municipal Drought Management WMS (acft/yr)

No.	Water User Group	County	2030	2040	2050	2060	2070	2080
1	Air Force Village II Inc	Bexar	8	8	8	8	8	8
2	Alamo Heights	Bexar	88	88	88	88	88	88
3	Aqua WSC [2]	Bexar	10	11	13	14	16	18
4	Atascosa Rural WSC	Bexar	100	117	132	145	159	176
5	Benton City WSC	Atascosa	158	176	192	202	213	225
6	Bexar County WCID 10	Bexar	71	80	88	95	103	113
7	Boerne	Kendall	213	293	396	516	653	810
8	C Willow Water	Wilson	7	8	8	9	10	11
9	Canyon Lake Water Service (Texas Water Company) [2]	Comal	827	1,131	1,323	1,448	1,916	2,432
10	Carrizo Hill WSC	Dimmit	3	4	4	5	6	9
11	Castroville	Medina	59	64	71	82	92	99
12	Cibolo	Guadalupe	207	252	301	353	413	482

[3] One acft is approximately 325,851 gallons.

No.	Water User Group	County	2030	2040	2050	2060	2070	2080
13	Clear Water Estates Water System	Comal	8	11	15	21	27	34
14	Converse	Bexar	284	285	285	285	285	285
15	County Line SUD	Hays	314	628	1,004	1,297	1,464	1,556
16	Creedmoor-Maha WSC [2]	Hays	112	202	292	381	472	563
17	Crystal Clear SUD	Hays	531	893	1,008	1,136	1,285	1,456
18	Cuero	DeWitt	76	76	76	75	75	75
19	East Central SUD	Guadalupe	472	535	592	644	702	767
20	East Medina County SUD	Medina	84	90	94	97	100	103
21	El Oso WSC [2]	Karnes	61	64	66	68	71	75
22	Elmendorf	Bexar	28	38	51	68	85	117
23	Fair Oaks Ranch	Bexar	74	88	95	98	99	99
24	Fayette WSC [2]	Bexar	0	0	1	1	1	1
25	Fort Sam Houston	Comal	47	47	47	47	47	47
26	Garden Ridge	Caldwell	211	261	311	368	436	517
27	Goforth SUD [2]	Gonzales	359	569	845	1,218	1,646	2,135
28	Gonzales	Comal	48	48	47	47	46	45
29	Green Valley SUD	Calhoun	380	508	652	805	980	1,179
30	Guadalupe-Blanco River Authority	Medina	91	127	123	119	115	110
31	Hondo	Karnes	59	57	55	56	56	56
32	Karnes City	Kendall	17	18	19	20	21	22
33	Kendall West Utility	Bexar	18	23	29	36	45	54
34	Kirby	Comal	63	71	72	72	72	72
35	KT Water Development	Hays	19	29	43	60	80	102
36	Kyle	Medina	542	809	1,102	1,235	1,279	1,312
37	La Coste	Bexar	11	11	11	11	11	12
38	Leon Valley	Bexar	142	172	172	172	172	172
39	Live Oak	Caldwell	85	85	85	85	85	85
40	Lockhart	Caldwell	141	153	166	179	192	205
41	Luling	Caldwell	38	38	39	41	42	44
42	Lytle	Atascosa	25	26	28	29	31	33
43	Martindale WSC	Caldwell	33	44	49	54	60	66

No.	Water User Group	County	2030	2040	2050	2060	2070	2080
44	Maxwell SUD	Caldwell	197	265	356	479	644	711
45	McCoy WSC [2]	Atascosa	73	77	81	85	90	96
46	Natalia	Medina	11	11	11	12	12	11
47	New Braunfels	Comal	1,529	2,177	3,004	4,010	5,161	12,958
48	Oak Hills WSC	Wilson	78	91	105	121	140	162
49	Pearsall	Frio	74	85	92	93	95	96
50	Picosa WSC	Wilson	23	27	30	34	37	41
51	Pleasanton	Atascosa	111	121	132	144	157	171
52	Port Lavaca	Calhoun	79	76	72	68	64	60
53	Runge	Karnes	11	11	12	13	14	14
54	S S WSC	Wilson	165	191	216	238	264	294
55	San Antonio Water System	Bexar	26,865	29,834	31,670	33,099	34,211	35,879
56	San Marcos	Hays	1,168	1,646	2,028	2,309	2,491	2,608
57	Schertz	Guadalupe	574	699	830	960	1,111	1,283
58	Seguin	Guadalupe	537	633	679	706	734	763
59	Selma	Bexar	108	131	153	173	197	224
60	Shavano Park	Bexar	73	83	91	99	108	118
61	South Buda WCID 1	Hays	47	77	116	168	229	298
62	Springs Hill WSC	Guadalupe	443	525	617	713	822	1,418
63	Texas State University	Hays	42	42	42	42	42	42
64	The Oaks WSC	Bexar	15	17	19	20	22	24
65	Universal City	Bexar	184	194	197	198	199	199
66	Uvalde	Uvalde	135	133	129	125	121	116
67	Victoria	Victoria	670	680	683	680	676	672
68	Victoria County WCID 1	Victoria	11	11	12	12	12	12
69	Ville Dalsace Water Supply	Medina	3	4	4	4	4	4
70	Water Services	Bexar	80	86	91	96	101	108
71	Wimberley WSC	Hays	44	64	91	126	167	214
72	Wingert Water Systems	Comal	14	16	18	19	19	19
73	Yancey WSC	Medina	54	57	59	61	63	65
All	**Total**	**All**	**39,542**	**46,302**	**51,738**	**56,697**	**61,766**	**74,550**

No.	Water User Group	County	2030	2040	2050	2060	2070	2080
[1] Based on 10% demand reduction (acft/yr) unless otherwise stated. [2] WUGs are split between Region L and other regions (Regions K, P, and/or N). Values in the table represent Region L portion of WUG's yield.								

7.5.2 Irrigation Drought Management

Irrigation Drought Management is a demand reduction strategy associated with irrigation-related, voluntary reductions of groundwater during severe drought conditions.

This strategy is recommended for irrigation WUGs demonstrating needs that do not fall under the Edwards Aquifer Authority's (EAA) jurisdiction, as the EAA implements water restrictions by curtailment of water from the Edwards-Balcones Fault Zone (BFZ) Aquifer. The EAA's Critical Period Management Plan helps sustain aquifer and spring flow levels during times of drought by temporarily reducing the authorized withdrawal amounts of EAA permit holders.

It is assumed that the growth of agriculture would be reduced based on water available, and during severe drought conditions, farmers that use groundwater would reduce their usage by 10%. The PDSI is a resource that could be used for determining triggers for drought management strategies. The volumes of water saved are shown in Table 7-2.

Table 7-2 Irrigation Drought Management WMS Yield (acft/yr)

Water User Group	2030	2040	2050	2060	2070	2080
Irrigation, Caldwell	34	34	34	34	34	34
Irrigation, Calhoun	1,046	1,046	1,046	1,046	1,046	1,046
Irrigation, Dimmit	189	189	189	189	189	189
Irrigation, Goliad	313	313	313	313	313	313
Irrigation, Guadalupe	28	28	28	28	28	28
Irrigation, Karnes	82	82	82	82	82	82
Irrigation, La Salle	394	394	394	394	394	394
Irrigation, Victoria	1,109	1,109	1,109	1,109	1,109	1,109
Irrigation, Wilson	1,223	1,223	1,223	1,223	1,223	1,223
Irrigation, Zavala	4,257	4,257	4,257	4,257	4,257	4,257
Total	**8,675**	**8,675**	**8,675**	**8,675**	**8,675**	**8,675**

7.5.3 Livestock Drought Management

The Livestock Drought Management WMS is recommended for only one Livestock WUG in Region L, which is Livestock – Hays County. The Texas Parks and Wildlife Department (TPWD) owns and operates the A.E. Wood State Fish Hatchery, which accounts for the majority of Livestock demands in Hays County, estimated at 2,432 acft/yr. During typical years, the hatchery relies on surface water from the Guadalupe River and recycled water from their facility. However, water availability modeling for the 2026 Plan indicates that the hatchery's Guadalupe Run-of-River water rights do not have a firm yield during a repeat of the drought of record. During periods of drought, the TPWD would rely on their recycled water or reuse supplies, which would provide 2,420 acft/yr, resulting in a need of 12 acft/yr. This recycled water supply would allow the hatchery to maintain broodstock that are critical to production; however, it will not enable the hatchery to sustain full operating capacity during severe drought.

7.6 Emergency Responses to Local Drought Conditions or Loss of Municipal Supply

The regional and state water plans aim to prepare entities for worst case drought scenarios using the drought of record described in Section 7.1. However, entities may experience significant local drought or loss of municipal supply. As described in Section 0, many DCPs identify responses to critical or emergency water shortages; however, it is less common for small municipalities or County-Other WUGs to have DCPs.

While rare, it is important to have a backup plan in case of infrastructure failure or water supply contamination. This is especially important for 1) entities that have historically reported having less than 180 days of available water supply to the TCEQ; 2) County-Other WUGs; or 3) small entities that rely on a sole source of supply.

The following entities reported having less than 180 days of available water supply to the TCEQ:

- Amber Creek Mobile Home Park (Comal County);
- Concan WSC (Uvalde County);
- Frio Cielo Ranch Association Water System (Uvalde County); and
- Windmill WSC (Uvalde County).

The SCTRWPG performed an evaluation in accordance with 31 TAC §357.42(g) to assess emergency response options for WUGs that reported having less than 180 days of available water supply to the TCEQ, all County-Other WUGs, and small WUGs with a 2020 historical population estimate less than 7,500 and a sole supply source. All “County-Other” WUGs were considered. Results of the evaluation are summarized in Table 7-3.

A broad range of emergency situations could result in the loss of reliable municipal supply, and it is not possible to plan one solution to meet any possible emergency; for that reason, a range of possible responses was selected for each entity according to source type and location.

Table 7-3 WUGs Identified for Emergency Drought Response Evaluation

Water User Group	2020 Population	Source	Type
3009 Water	1,166	Trinity Aquifer	Groundwater
Air Force Village II Inc	536	Edwards-BFZ Aquifer	Groundwater
Asherton	722	Carrizo-Wilcox Aquifer	Groundwater
Batesville WSC	877	Carrizo-Wilcox Aquifer	Groundwater
Bexar County WCID 10	5,410	Edwards-BFZ Aquifer	Groundwater

Water User Group	2020 Population	Source	Type
Big Wells	441	Carrizo-Wilcox Aquifer	Groundwater
C Willow Water	591	Carrizo-Wilcox Aquifer	Groundwater
Carrizo Hill WSC	584	Carrizo-Wilcox Aquifer	Groundwater
Carrizo Springs	4,756	Carrizo-Wilcox Aquifer	Groundwater
Castroville	3,002	Edwards-BFZ Aquifer	Groundwater
Charlotte	1,348	Carrizo-Wilcox Aquifer	Groundwater
Clear Water Estates Water System	638	Trinity Aquifer	Groundwater
Cotulla	3,477	Carrizo-Wilcox Aquifer	Groundwater
County-Other, Atascosa	2,776	Carrizo-Wilcox Aquifer Edwards-BFZ Aquifer Queen City Aquifer	Groundwater
County-Other, Bexar	4,789	Carrizo-Wilcox Aquifer Edwards-BFZ Aquifer Trinity Aquifer	Groundwater
County-Other, Caldwell	5,785	Carrizo-Wilcox Aquifer Queen City Aquifer	Groundwater
County-Other, Calhoun	2,486	Gulf Coast Aquifer System	Groundwater
County-Other, Comal	29,110	Canyon Lake/Reservoir Edwards-BFZ Aquifer Trinity Aquifer	Surface Water & Groundwater
County-Other, DeWitt	7,269	Gulf Coast Aquifer System	Groundwater
County-Other, Dimmit	2,112	Carrizo-Wilcox Aquifer	Groundwater
County-Other, Frio	5,618	Carrizo-Wilcox Aquifer	Groundwater
County-Other, Goliad	5,517	Gulf Coast Aquifer System	Groundwater
County-Other, Gonzales	2,427	Carrizo-Wilcox Aquifer	Groundwater
County-Other, Guadalupe	2,629	Canyon Lake/Reservoir Guadalupe Run-of-River Carrizo-Wilcox Aquifer Edwards-BFZ Aquifer	Surface Water & Groundwater
County-Other, Hays	49,207	Canyon Lake/Reservoir Highland Lakes Lake/Reservoir System Edwards-BFZ Aquifer Trinity Aquifer	Surface Water & Groundwater
County-Other, Karnes	2,000	Gulf Coast Aquifer System Yegua-Jackson Aquifer	Groundwater

Water User Group	2020 Population	Source	Type
County-Other, Kendall	19,221	Canyon Lake/Reservoir Edwards-Trinity-Plateau Aquifer Trinity Aquifer	Surface Water & Groundwater
County-Other, La Salle	2,181	Carrizo-Wilcox Aquifer	Groundwater
County-Other, Medina	8,079	Carrizo-Wilcox Aquifer Edwards-BFZ Aquifer Leona Gravel Aquifer Trinity Aquifer	Groundwater
County-Other, Refugio	2,801	Gulf Coast Aquifer System	Groundwater
County-Other, Uvalde	4,387	Buda Limestone Aquifer Edwards-BFZ Aquifer Leona Gravel Aquifer Trinity Aquifer	Groundwater
County-Other, Victoria	23,351	Gulf Coast Aquifer System	Groundwater
County-Other, Wilson	6,952	Carrizo-Wilcox Aquifer	Groundwater
County-Other, Zavala	1,177	Carrizo-Wilcox Aquifer	Groundwater
Crystal City	6,043	Carrizo-Wilcox Aquifer	Groundwater
Dilley	4,036	Carrizo-Wilcox Aquifer	Groundwater
Encinal WSC	1,006	Carrizo-Wilcox Aquifer	Groundwater
Falls City	451	Carrizo-Wilcox Aquifer	Groundwater
Floresville	5,564	Carrizo-Wilcox Aquifer	Groundwater
Goliad	1,495	Gulf Coast Aquifer System	Groundwater
Jourdanton	4,655	Carrizo-Wilcox Aquifer	Groundwater
Kendall West Utility	2,208	Trinity Aquifer	Groundwater
KT Water Development	1,580	Trinity Aquifer	Groundwater
La Coste	1,352	Edwards-BFZ Aquifer	Groundwater
Loma Alta Chula Vista Water System	330	Carrizo-Wilcox Aquifer	Groundwater
Luling	5,511	Carrizo-Wilcox Aquifer	Groundwater
Lytle	3,314	Edwards-BFZ Aquifer	Groundwater
Moore WSC	493	Carrizo-Wilcox Aquifer	Groundwater
Natalia	1,136	Edwards-BFZ Aquifer	Groundwater
Nixon	2,243	Carrizo-Wilcox Aquifer	Groundwater
Oak Hills WSC	5,219	Carrizo-Wilcox Aquifer	Groundwater

Water User Group	2020 Population	Source	Type
Picosa WSC	3,031	Carrizo-Wilcox Aquifer	Groundwater
Point Comfort	575	Texana Lake/Reservoir	Surface Water
Port Oconnor Improvement District	869	Gulf Coast Aquifer System	Groundwater
Poteet	3,034	Carrizo-Wilcox Aquifer	Groundwater
Poth	1,583	Carrizo-Wilcox Aquifer	Groundwater
Quail Creek MUD	1,265	Gulf Coast Aquifer System	Groundwater
Refugio	2,592	Gulf Coast Aquifer System	Groundwater
Runge	830	Gulf Coast Aquifer System	Groundwater
Sabinal	1,321	Edwards-BFZ Aquifer	Groundwater
Seadrift	936	Gulf Coast Aquifer System	Groundwater
Shavano Park	1,570	Edwards-BFZ Aquifer	Groundwater
Smiley	473	Carrizo-Wilcox Aquifer	Groundwater
South Buda WCID 1	2,200	Trinity Aquifer	Groundwater
Stockdale	1,452	Carrizo-Wilcox Aquifer	Groundwater
Sunko WSC	3,697	Carrizo-Wilcox Aquifer	Groundwater
Three Oaks WSC	1,302	Carrizo-Wilcox Aquifer	Groundwater
Tri Community WSC	1,346	Guadalupe Run-of-River	Surface Water
Victoria County WCID 1	1,762	Gulf Coast Aquifer System	Groundwater
Waelder	1,013	Queen City Aquifer	Groundwater
Water Services	5,277	Trinity Aquifer	Groundwater
West Medina WSC	1,005	Edwards-BFZ Aquifer	Groundwater
Wimberley WSC	3,544	Trinity Aquifer	Groundwater
Windmill WSC	1,655	Austin Chalk Aquifer	Groundwater
Wingert Water Systems	1,483	Trinity Aquifer	Groundwater
Woodsboro	1,348	Gulf Coast Aquifer System	Groundwater
Yorktown	1,837	Gulf Coast Aquifer System	Groundwater
Zavala County WCID 1	1,243	Carrizo-Wilcox Aquifer	Groundwater

7.6.1 Sole Source: Groundwater

Entities dependent on groundwater as a sole supply source are encouraged to actively monitor water levels in wells, especially in high-demand periods. Water levels can be used to trigger drought responses, and to guide expansion of wellfields or deepening of wells. Additionally, groundwater quality may be an indicator of decreasing availability from a well or well field. Potential emergency responses for entities that rely solely on groundwater are shown in Table 7-4.

Table 7-4 Emergency Water Shortage Responses for Groundwater Dependent WUGs

Emergency Shortage Cause	Responses
Insufficient Well Production	• Highest stage drought restrictions. • Deepen wells (if possible). • Interconnects with other systems (if possible). • Truck in water. • Long term: facility improvements, system evaluation, and phased improvement plan.
Water Treatment Plant Failure	• Highest stage drought restrictions. • Interconnects with other systems (if possible). • Truck in water. • Long term: facility improvements, system evaluation, and phased improvement plan.
Groundwater Quality	• Immediate testing. • Highest stage drought restrictions. • Additional emergency treatment (if possible). • Interconnects with other systems (if possible). • Truck in water. • Long term: supply or treatment facility improvements, system evaluation, and phased improvement plan.

7.6.2 Sole Source: Surface Water

Entities that are dependent solely on surface water are encouraged to consider expansion of alternate water supplies, including fresh and brackish groundwater, where available. Potential emergency responses for entities that rely solely on surface water are listed in Table 7-5.

Table 7-5 Emergency Water Shortage Responses for Surface Water Dependent WUGs

Emergency Shortage Cause	Responses
Insufficient Surface Water Rights	• Purchase additional surface water. • Coordinate short term contract/transfer with nearby entity. • Interconnect with other systems. • Truck in water. • Activate highest stage drought restrictions. • Long term: purchase/contract additional water rights, add storage, and add a groundwater source.

Emergency Shortage Cause	Responses
Water Treatment Plant Failure	• Interconnect with other systems. • Truck in water. • Activate highest stage drought restrictions. • Long term: facility improvements, system evaluation, and phased improvement plan.
Surface Water Contamination	• Perform immediate testing. • Pump and store safe water in any existing storage facilities. • Interconnect with systems that have alternate supplies. • Truck in water. • Initiate emergency communication with boil water notices or other guidance to customers. • Activate highest stage drought restrictions. • Long term: emergency response plan including communications, provision of safe water to critical facilities, etc.

7.7 Other Drought-Related Considerations and Recommendations

7.7.1 Monitoring and Assessment

The SCTRWPG recommends that all entities monitor state and local drought conditions to prepare and facilitate decisions. Several state and local agencies monitor and report on conditions with up-to-date information, including the following:

- SAWS Drought Restrictions: http://www.saws.org/conservation/droughtrestrictions/
- Guadalupe-Blanco River Authority (GBRA) Drought/Conservation: http://www.gbra.org/drought/default.aspx
- EAA Edwards Aquifer Conditions: http://www.edwardsaquifer.org
- TWDB Drought Information: http://waterdatafortexas.org/drought/
- TCEQ Drought Information: https://www.tceq.texas.gov/response/drought
- Palmer Drought Severity Index: http://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/
- Regional Planning Group Information: http://www.regionltexas.org/

7.7.2 Drought Preparedness Council Recommendations

The SCTRWPG supports the efforts of the Texas Drought Preparedness Council and recommends that entities review information developed by the council. The council was established by the legislature in 1999 and is composed of representatives from 16 state agencies, as well as appointees of the governor. The council is responsible for assessment and public reporting of drought monitoring and water supply conditions, advising the governor on significant drought conditions, recommending response plans for drought-related disasters, advising regional water planning groups on drought-related issues in the regional water plans, coordinating local, state, and federal drought-response planning, and submitting a report to the legislature every odd numbered year.

The Drought Preparedness Council provided a letter to the SCTRWPG on February 8, 2024, which included three recommendations (See Appendix 7C). The following summarizes those recommendations and the SCTRWPG's response to each.

1. **Planning for DWDOR.**
   a. Drought Preparedness Council Recommendation No. 1:
   The regional water plans and state water plan shall serve as water supply plans under drought of record conditions. The DPC encourages regional water planning groups to consider planning for drought conditions worse than the drought of record, including scenarios that reflect greater rainfall deficits and/or higher surface temperatures.
   b. SCTRWPG Response to Recommendation No. 1:
   As described in Section 0, the SCTRWPG considered planning for a DWDOR for the 2026 SCTRWP. However, the SCTRWPG chose not to incorporate it at this time because forecasting tools have not been able to provide the resolution needed for water planning on a regional basis.

   Instead, the SCTRWPG included a Legislative and Other Recommendation in Chapter 8 that recognizes that down-scaling of climate models is becoming more sophisticated, and the results are being considered in other planning efforts and models, such as WAMs. In Chapter 8, the SCTRWPG recommends that:
   1) the Texas Legislature fund relevant studies and down-scaled regional models to incorporate available climate variability into the Regional Water Planning process; and
   2) the TWDB to reassess available climate models and consider incorporating them into Regional Water Planning.

2. **Incorporating Projected Future Reservoir Evaporation Rates in Water Availability Assessments.**
   a. Drought Preparedness Council Recommendation No. 2:
   The Drought Preparedness Council encourages regional water planning groups to incorporate projected future reservoir evaporation rates in their assessments of future surface water availability.
   b. SCTRWPG Response to Recommendation No. 2:
   Historical reservoir evaporation rates are incorporated into the WAMs used by the SCTRWPG to estimate surface water availability for the 2026 SCTRWP. However, incorporation of projected future reservoir evaporation rates would require development of climate models. The SCTRWPG considered incorporation of climate models but chose not to incorporate them for the 2026 SCTRWP because forecasting tools have not been able to provide the resolution needed for water planning on a regional basis.

   As described previously, the SCTRWPG understands that incorporation of down scaled climate models is being considered for inclusion in WAMs, which would incorporate projected future reservoir evaporation rates. In Chapter 8, the SCTRWPG recommends incorporating these models into Regional Water Planning efforts.

3. Evaluating Alternative, Emergency Water Supplies for Entities That Reported Having Less Than 180 Days of Water Supply to the TCEQ.

a. Drought Preparedness Council Recommendation No. 3:
The Drought Preparedness Council encourages regional water planning groups to identify in their plans utilities within their boundaries that reported having less than 180 days of available water supply to the TCEQ during the current or preceding planning cycle. For systems that appeared on the 180-day list, RWPGs should perform the evaluation required by 31 TAC §357.42(g), if it has not already been completed for that system.

b. SCTRWPG Response to Recommendation No. 3:
In Section 7.6, the SCTRWPG identified entities that reported having less than 180 days of available water supply to the TCEQ. For these systems and other vulnerable entities, the SCTRWPG performed an evaluation to identify potential alternative water sources for temporary emergency use by WUGs and WWPs in the event of water supplies becoming temporarily unavailable.

7.8 Region-Specific Drought Response Recommendations and Model Drought Contingency Plans

The SCTRWPG acknowledges that DCPs are a useful drought management tool for entities with both surface and groundwater sources and recommends that all entities consider adopting a DCP in preparation for drought conditions. The SCTRWPG also recommends that, in accordance with TCEQ guidelines, entities update their DCPs every five years because triggers can change as wholesale and retail water providers reassess their contracts and supplies.

7.8.1 Recommended Surface Water Triggers and Responses

Surface water accounts for approximately 19% of 2030 existing municipal supplies in the SCTRWPA. With such a variety of supply sources, it is difficult to create a set of triggers and responses that will fit the needs of all WUGs in the regional water planning area. The SCTRWPG recognizes that supplies are understood best by the operators and suggests that WUGs review DCPs that their water providers have adopted.

For entities without DCPs supplying themselves with local surface water, the SCTRWPG suggests reviewing the drought responses and recommendations used by similar entities in the region. An example of triggers and responses from the DCP for GBRA is presented in Table 7-6. GBRA was selected as a representative example because it provides water to several entities throughout the SCTRWPA and relies on various types of surface water. The GBRA DCP includes five water stages ranging from "Mild Water Shortage" to "Emergency Water Shortage." The triggers depend on parameters such as storage levels, reservoir elevations, and system failures. The responses include categories ranging from home irrigation limits to pool and fountain restrictions.

Table 7-6 Surface Water Drought Contingency Plan for GBRA

Drought Stage	Water Type	Trigger	Response
Stage 1 – Mild Water Shortage	Canyon Reservoir	Reservoir less than or equal to Elevation (El) 895 feet mean sea level (ft-msl)	• Achieve voluntary 5% reduction in comparison to the average monthly usage of contracted water for that time period of the calendar year
	Luling Water Right	Flow at United States Geological Survey (USGS) 08172000 drops below 130 cubic feet per second (cfs)	• Achieve voluntary 5% reduction in comparison to the average monthly usage of contracted water for that time period of the calendar year
	Lower Basin Water Right	When combined average daily flow at the USGS Guadalupe River at Victoria Gauging Station #08176500 and USGS San Antonio River at Goliad Gauging #08188500 drops below 400 cfs.	• Achieve voluntary reduction of 5% in comparison to their average monthly usage of contracted water for that time period of the calendar year
Stage 2 – Moderate Water Shortage	Canyon Reservoir	Reservoir less than or equal to El 890 ft-msl	• Achieve voluntary 10% reduction in comparison to the average monthly usage of contracted water for that time period of the calendar year
	Luling Water Right	Flow at USGS 08172000 drops below 80 cfs	• Achieve voluntary 10% reduction in comparison to the average monthly usage of contracted water for that time period of the calendar year
	Lower Basin Water Right	When combined average daily flow at the USGS Guadalupe River at Victoria Gauging Station #08176500 and USGS San Antonio River at Goliad Gauging #08188500 drops below 250 cfs.	• Achieve voluntary reduction of 10% in comparison to their average monthly usage of contracted water for that time period of the calendar year
Stage 3 – Severe Water Shortage	Canyon Reservoir	Reservoir less than or equal to El 885 ft-msl	• Achieve voluntary 15% reduction in comparison to the average monthly usage of contracted water for that time period of the calendar year
	Luling Water Right	Flow at USGS 08172000 drops below 40 cfs	• Initiate allocation of water supplies on a pro rata basis in accordance with TWC §11.039; 15% curtailment percentage.
	Lower Basin Water Right	When combined average daily flow at the USGS Guadalupe River at Victoria Gauging Station #08176500 and USGS San Antonio River at Goliad Gauging #08188500 drops below 150 cfs.	• Initiate allocation of water supplies on a pro rata basis in accordance with TWC §11.039. The curtailment percentage in effect will be 15% • Suspend water deliveries to agricultural users with contracts for interruptible water

Drought Stage	Water Type	Trigger	Response
Stage 4 – Critical Water Shortage	Canyon Reservoir	Reservoir less than or equal to El 880 ft-msl	• Initiate allocation of water supplies on a pro rata basis in accordance with TWC §11.039; 15% curtailment percentage.
	Luling Water Right	• Loss of capability to provide water service • Contamination of supply source • GBRA determines water levels are reduced to a condition that could lead to loss of service with 180 days or less	• Initiate allocation of water supplies on a pro rata basis in accordance with TWC §11.039; GBRA Board to establish curtailment percentage. • Assess severity of problem and identify actions needed and time require to solve problem • Inform utility direction of each wholesale water customer and suggest actions • Notify city, county, and/or state emergency response officials • Complete repairs and/or clean-up
	Lower Basin Water Right	• Loss of capability to provide water service • Contamination of supply source • GBRA determines water levels are reduced to a condition that could lead to loss of service with 180 days or less	• Initiate allocation of water supplies on a pro rata basis in accordance with TWC §11.039; GBRA Board to establish curtailment percentage • Assess severity of problem and identify actions needed and time require to solve problem • Inform utility direction of each wholesale water customer and suggest actions • Notify city, county, and/or state emergency response officials • Complete repairs and/or clean-up
Stage 5 – Emergency Water Shortage	Canyon Reservoir	Reservoir less than or equal to El 865 ft-msl	• Initiate allocation of water supplies on a pro rata basis in accordance with TWC §11.039; 30% curtailment percentage
	Lower Basin Water Right	• Loss of capability to provide water service • Contamination of supply source • May occur at any time and is not dependent on being preceded by Stages 1 through 4	• Achieve voluntary reduction of 50% in total domestic water usage during each month of this stage • General Manager convenes emergency session to consider emergency rules or responses

Drought Stage	Water Type	Trigger	Response
Stage 6 – Emergency Water Shortage	Canyon Reservoir	• Loss of capability to provide water service • Contamination of supply source • GBRA determines water levels are reduced to a condition that could lead to loss of service with 180 days or less	• Initiate allocation of water supplies on a pro rata basis in accordance with TWC §11.039; GBRA Board to establish curtailment percentage. • Assess severity of problem and identify actions needed and time require to solve problem • Inform utility direction of each wholesale water customer and suggest actions • Notify city, county, and/or state emergency response officials • Complete repairs and/or clean-up

7.8.2 Recommended Groundwater Triggers and Responses

Entities in the SCTRWPA utilize both brackish and non-brackish wells in four major formations. With such a variety of supply sources, it is difficult to create a set of triggers and responses that will fit the needs of each WUG in the regional water planning area. The SCTRWPG recognizes that supplies are understood best by the operators and suggests that WUGs review DCPs that their water providers have adopted.

For entities without DCPs supplying themselves with local groundwater, the SCTRWPG suggests reviewing the drought responses and recommendations used by similar entities in the region. An example of triggers and responses from the DCP for SAWS is presented in Table 7-7. SAWS was selected as a representative example because it is the largest provider of groundwater in the SCTRWPA. The DCP includes four water stages. The triggers depend on parameters such as supply and well levels. The responses include categories ranging from residential irrigation limits to commercial and irrigation use reductions.

Table 7-7 Groundwater Drought Contingency Plan for SAWS

Drought Stage	Trigger	Response
Stage 1	Edwards Aquifer (Well J-17) 10 day rolling average level falls to 660 ft-msl	• No water waste • Lawn watering is limited to 1 day per week at restricted times unless by handheld device • Residential fountains and indoor commercial fountains may operate at any stage of drought; outdoor commercial fountains must have a variance in order to operate • No person may wash an impervious outdoor ground covering • Golf courses, parks, and fields must submit conservation plans and follow irrigation schedule • Use of recycled water. With no potable water backup for irrigation is allowed-without waste-any day. If the customer has posted proper approved signage • Vehicles may only be washed at commercial locations or once per week on Saturday or Sunday with no water waste
Stage 2	Edwards Aquifer (Well J-17) 10 day rolling average level falls to 650 ft-msl	• All Stage 1 responses • Irrigation system, sprinkler, or soaker hose watering limited to 1 day per week at further restricted times unless by handheld device • Drip irrigation and handheld device watering allowed any day at restricted times
Stage 3	Stage 3 water use reduction measures may be implemented when Edwards Aquifer (Well J-17) 10 day rolling average level falls to 640 ft-msl	• All Stages 1 and 2 responses • A surcharge is assessed on all accounts used or assumed to be used for landscape irrigation
Stage 4	Stage 4 water use reduction measures may be implemented when the Edwards Aquifer (Well J-17) drops to 630 ft-msl and/or if the total supply of water from the Edwards Aquifer and other sources is projected to be insufficient to meet customer demand. Stage 4 restrictions may be declared at the discretion of the City Manager.	• All Stages 1, 2, and 3 responses • A surcharge is assessed on all accounts used or assumed to be used for landscape irrigation • Drip irrigation allowed once a week, following restricted schedule • Additional restrictions may be established at the discretion of the President/CEO of SAWS, in consultation with the City Manager

7.8.3 Recommended Triggers and Responses for Irrigation and Steam-Electric Uses

As mentioned previously, it is difficult to create a set of drought triggers and responses that will fit the needs of all WUGs in the regional planning area. For entities supplying significant amounts of water to customers for irrigation and steam-electric uses, the SCTRWPG suggests reviewing the drought responses and recommendations used by similar entities in the region.

Examples of triggers and responses from the EAA Critical Period/Drought Management Plan for the Uvalde Pool and the San Antonio Pool are presented in Figure 7-6 and Figure 7-7. EAA was selected as a representative example because their Critical Period Management Plan applies to municipal, industrial, and irrigation users that are authorized to withdraw more than 3 acre-feet. The Critical Period Management Plan includes five critical period water stages for the Uvalde Pool (Uvalde County) and the San Antonio Pool (Atascosa, Bexar, Caldwell, Comal, Guadalupe, Hays, and Medina Counties). The triggers depend on 10-day average spring flow (as cfs) and index well levels (as above mean sea level [amsl]), and the responses are stepwise, mandatory withdrawal reductions.

Critical Period Stage	J-27 Index Well Level above mean sea level (amsl)	% of Water Reduction
No Stage indicates stable levels	850 feet or above	0%
Stage 1	N/A	0%
Stage 2	Less than 850 feet	5%
Stage 3	Less than 845 feet	20%
Stage 4	Less than 842 feet	35%
Stage 5	Less than 840 feet	44%

Figure 7-6 EAA Critical Period Management Plan for the Uvalde Pool

For irrigation uses, the SCTRWPG also suggests review of the Voluntary Irrigation Suspension Program Option (VISPO) of the Edwards Aquifer Habitat Conservation Plan (EAHCP). VISPO is available for irrigation users who wish to help protect spring flow for federally listed threatened and endangered species that rely heavily on the Comal and San Marcos Springs. The enrollment term is for a period of five years. VISPO compensates enrolled irrigation permit holders for enrollment and also pays an additional suspension rate in years when irrigation suspension is required due to index well levels. VISPO is triggered when the J-17 index well in Bexar County is at or below 635 feet on October 1; the response is for enrolled permit holders to suspend irrigation for the following calendar year. If VISPO is not triggered, then the permit holder may use or lease enrolled water permits during the non-suspension years. More information regarding the EAHCP VISPO can be found on the EAA website: https://www.edwardsaquifer.org/.

Critical Period Stage	J-17 Index Well Level above mean sea level (amsl)	San Marcos Springs Flow cubic feet per second (cfs)	Comal Springs Flow cubic feet per second (cfs)	% of Water Reduction
No Stage indicates stable levels	660 feet or above	96 or above	225 or above	0%
Stage 1	less than 660 feet	less than 96	less than 225	20%
Stage 2	Less that 650 feet	less than 80	Less than 200	30%
Stage 3	Less than 640 feet	Not Applicable	Less than 150	35%
Stage 4	Less than 630 feet	Not Applicable	Less than 100	40%
Stage 5	Less than 625 feet	Not Applicable	Less than 45/40*	44%

*Stage 5 Comal Springs Flow - to enter this stage based on the springflow, the reading must be less than 45 cfs on a ten-day rolling average, or less than 40 cfs based on a three-day rolling average. To leave this stage, the ten-day rolling average must be 45 cfs or greater.

Figure 7-7 EAA Critical Period Management Plan for the San Antonio Pool

7.8.4 Model Drought Contingency Plans

The TCEQ has prepared model DCPs for wholesale and retail water suppliers to provide guidance and suggestions to entities regarding the preparation of DCPs. Not all items in the model will apply to every system's situation, but the overall model can be used as a starting point for most entities. The SCTRWPG suggests that the TCEQ model DCPs be used in conjunction with drought contingency measures such as those described in Sections 7.8.1, 7.8.2, and 0 for entities wishing to develop a new DCP. The TCEQ model DCPs can be found on TCEQ's website: https://www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/contingency.html

Appendix 7A: Summary of Drought Response Measures

Appendix 7A: Summary of Drought Response Measures

Entity Name	DCP Date	Stage Number	Triggers										Responses										Water Supply		
			WWP	Demand/Capacity Based	Failure/Contamination	Groundwater Level	Season	Reservoir Level	Supply-Based	Well Pumping Time/Flow	Storage Tank Recovery Time	Other	Assessment and Identification	Water Rate Change or Surcharge	Irrigation Schedule	Mandatory Reduction	Notification of Public Agencies or Specific Users	Prohibited Use	Discontinue Water Diversions	Potential Suspend Service	Water Allocation	Others	Surface Water	Ground Water	Water Source
Aqua WSC	2024	1		•											•		•							•	Carrizo-Wilcox Aquifer
		2		•	•				•						•		•	•							
		3		•	•				•	•		•					•	•							
		4			•							•	•	•		•	•	•		•		•			
Atascosa Rural WSC	2024	1							•	•					•		•							•	Edwards-BFZ Aquifer
		2				•			•	•					•	•	•	•							
		3				•			•	•					•	•	•	•							
		4				•			•	•						•	•	•							
Benton City WSC	2024	1					•								•		•					•		•	Carrizo-Wilcox Aquifer
		2		•											•	•	•	•				•			
		3		•					•		•				•	•	•	•				•			
		4		•	•											•	•	•				•			
		5		•	•											•	•	•							
Bexar Medina Atascosa Counties WCID	2024	1						•									•						•		Medina Lake/Reservoir
		2						•					•				•								
		3						•									•		•		•	•			
		4						•					•				•		•	•	•				
City of Boerne	2022	1			•				•		•	•			•	•	•	•				•	•	•	Boerne City Lake, Trinity Aquifer, Canyon Reservoir
		2			•				•		•	•			•	•	•	•				•			
		3			•				•		•	•			•	•	•	•				•			
		4			•				•		•	•		•	•	•	•	•				•			
Canyon Lake WSC (Texas Water Company)	2024	1		•				•		•		•			•		•					•	•	•	Canyon Lake/Reservoir; Trinity Aquifer
		2		•				•		•		•			•	•	•		•			•			
		3		•				•		•	•	•	•		•	•	•	•	•		•	•			
		4		•				•		•	•	•	•	•	•	•	•	•	•		•	•			
		5						•				•	•	•	•	•	•	•	•		•	•			
		Emergency			•			•			•	•	•	•	•	•	•	•	•		•	•			
Canyon Regional Water Authority	2024	1						•									•						•	•	Carrizo-Wilcox Aquifer, Canyon Lake/Reservoir, Guadalupe River
		2						•									•								
		3						•									•								
		4						•						•	•	•	•			•	•				
		5						•						•	•	•	•			•	•				
		6			•			•				•	•	•	•	•	•			•	•				
Chaparral Water System, Hays (Aqua Texas)	2024	Voluntary Conservation	•												•		•					•		•	Carrizo-Wilcox Aquifer
		1	•	•		•			•	•	•				•		•			•	•				
		2	•	•		•			•	•	•				•		•			•	•				
		3	•	•		•			•	•	•			•	•	•	•			•	•				
		4	•	•		•			•	•	•			•	•	•	•	•		•	•				

Entity Name	DCP Date	Stage Number	Triggers										Responses										Water Supply		
			WWP	Demand/Capacity Based	Failure/Contamination	Groundwater Level	Season	Reservoir Level	Supply-Based	Well Pumping Time/Flow	Storage Tank Recovery Time	Other	Assessment and Identification	Water Rate Change or Surcharge	Irrigation Schedule	Mandatory Reduction	Notification of Public Agencies or Specific Users	Prohibited Use	Discontinue Water Diversions	Potential Suspend Service	Water Allocation	Others	Surface Water	Ground Water	Water Source
City of Cibolo	2024	1	●					●	●						●	●	●					●	●	●	Edwards-BFZ Aquifer, Carrizo-Wilcox Aquifer, Canyon Lake/Reservoir
		2	●					●	●						●	●	●					●			
		3	●					●	●						●	●	●					●			
		4	●					●	●			●	●		●	●	●					●			
		5	●					●	●						●	●	●	●				●			
		6	●	●	●								●		●	●	●								
City of Converse	2015	1	●			●				●			●	●	●	●		●				●		●	Carrizo-Wilcox Aquifer, Edwards-BFZ Aquifer
		2	●			●				●			●	●	●	●		●				●			
		3	●			●				●			●	●	●	●		●				●			
		4	●			●				●			●	●	●	●		●				●			
		5	●			●				●			●	●	●	●		●				●			
		Failure/Emergency			●							●					●					●			
Crystal Clear SUD	2024	1						●		●					●		●					●	●	●	Carrizo-Wilcox Aquifer, Edwards-BFZ Aquifer, Canyon Lake/Reservoir
		2						●		●					●		●	●							
		3						●		●					●		●	●							
		4						●		●					●		●	●							
		5						●		●					●		●	●							
		6	●		●											●	●			●	●				
County Line Special Utilities District	2024	1	●							●	●				●								●	●	Canyon Lake/Reservoir, Carrizo-Wilcox Aquifer, Edwards-BFZ Aquifer
		2	●							●	●				●			●							
		3	●							●	●				●			●							
		4	●							●	●				●			●			●				
		5			●										●			●				●			
East Central SUD	2024	1	●									●	●		●		●					●	●	●	Caririzo-Wilcox Aquifer, Edwards-BFZ Aquifer, Trinity Aquifer, Canyon Lake/Reservoir
		2	●	●	●						●	●	●		●	●	●	●				●			
		3	●	●		●		●			●	●	●		●	●	●	●				●			
		4	●		●							●	●		●	●	●	●				●			
		5	●		●							●	●		●	●	●	●			●	●			
Goforth Special Utility District	2023	Conservation Period					●										●						●	●	Canyon Lake/Reservoir, Carrizo-Wilcox Aquifer, Trinity Aquifer, Edwards-BFZ Aquifer
		1	●	●					●				●		●		●	●							
		2	●	●					●		●		●		●	●	●	●							
		3	●	●					●		●		●		●	●	●	●							
		4	●	●	●								●		●	●	●	●			●				

Entity Name	DCP Date	Stage Number	Triggers										Responses										Water Supply		
			WWP	Demand/Capacity Based	Failure/Contamination	Groundwater Level	Season	Reservoir Level	Supply-Based	Well Pumping Time/Flow	Storage Tank Recovery Time	Other	Assessment and Identification	Water Rate Change or Surcharge	Irrigation Schedule	Mandatory Reduction	Notification of Public Agencies or Specific Users	Prohibited Use	Discontinue Water Diversions	Potential Suspend Service	Water Allocation	Others	Surface Water	Ground Water	Water Source
City of Gonzales	2024	1				•									•		•					•	•	•	Carrizo-Wilcox Aquifer, Guadalupe Run-of-River
		2				•									•		•	•				•			
		3				•									•	•	•	•			•	•			
		4				•									•	•	•	•			•	•			
		5			•											•	•	•			•	•			
Guadalupe Blanco River Authority	2024	1						•		•			•	•		•	•						•	•	Canyon Lake/Reservoir, Guadalupe Run-Of-River, Carrizo-Wilcox Aquifer
		2						•		•			•	•		•	•								
		3						•		•			•	•		•	•			•	•				
		4			•			•					•	•		•	•				•				
		5						•					•	•		•	•				•				
		6			•			•					•	•	•	•	•	•	•		•	•			
Green Valley SUD	2023	1	•										•		•		•						•	•	Trinity Aquifer, Carrizo-Wilcox Aquifer, Canyon Lake/Reservoir, Edwards-BFZ Aquifer
		2	•	•	•				•		•		•		•	•	•	•							
		3	•	•					•				•		•	•	•	•							
		4	•		•											•	•	•		•	•				
Kendall West Utility	2024	1		•				•		•		•			•		•	•						•	Trinity Aquifer
		2		•				•		•		•			•		•	•							
		3		•				•	•	•	•	•			•		•	•							
		4		•				•	•	•	•	•			•		•	•	•		•				
		5						•							•		•	•	•		•				
		Emergency	•		•						•				•		•	•	•		•				
City of Kyle	2024	1			•		•		•						•		•						•	•	Carrizo-Wilcox Aquifer, Canyon Lake/Reservoir, Edwards-BFZ Aquifer,
		2			•				•						•		•	•							
		3			•				•						•		•	•		•					
City of Lockhart	2024	1		•											•		•							•	Carrizo-Wilcox Aquifer
		2		•											•		•	•							
		3		•											•		•	•							
		4		•	•										•		•	•							
		5			•										•		•	•							
		6		•										•		•	•	•			•	•			
City of New Braunfels	2019	1				•		•							•			•				•	•	•	Edwards-BFZ Aquifer, Trinity Aquifer, Carrizo-Wilcox Aquifer, Guadalupe Run-Of-River, Canyon Lake/Reservoir, Direct Reuse
		2				•		•							•			•				•			
		3				•		•							•			•				•			
		3			•		•		•			•													
City of Pleasanton	2020	1		•								•			•									•	Carrizo-Wilcox Aquifer
		2		•								•			•	•									
		3		•								•			•	•									
		4		•	•										•	•	•				•				

Entity Name	DCP Date	Stage Number	Triggers										Responses										Water Supply		
			WWP	Demand/Capacity Based	Failure/Contamination	Groundwater Level	Season	Reservoir Level	Supply-Based	Well Pumping Time/Flow	Storage Tank Recovery Time	Other	Assessment and Identification	Water Rate Change or Surcharge	Irrigation Schedule	Mandatory Reduction	Notification of Public Agencies or Specific Users	Prohibited Use	Discontinue Water Diversions	Potential Suspend Service	Water Allocation	Others	Surface Water	Ground Water	Water Source
Plum Creek	2024	Voluntary Conservation					•								•		•							•	Carrizo-Wilcox Aquifer, Edwards Aquifer, Leona Aquifer
		1		•					•	•					•	•	•	•		•					
		2		•					•	•					•	•	•	•		•	•				
		3		•					•	•					•	•	•	•		•	•				
		4	•		•			•								•	•	•		•	•				
		5	•							•						•	•	•							
		Emergency	•					•	•	•						•	•	•							
City of Port Lavaca	2023	1	•			•									•		•						•		Guadalupe Run-of-River
		2	•			•									•		•	•							
		3	•			•						•			•		•	•							
		4		•	•	•									•		•	•							
		5			•										•		•	•							
		6										•		•			•				•				
City of San Marcos	2024	1		•	•			•	•						•			•		•			•	•	Canyon Lake/Reservoir, Edwards-BFZ Aquifer, Carrizo-Wilcox Aquifer, Direct Reuse
		2		•	•			•	•						•			•		•					
		3		•	•			•	•						•			•		•					
		4		•	•			•	•						•			•		•		•			
SAWS	2024	1						•		•					•		•	•					•	•	Trinity Aquifer, Edwards-BFZ Aquifer, Direct Reuse, Canyon Lake/Reservoir, Carrizo-Wilcox Aquifer,
		2						•		•					•		•	•							
		3						•		•				•	•		•	•							
		4						•	•	•				•	•		•	•							
		5						•	•	•					•		•	•							
City of Schertz	2023 (resubmitted from 2013)	1	•	•	•					•					•	•	•	•						•	Carrizo-Wilcox Aquifer, Edwards-BFZ Aquifer,
		2	•	•	•					•					•	•	•	•							
		3	•	•	•					•					•	•	•	•							
		4	•	•	•					•				•		•	•	•		•	•				
City of Seguin	2024	1	•	•					•		•	•		•	•		•	•		•			•	•	Canyon Lake/Reservoir, Carrizo-Wilcox Aquifer, Direct Reuse, Guadalupe Run-of-River
		2	•	•		•		•	•		•	•		•	•	•	•	•		•					
		3	•	•		•		•			•	•		•	•	•	•	•		•					
		4	•	•	•	•		•			•	•		•	•	•	•	•		•					
		5			•				•					•		•	•	•		•					
City of Selma	2024	1														•	•	•						•	Carrizo-Wilcox Aquifer, Edwards-BFZ Aquifer
		2														•	•	•							
		3														•	•	•							
		4			•											•	•	•			•				
SJWTX Triple Peak Plan (Canyon Lake Water Service [Texas Water Company])	2024	1		•				•		•		•			•		•					•	•	•	Canyon Lake/Reservoir; Trinity Aquifer
		2		•				•		•		•			•	•	•		•			•			
		3		•				•		•	•	•	•		•	•	•	•	•		•	•			
		4		•				•		•	•	•	•	•	•	•	•	•	•		•	•			
		5						•				•	•	•	•	•	•	•	•		•	•			
		Emergency			•			•			•	•	•	•	•	•	•	•	•		•	•			

Entity Name	DCP Date	Stage Number	Triggers										Responses										Water Supply		
			WWP	Demand/Capacity Based	Failure/Contamination	Groundwater Level	Season	Reservoir Level	Supply-Based	Well Pumping Time/Flow	Storage Tank Recovery Time	Other	Assessment and Identification	Water Rate Change or Surcharge	Irrigation Schedule	Mandatory Reduction	Notification of Public Agencies or Specific Users	Prohibited Use	Discontinue Water Diversions	Potential Suspend Service	Water Allocation	Others	Surface Water	Ground Water	Water Source
S.S. WSC	2024	0										•			•	•	•			•				•	Carrizo-Wilcox Aquifer
		1		•								•			•	•	•			•					
		2		•					•		•	•			•	•	•	•		•					
		3		•					•		•	•			•	•	•	•		•					
		4		•					•		•	•			•	•	•	•		•					
		5			•									•		•	•	•		•	•				
Sunilandings Utilities	2022	1				•	•										•							•	Gulf Coast Aquifer System
		2						•							•	•	•	•							
		3						•								•	•	•							
		4			•			•								•	•	•							
		5			•			•								•	•				•				
Springs Hill WSC	2024	1	•	•	•				•				•	•	•		•	•					•	•	Canyon Lake/Reservoir, Carrizo-Wilcox Aquifer
		2	•	•	•				•				•	•	•	•	•	•	•			•			
		3	•	•	•				•				•	•	•	•	•	•				•			
		4	•		•								•	•	•	•	•	•	•	•	•	•			
Universal City	2023 (DRAFT)	1								•					•	•	•	•						•	Carrizo-Wilcox Aquifer, Edwards-BFZ Aquifer, Direct Reuse
		2								•					•	•	•	•							
		3								•					•	•	•	•							
		4	•		•				•	•				•	•	•	•	•		•					
City of Uvalde	2005	1								•					•	•	•	•						•	Edwards-BFZ Aquifer
		2								•					•	•	•	•							
		3								•					•	•	•	•							
		4								•							•								

Entity Name	DCP Date	Stage Number	Triggers										Responses										Water Supply		
			WWP	Demand/Capacity Based	Failure/Contamination	Groundwater Level	Season	Reservoir Level	Supply-Based	Well Pumping Time/Flow	Storage Tank Recovery Time	Other	Assessment and Identification	Water Rate Change or Surcharge	Irrigation Schedule	Mandatory Reduction	Notification of Public Agencies or Specific Users	Prohibited Use	Discontinue Water Diversions	Potential Suspend Service	Water Allocation	Others	Surface Water	Ground Water	Water Source
City of Victoria	2024	1				●				●					●		●						●	●	Canyon Lake/Reservoir, Gulf Coast Aquifer System, Guadalupe Run-of-River
		2				●				●					●		●								
		3		●				●							●		●	●				●			
		4		●				●							●		●	●							
		5		●	●										●		●	●							
		6		●										●	●		●	●		●	●				
Victoria County WCID No. 1	2023	1		●			●								●		●	●						●	Gulf Coast Aquifer System
		2		●											●	●	●	●							
		3		●										●	●	●	●	●			●				
		4		●										●	●	●	●	●			●				
		5			●									●		●	●	●			●				

Appendix 7B: Existing and Potential Emergency Interconnection Information

Appendix 7B: Summary of Existing and Potential Emergency Interconnects

Table 7B-1: Existing Emergency Interconnects

No.	Emergency User	Emergency Provider
1	90 Ranch WSC	East Medina County SUD
2	Alamo Heights	SAWS
3	Benton City WSC	Lytle
4	Cadillac Water	SAWS
5	Cibolo	Green Valley SUD
6	City of Seguin	Springs Hill WSC
7	Creedmoore-Maha WSC	Aqua WSC
8	Creedmoore-Maha WSC	City of Austin
9	Crystal Clear	Springs Hill WSC
10	East Central SUD	La Vernia
11	East Central SUD	Springs Hill WSC
12	East Medina County SUD Unit 1	Natalia
13	El Oso WSC	Karnes City
14	Fair Oaks Ranch	SAWS
15	Gonzales County WSC	City of Smiley
16	Gonzales County WSC	City of Gonzales
17	Green Valley SUD	City of Cibolo
18	Green Valley SUD	Schertz
19	Green Valley SUD	Springs Hill WSC
20	Kyle	City of San Marcos
21	Leon Valley	SAWS
22	Live Oak	SAWS
23	Live Oak	Selma
24	Live Oak	Universal City
25	Lytle	Benton City WSC
26	Marion	CRWA
27	Marion	Green Valley SUD
28	Martindale WSC	Maxwell WSC
29	Medina County WCID 2	West Medina WSC
30	Natalia	East Medina County WSC
31	Oak Village North	Rim Rock Ranch
32	Polonia WSC	Polonia WSC North
33	Polonia WSC North	Lockhart
34	Polonia WSC South	Lockhart
35	Rim Rock Ranch	Oak Village North
36	Schertz	SAWS
37	Selma	Live Oak
38	Selma	Universal City
39	Shavano Park	SAWS
40	Smiley	Gonzales WSC

No.	Emergency User	Emergency Provider
41	South Buda WCID 1	Southwest Water Co.
42	Southwest Water Co.	SAWS
43	Springs Hill WSC	Canyon Regional WA
44	Springs Hill WSC	City of Sequin
45	Springs Hill WSC	Green Valley SUD
46	Stockdale	Sunko WSC
47	Sunko WSC	Stockdale
48	Texas State University	San Marcos
49	West Medina WSC	D'Hanis
50	West Medina WSC	Hondo
51	Yancey WSC	SAWS

Table 7B-2: Potential Emergency Interconnects

No.	Potential Emergency User	Potential Emergency Provider
1	Atascosa Rural WSC	East Medina SUD
2	Cibolo	Schertz
3	County Line SUD	City of Kyle
4	Crystal Clear WSC	San Marcos
5	Crystal Clear WSC	NBU
6	East Medina County SUD	Atascosa Rural WSC
7	Wimberley WSC	Aqua WSC

Appendix 7C: Drought Preparedness Council Letter to Region L, Dated February 8, 2024

Drought Preparedness Council

February 8, 2024

Region L Planning Group
c/o: Tim Andruss
Region L Chair
100 East Guenther Street
San Antonio, Texas 78283-9980

Dear Mr. Andruss,

The Drought Preparedness Council, which is comprised of representatives from 16 state agencies as well as appointees of the governor, would like to offer its assistance on drought-related issues encountered during the planning process. Authorized and established in 1999 as part of the 76th Texas Legislature, the council was created to carry out the provisions of Sections 16.055 and 16.0551 of the Texas Water Code. Its responsibilities include assessing and public reporting of drought monitoring and water supply conditions; advising the governor on significant drought conditions; recommending response plans for drought-related disasters; advising regional water planning groups on drought-related issues in the regional water plans; coordinating local, state, and federal drought-response planning; and submitting a report to the legislature every odd-numbered year.

Council members represent a broad swath of state agencies, including Texas Division of Emergency Management, Texas Water Development Board, Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, Texas Department of Agriculture, Texas A&M AgriLife Extension Service, Texas State Soil and Water Conservation Board, Texas Department of Housing and Community Affairs, Texas A&M Forest Service, Texas Department of Transportation, Texas Department of Economic Development, Office of the State Climatologist, Public Utilities Commission, Electric Reliability Council of Texas and Texas Health and Human Services Commission. Each member brings expertise in his or her field, and the greatest strength of the council lies in its ability to utilize the knowledge and skills of its members for the betterment of Texas. The council includes members of the emergency management community who can guide regional groups in the emergency management process, including how to request resources, and can provide instructions to local emergency management partners.

The council is aware that your regional water planning group is developing its 2026 Regional Water Plan, including its drought chapter. Per Title 31 of Texas Administrative Code Section 357.42(h), regional water planning groups are required to consider "any relevant recommendations from the Drought Preparedness Council." As chairman of the council, I would like to extend the council's assistance on any drought related issues that you may come across while working through the regional water planning process. Additionally, the council and I offer the following recommendations:

1. The regional water plans and state water plan shall serve as water supply plans under drought of record conditions. The DPC encourages regional water planning groups to consider planning for drought conditions worse than the drought of record, including scenarios that reflect greater rainfall deficits and/or higher surface temperatures.
2. The Drought Preparedness Council encourages regional water planning groups to incorporate projected future reservoir evaporation rates in their assessments of future surface water availability.
3. The Drought Preparedness Council encourages regional water planning groups to identify in their plans utilities within their boundaries that reported having less than 180 days of available water supply to the Texas Commission on Environmental Quality during the current or preceding planning cycle. For systems that appeared on the 180-day list, RWPGs should perform the evaluation required by Texas Administrative Code Section 357.42(g), if it has not already been completed for that system.

If you have any questions for the council or would like to attend the Drought Preparedness Council's quarterly meetings, please contact John Honoré at John.Honore@tdem.texas.gov.

Sincerely,

W. Nim Kidd, MPA, CEM
Chief, Texas Division of Emergency Management
Chair, Drought Preparedness Council
Chair, Texas Emergency Management Council
Vice Chancellor for Disaster and Emergency Services
The Texas A&M University System

INITIALLY PREPARED PLAN

CHAPTER 8: POLICY RECOMMENDATIONS AND UNIQUE SITES

South Central Texas Regional Water Plan

B&V PROJECT NO. 411170

PREPARED FOR

South Central Texas Regional Water Planning Group

3 MARCH 2025

BLACK & VEATCH

Table of Contents

List of Abbreviations

acft/yr	Acre-Foot per Year
DFC	Desired Future Condition
GAM	Groundwater Availability Model
GCD	Groundwater Conservation District
GMA	Groundwater Management Area
gpm	Gallon per Minute
HB	House Bill
MAG	Modeled Available Groundwater
PWS	Public Water System
Region L	South Central Texas Region
RWPG	Regional Water Planning Group
SCTRWPA	South Central Texas Regional Water Planning Area
SCTRWPG	South Central Texas Regional Water Planning Group
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks and Wildlife Department
TWC	Texas Water Code
TWDB	Texas Water Development Board
WAM	Water Availability Model
WMS	Water Management Strategy
WUG	Water User Group
WWP	Wholesale Water Provider

8.0 Policy Recommendations and Unique Sites

Chapter 31, Section 357.43 of the Texas Administrative Code (TAC) specifies that Regional Water Plans shall include recommendations on regulatory, administrative, or legislative issues. The South Central Texas (Region L) Regional Water Planning Group (SCTRWPG) establishes these recommendations to facilitate the orderly development, management, and conservation of water resources.

The following chapter provides recommendations for designation of ecologically unique river and stream segments, unique sites for reservoir construction, and any other recommendations that the SCTRWPG believes are needed and desirable to achieve the stated goals of state and regional water planning.

8.1 Ecologically Unique River and Stream Segments

Regional Water Planning Groups (RWPGs) may choose to adopt recommendations in Regional Water Plans for all or parts of river and stream segments as being of unique ecological value, based on criteria defined in 31 TAC §358.2(6). The following subsections provide information regarding unique stream segments recommendations by the SCTRWPG.

8.1.1 Legislative Designation of Five Unique Stream Segments

In the 2011 and 2016 Region L Regional Water Plans, the SCTRWPG recommended five stream segments as having unique ecological value for designation by the Texas Legislature. In 2015, House Bill 1016 (HB 1016, 84th Texas Legislature) designated five river or stream segments as being of unique ecological value. The SCTRWPG is appreciative of legislative action in the form of HB 1016.

Legislative Recommendation: The SCTRWPG recommends the Texas Legislature adequately fund the Texas Commission on Environmental Quality (TCEQ) and other entities in monitoring the water quality of the five river and stream segments designated as being of unique ecological value within the South Central Texas Regional Water Planning Area (SCTRWPA).

Other Recommendation: None.

8.1.2 Recognition of Potential Additional Stream Segments of Unique Ecological Value

The SCTRWPG believes that designating ecologically unique stream segments raises public awareness and voluntary stewardship that can result in the preservation of the character and environmental function of these segments. The SCTRWPG recognizes the ecologically significant stream segments designated by Texas Parks and Wildlife Department (TPWD) in July 2005. The SCTRWPG shall consider these stream segments as a guide for recommending additional stream segments of unique ecological value for future legislative designation.

Legislative Recommendation: The SCTRWPG recommends increased Texas Water Development Board (TWDB) funding to be allocated for future planning cycles to conduct analyses necessary for designation of additional stream segments as segments of unique ecological value.

Other Recommendation: None.

8.2 Unique Sites for Reservoir Construction

Regional Water Plans may include RWPG recommendations to designate sites of unique value for construction of reservoirs based on criteria defined in 31 TAC §358.2(7). At this time, the SCTRWPG does not recommend any unique reservoir sites for inclusion in the 2026 Region L Regional Water Plan.

Legislative Recommendation: None.

Other Recommendation: None.

8.3 Other Policy and Legislative Recommendations

8.3.1 Funding Water Projects for a Growing Region

8.3.1.1 Project Studies and Implementation

The SCTRWPA is located in one of the fastest growing regions of the United States. Region L comprises 21 counties with a current population of 3.0 million people. Based on board-approved projections from the TWDB, the population is projected to increase to 3.9 million people in 2030, 4.7 million people by 2040, and 7.6 million people by the end of the 50-year planning horizon in 2080. Water User Groups (WUGs) and wholesale water providers (WWPs) have the responsibility of meeting the water needs of these future Texans.

Legislative Recommendation: In order to meet the water needs of the State and to support the growing population and economy, the SCTRWPG recommends the Texas Legislature allocate funding to state and local governmental entities to support studies water management strategies (WMSs) and implementation of water supply projects.

Other Recommendation: None.

8.3.1.2 Lengthening Financing Terms

The price of water has increased tremendously over the past 30 years, raising utility concerns regarding water affordability for rate payers. The TWDB's current loan and funding programs have 30-year financing terms available for most types of projects. However, many of these projects have a project life greater than 50 years, placing the financial burden on rate payers now when it would be used by future rate payers. Lengthening the financing terms to 40 or 50 years would mean utilities would pay for these projects over a longer period of time, which could enable utilities more flexibility to ensure affordable rates for residents.

Legislative Recommendation: The SCTRWPG recommends the Texas Legislature pass legislation that enables the TWDB loan and funding programs to provide 40- and 50-year financing terms, in addition to the current 30-year financing term available. This lengthened financing term would allow payment for projects over a longer period of time, which could help with water affordability.

Other Recommendation: None.

8.3.2 Sponsorship and Implementation of Irrigation Strategies

The SCTRWPG finds that, given the complexity of the factors that influence decisions regarding the development of agricultural water supplies (e.g., commodity prices; variability of quality and quantity of local, privately-owned water resources; broad geographic distribution of needs; and other economic considerations of individual agricultural producers) as well as the lack of appropriate WUGs or WWPs to serve as sponsors of WMSs meant to address irrigation needs, it is not practical for the SCTRWPG to develop WMSs designed to develop new water supplies or infrastructure for agricultural water users for projected irrigation water shortages and substantially limits the SCTRWPG's ability to conceive of and evaluate discrete strategies to supply water for future water needs in many cases.

The SCTRWPG recognizes one of the obstacles encountered by RWPGs and irrigation water users in developing WMSs to supply water for irrigation needs is the lack of an eligible sponsor for potential WMSs.

Legislative Recommendation: None.

Other Recommendation: The SCTRWPG recommends that the TWDB evaluate revisions to the regional water planning rules and guidance to allow entities other than WUGs and WWPs to serve as sponsors of WMSs related solely to irrigation and to receive funding to implement WMSs designed to address irrigation water needs.

8.3.3 Groundwater

8.3.3.1 Groundwater Management

The SCTRWPG respects the rules and regulations of groundwater conservation districts (GCDs), as it does those of all other subdivisions of the state and state agencies. The SCTRWPG respects the decision of the Texas Supreme Court that groundwater is a private property right (Chapter 36 of the Texas Water Code [TWC]). The SCTRWPG believes that all rules adopted by GCDs pursuant to administrative procedures established under Chapter 36 of the TWC should be based on standards of rationality, equity, and scientific evidence to support the achievement of desired future conditions (DFCs) established by a groundwater management area (GMA). The SCTRWPG supports the use of aquifer monitoring programs implemented by GCDs within a GMA to evaluate achievement of and compliance with DFCs.

The SCTRWPG recognizes that the development of brackish groundwater resources is an important water supply strategy in meeting the state's projected water demands.

Legislative Recommendation: The SCTRWPG recommends the Texas Legislature support the development of brackish groundwater resources as an important water supply strategy by funding additional studies and research to assess the quality, quantity, and treatability of potential supplies, providing financial assistance for brackish groundwater supply projects, and promoting efficient permitting of these projects by regulatory agencies.

Other Recommendation: The SCTRWPG recommends the TWDB included the following explanatory note in the state water plan and database at appropriate locations:

"For each groundwater management area (GMA) within the region, the representatives of the member groundwater conservation district (GCDs) have adopted desired future conditions (DFCs) for the relevant aquifers. To ensure consistency with the DFCs, TWDB limits groundwater availability for each aquifer to the associated modeled available groundwater (MAG) for planning purposes. This water planning limitation has resulted in reductions to the yield of existing groundwater supplies and future groundwater supplies (as water management strategies [WMSs]) in this plan. This result should not be misconstrued as a recommendation of the SCTRWPG to the associated GCDs to make any adjustments to the associated DFC or to TWDB to make any adjustment to the associated MAG. The SCTRWPG recognizes and supports the ability of permit holders to exercise their rights to groundwater in accordance with their permits. The SCTRWPG recognizes and supports the authority and responsibility of GCDs to manage groundwater resources to achieve DFCs."

8.3.3.2 Notice of Groundwater Projects

Legislative Recommendation: The SCTRWPG recommends the Texas Legislature develop a process requiring WMS sponsors to provide public notice to county officials describing the WMSs with a groundwater source within the county where the potential WMS is located.

Other Recommendation: None.

8.3.3.3 Groundwater Availability Model Updates

Legislative Recommendation: The SCTRWPG recommends the Texas Legislature provide adequate funding to the TWDB to revise and improve, at a minimum, on a 10-year basis, the groundwater availability models (GAMs) used to develop DFCs and determine modeled available groundwater (MAG) estimates.

Other Recommendation: The SCTRWPG recommends the TWDB initiate a program that provides the necessary information, technical expertise, and experience to update and improve the GAMs on a 10-year basis to support the permitting efforts of GCDs, the joint planning efforts of GMAs, and the regional water planning efforts of the RWPGs.

8.3.4 Surface Water

8.3.4.1 Surface Water Availability Model Updates

Although a new drought of record has not occurred for the Guadalupe-San Antonio Basin since the 1950s, appropriate updates to the related Water Availability Models (WAMs) would increase the simulation period by at least 50 percent and facilitate development of improved estimates of channel losses and missing streamflow records (especially those during the drought of record) throughout the watersheds. Furthermore, an extension of the Guadalupe-San Antonio WAM naturalized flow set would enhance the permitting process by providing additional hydrologic data used in the determination of the attainment frequencies associated with freshwater inflow regimes.

Legislative Recommendation: Periodic updates to the Guadalupe-San Antonio and Nueces WAMs should be performed at least every 10 years so that hydrologic data included in the models is within 10 years of the current date. The SCTRWPG recommends the Texas Legislature fund the TCEQ to update the WAMs for the Guadalupe-San Antonio River Basin and Nueces River Basin to include the most-recent available hydrologic data, and continue allocating funding to update the WAMs on a 10-year basis.

Other Recommendation: The SCTRWPG recommends the TCEQ design and implement a systematic process for WAM updates, which would document any changes and associate those changes with official numbered versions of each of the WAMs.

8.3.5 Conservation

The SCTRWPG appreciates and supports recently passed legislation (Senate Bill 28, Senate Joint Resolution 75, and Senate Bill 30) by the 88th Texas Legislature to establish and fund a statewide water public awareness program. These actions will further general mainstream municipal conservation efforts. The SCTRWPG also recognizes that additional steps need to be taken to promote sustainable landscapes, thereby substantially reducing the quantities of water used (and potentially wasted) for municipal landscape irrigation.

Legislative Recommendation: The SCTRWPG recommends the Texas Legislature provide adequate funding to promote sustainable landscaping practices that conserve water with the statewide public education programs.

Other Recommendation: The SCTRWPG encourages and recommends communities within Region L to adopt and/or incentivize efforts to promote sustainable landscaping practices and conserve water, where feasible.

8.3.6 Water System Capacity

Rules in 30 TAC §290.45 include requirements for minimum water system capacity. Currently, the rules require a minimum of 0.6 gallons per minute (gpm) per connection for the total public water system capacity, as well as capacities for individual water treatment plants, groundwater wells, ground storage tanks, raw water pump stations, transfer pump stations, and others. The 0.6 gpm requirement converts to 315,360 gallons per year per connection, or 0.97 acre-feet per year (acft/yr) per connection. This represents a substantial cost to develop reserve capacities that are unlikely to be used.

TAC §290.45(g) provides a process for a Public Water System (PWS) to request a waiver for an Alternative Capacity Requirement:

> *Any water system requesting to use an alternative capacity requirement must demonstrate to the satisfaction of the executive director that approving the request will not compromise the public health or result in a degradation of service or water quality and comply with the requirements found in §290.46(x) and (y) of this title.*

30 TAC §290.45(g).

Legislative Recommendation: None.

Other Recommendation: The SCTRWPG recommends that the TCEQ perform the following:

- Perform a systematic review of the Minimum Water System Capacity requirements to ensure the following:
  - Maintaining public health
  - Availability of firm water supplies to meet customer demand during a repeat of the drought of record
  - Maintaining water quality
- The SCTRWPG recommends the Minimum Water System Capacity review include the following:
  - Review the model to ensure it meets the 21st century needs of rapid population growth in the state
    - Maximum daily demand
    - Safety factor

- Equivalency ratio calculation
- Required justification
- Ensure a balance of maintaining available water supplies during drought while avoiding the need for PWSs to lock up water supplies that may never be used preventing other PWS access to water resources.

8.3.7 Innovative Strategies

8.3.7.1 Assistance for Alternative Rangeland Management

Legislative Recommendation: The SCTRWPG recommends the Texas Legislature increase funding to the Texas State Soil and Water Conservation Board Water Supply Enhancement Program for the purpose of implementing brush control and rangeland management practices.

Other Recommendation: None.

8.3.7.2 One Water

In recent years, municipalities have begun to view water resources from a holistic, systemwide approach, known as One Water. One Water is a decentralized concept that views all water resources as valuable. The majority of laws and regulations in Texas are not structured in such a way as to encourage or incentivize One Water approaches. In December 2019, the Meadows Center for Water and the Environment published a report entitled, *Regulatory Impediments to Implementing One Water in Texas*. According to the 2019 Meadows Center Report:

One Water projects are still not the norm. This is, in part, due to the current regulatory framework's inability to accommodate more innovative water reuse strategies, where the risk to public health is significant or not well understood. For example, federal drinking water regulations are necessary to protect public drinking water supplies, but they create onerous regulatory hurdles for smaller, onsite systems that may seek to use alternative sources, such as rainwater. Additionally, although onsite non-potable reuse of blackwater is a hallmark of the One Water approach, existing regulations in Texas make it extremely difficult for developers to construct onsite blackwater reuse systems. Finally, the lack of regulations that govern water reuse in Texas could actually stymie the development of One Water projects as developers often prefer clear regulatory and permitting paths over case-by-case decision making by regulators.

Legislative Recommendation: The SCTRWPG recommends the Texas Legislature review existing state laws regarding rainwater, non-potable on-site reuse, direct potable reuse, and blackwater reuse systems to enable and incentivize implementation of One Water Projects.

Other Recommendation: The SCTRWPG recommends the TWDB and TCEQ (1) financially support research for determining appropriate technology and risk mitigation approaches necessary to significantly expand One Water with appropriate protections for the public, environment, and worker health, in consideration of and with respect to impacts on existing water rights; and (2) assist the funding and development of incentive programs to advance One Water in Texas.

8.3.8 Water Quality and Data Collection

The primary focus of the regional water planning process is to ensure that water supplies are identified in sufficient quantity to meet future water demands; however, the SCTRWPG recognizes that the quality of those water supplies is also important to protect. Protecting groundwater and surface water supplies from contamination not only helps to reduce the cost to treat water to public drinking water standards, but also reduces pollutants that may harm the ecological health of the basin.

Legislative Recommendation: The SCTRWPG recommends the Texas Legislature fully fund the cooperative, federal-state-local program of basic water data collection, including (1) stream gages-quantity and quality; (2) groundwater monitoring-water levels and quality; (3) hydrographic surveys and sediment accumulation in reservoirs; (4) water surface evaporation rates; (5) water use data for all WUGs; (6) population projections; and (7) Clean Rivers Program.

Other Recommendation: The SCTRWPG recommends the TCEQ and local governments promote practices and/or regulations to avoid or mitigate threats to water quality in surface water and groundwater sources.

8.3.9 Consideration of Climate Variability in Regional Water Planning

Regional Water Plans are based on drought of record conditions using historical data; however, climate models indicate the potential for an increase in the number of dry days with increased evaporation along with more intense rainfall events, which impacts water supply and demand. Historically, the TWDB has not used climate models to predict impacts to future water resources in Texas because forecasting tools have not been able to provide the resolution needed for water planning. The SCTRWPG recognizes that down-scaling of climate models is becoming more sophisticated, and the results are being considered in other planning efforts and models (including WAMs). Similar incorporation into future regional water plans is needed to ensure meeting customer demand under climate enhanced drought conditions.

Legislative Recommendation: The SCTRWPG recommends the Texas Legislature fund relevant studies and down-scaled regional models to incorporate available climate variability into the Regional Water Planning process.

Other Recommendation: The SCTRWPG recommends the TWDB to reassess available climate models and consider incorporating them into regional water planning.

INITIALLY PREPARED PLAN

CHAPTER 9: IMPLEMENTATION AND COMPARISON TO THE PREVIOUS REGIONAL WATER PLAN

South Central Texas Regional Water Plan

B&V PROJECT NO. 411170

PREPARED FOR

South Central Texas Regional Water Planning Group

3 MARCH 2025

BLACK & VEATCH

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%	percent
acft/yr	Acre-foot per Year
ASR	Aquifer Storage and Recovery
BFZ	Balcones Fault Zone
DFC	Desired Future Condition
EAA	Edwards Aquifer Authority
EAHCP	Edwards Aquifer Habitat Conservation Plan
FERC	Federal Energy Regulatory Commission
FRAT	Flow Regime Application Tool
GMA	Groundwater Management Area
MAG	Modeled Available Groundwater
Region L	South Central Texas Region
RWPA	Regional Water Planning Area
RWPG	Regional Water Planning Group
SV/SA	Storage Volume/Surface Area
SCTRWP	South Central Texas Regional Water Plan
SCTRWPA	South Central Texas Regional Water Planning Area
SCTRWPG	South Central Texas Regional Water Planning Group
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TWDB	Texas Water Development Board
WAM	Water Availability Model
WMS	Water Management Strategy
WMSP	Water Management Strategy Project
WUG	Water User Group
WWP	Wholesale Water Provider
WWTP	Wastewater Treatment Plant

9.0 Implementation and Comparison to the Previous Regional Water Plan

The purpose of this chapter is to document the level of implementation of previously recommended water management strategies (WMSs), provide an assessment of progress toward achieving economies of scale, and summarize the differences between this 2026 South Central Texas (Region L) Regional Water Plan (SCTRWP) and the 2021 SCTRWP. The following sections provide more information regarding each of these topics.

9.1 Implementation of Previous Regional Water Plan

The Texas Water Development Board (TWDB) requires regional water planning groups (RWPGs) to report the level of implementation and identified, reported implementation impediments to the development of previously recommended WMSs and Water Management Strategy Projects (WMSPs) that have affected progress in meeting water needs. For the 2026 SCTRWP, this task assesses the implementation of WMSs and WMSPs included in the previous water plan, which was the 2021 SCTRWP.

To assess the level of implementation of the 2021 SCTRWP, the South Central Texas Regional Water Planning Group (SCTRWPG) distributed a survey to water user groups (WUGs) and wholesale water providers (WWPs) in the South Central Texas Regional Water Planning Area (SCTRWPA) that had WMSs and or WMSPs included in the 2021 SCTRWP. The survey consisted of a spreadsheet provided by the TWDB that requested information regarding several aspects of the proposed WMSs and WMSPs, including the following questions.

1. Has the sponsor taken affirmative vote or actions?
2. What is the status of the WMS project or WMS recommended in the 2021 SCTRWP?
3. If project has not been started or no longer being pursued, please tell us why.
4. Please select one or more project impediments. If an impediment is not listed, provide information in the “Other” text field.
5. What funding types are being used for the project?

As of February 11, 2025, the SCTRWPG received survey responses regarding 43 of the 241 WMSs or WMSPs. Appendix 9A includes survey results that were received from sponsors. If new or updated responses are submitted, the SCTRWPG will update this chapter prior to adoption of the 2026 SCTRWP in October 2025.

9.2 Assessment of Progress Toward Regionalization

In accordance with Title 31 of the Texas Administrative Code (TAC) §357.45(b), RWPGs must “assess the progress of the [Regional Water Planning Area (RWPA)] in encouraging cooperation between WUGs for the purpose of achieving economies of scale and otherwise incentivizing WMSs that benefit the entire RWPA.”

Several WMSs in the 2026 SCTRWP focus on cooperative agreements among WUGs and WWPs. The 2026 SCTRWP includes 17 WMSs that serve more than one WUG. The 2021 SCTRWP had 19 WMSs that served more than one WUG and to the knowledge of the SCTRWPG, three of these have been implemented since adoption of the 2021 SCTRWP.

For many years, the SCTRWPG has encouraged cooperation and collaboration among WUGs for the purpose of achieving economies of scale. In the SCTRWPA, there are several existing partnerships that coordinate to develop and deliver water supplies, such as Alliance Regional Water Authority, Canyon Regional Water Authority, Cibolo Valley Local Government Corporations, and Schertz-Seguin Local Government Corporation. New to this 6th cycle of planning is the Medina County Regional Water Alliance, which is developing the Medina County Regional Aquifer Storage and Recovery (ASR) Project (refer to Section 5.2.22) to share water supplies and costs of infrastructure development.

Development of the Edwards Aquifer Habitat Conservation Plan (EAHCP) is another example of a local partnership in the SCTRWPA that encourages coordination to achieve economies of scale. The EAHCP protects federally-listed species that live in the Edwards Aquifer and the Comal and San Marcos Springs. It protects covered species through habitat protection, flow protection, and supporting measures, such as water quality monitoring, biological monitoring, and applied research. The partners participating in the EAHCP include the following:

- Edwards Aquifer Authority;
- The City of New Braunfels;
- The City of San Marcos;
- The City of San Antonio acting by and through its San Antonio Water System Board of Trustees;
- Guadalupe-Blanco River Authority;
- Texas State University;
- Texas Parks and Wildlife Department; and
- U.S. Fish and Wildlife Service.

This assessment demonstrates that the prevailing approach for entities within the SCTRWPA is to coordinate and collaborate in order to achieve regionalization. Based on the array of collaborative projects and partnerships, the SCTRWPA has been successful in encouraging cooperation among WUGs for the purpose of achieving economies of scale or otherwise incentivizing WMSs that benefit the entire SCTRWPA. The SCTRWPG is committed to encouraging continued cooperation among WUGs and is always looking for ways to achieve economies of scale for the benefit of the region and the state.

9.3 Comparison to Previous Regional Water Plan

Each update to the SCTRWP is an opportunity for the SCTRWPG to evaluate the changes in the region's water use and conservation goals, and to lay out a path toward meeting future water needs. Every five-year cycle of planning includes a reevaluation of current and future demands, supplies currently being used, and development of a range of WMSs and WMSPs that can be used to meet projected needs. This section focuses on changes that have occurred since the previous plan was adopted, including providing comparisons for the following:

- Water demand projections;
- Droughts of record;
- Source water availabilities;
- Existing water supplies;
- Identified needs; and
- Recommended and alternative water management strategies and projects.

9.3.1 Water Demand Projections

With each regional water planning cycle, population and water demand projections can potentially change for each WUG. Population can change because of updated data, either from the latest census or better estimates from the Texas State Demographer. Water demands can change because of changes in population or variations in per capita water use values, which are affected by conservation efforts, drought measures, and shifts in water use patterns. The TWDB collaborated with RWPGs to develop the adopted demand projections for the region's WUGs. Population and municipal demands were estimated for utilities and rural areas for the municipal WUG projections. Other users were aggregated into geographical areas defined by county and river basin boundaries, such as irrigation and steam-electric power generation, to form the demand projections for non-municipal WUGs. TWDB estimated demands using historical data and recent studies for each category to establish the base year. The base year was used with a rate of change to project decadal estimates over the 50-year planning horizon from 2030 to 2080.

In general, water demand projections in the 2021 SCTRWP and the 2026 SCTRWP demonstrate similar growth trends. However, the magnitude of the growth in water demands over the planning horizon is greater in the 2026 SCTRWP (37 percent [%]) than the 2021 SCTRWP (25%). Between 2030 and 2080, municipal water demand projections for the 2026 SCTRWP are higher than the 2021 SCTRWP. In the 2021 SCTRWP, municipal water demands ranged from 485,978 acre-feet per year (acft/yr) [1] in 2030 to 700,477 acft/yr by the 2070 decade (Figure 9-1). In the 2026 plan, municipal water demand ranges from 530,751 acft/yr in 2030 to 856,949 acft/yr in 2070, and then to 956,362 acft/yr by 2080.

Non-municipal demands for the 2026 SCTRWP are projected to remain relatively flat over the planning period (Figure 9-2), decreasing slightly in 2080. The 2026 SCTRWP non-municipal water demand projections are generally lower than those projected in the 2021 SCTRWP, except for the 2060 and 2070 decades. The 2021 SCTRWP projected demands range from 628,970 acft/yr in 2030 to 619,651 acft/yr in 2070. In the 2026 SCTRWP, non-municipal water demand ranges from 604,220 acft/yr in 2030 to 636,338 acft/yr in 2070 and then to 601,075 acft/yr by 2080.

The total water demand projections for the 2026 SCTRWP increase from 1,134,971 acft/yr in 2030 to 1,557,437 acft/yr in 2080 (Figure 9-3).

[1] One acft is approximately 325,851 gallons.

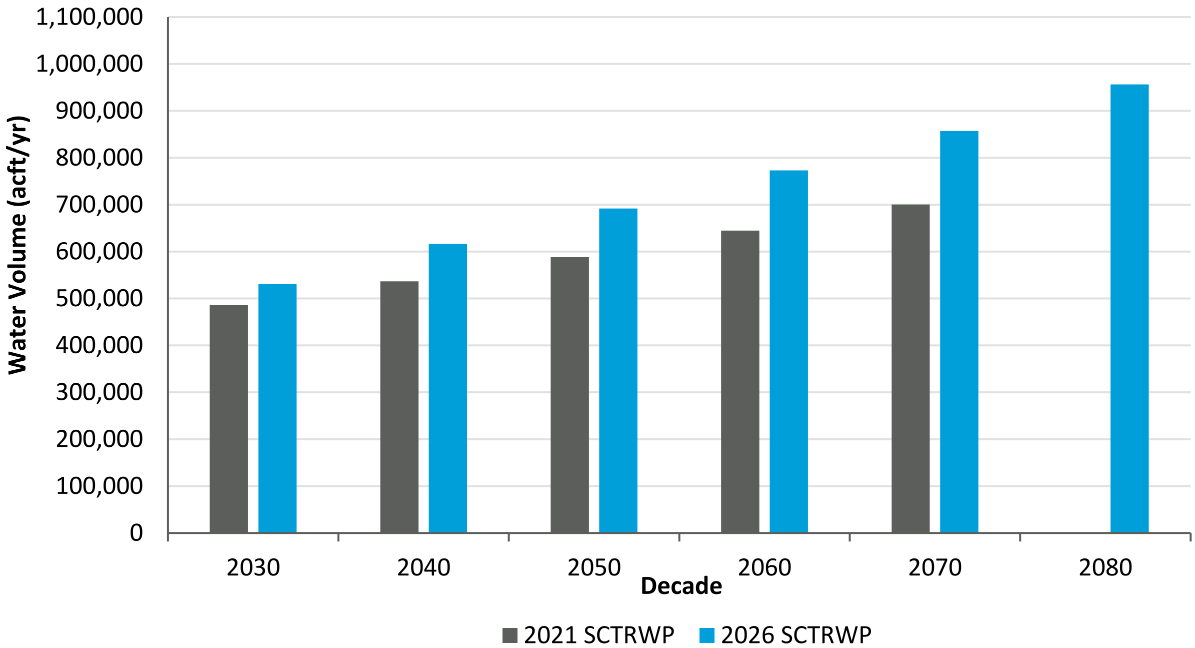

Figure 9-1 Municipal Water Demand Projections

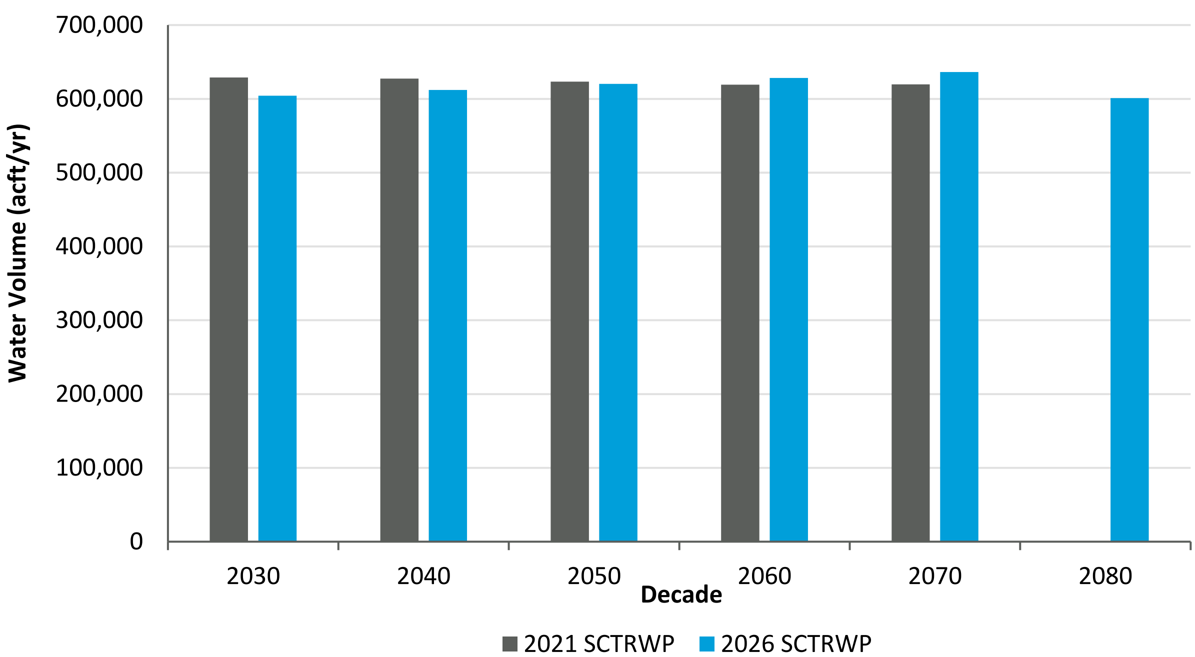

Figure 9-2 Non-Municipal Water Demand Projections

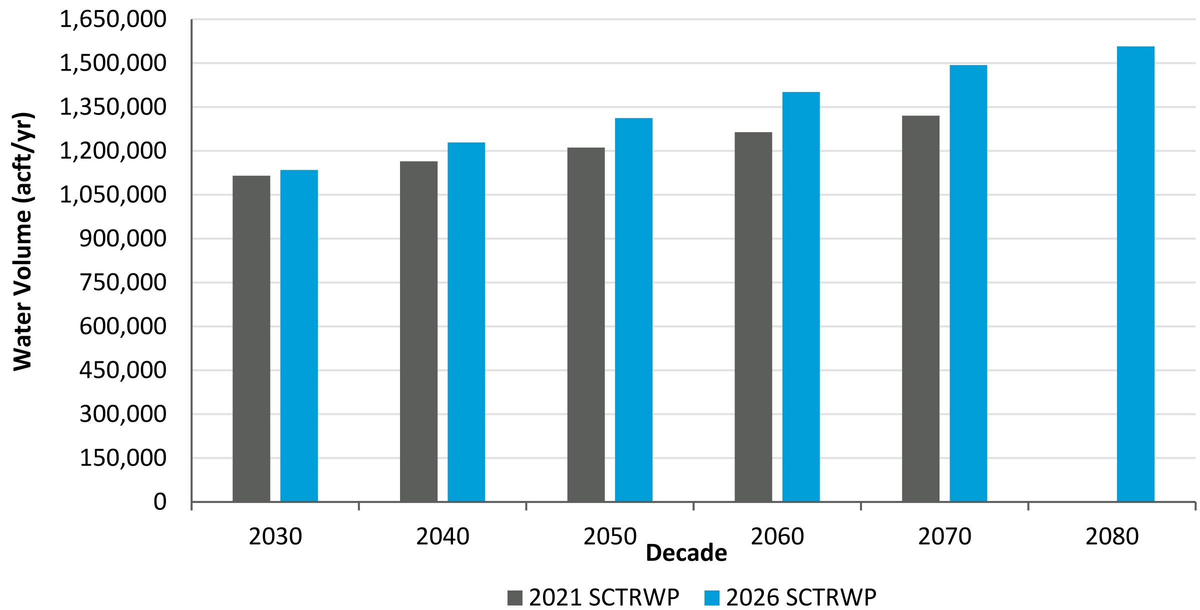

Figure 9-3 Total Water Demand Projections

9.3.2 Drought of Record and Assumptions

The drought of record in the Guadalupe-San Antonio River Basin is the drought of the 1950s and did not change from the 2021 SCTRWP. The drought of record for the Nueces River Basin is the drought of the 1990s and did not change from the 2021 SCTRWP. Water modeling assumptions associated with both plans are listed in Table 9-1. Refer to Appendix 3B for correspondence between the SCTRWPG and TWDB regarding the hydrologic assumptions and variances.

Table 9-1 Comparison of Hydrologic and Modeling Assumptions in the 2021 SCTRWP and the 2026 SCTRWP

Assumption Category	2021 SCTRWP	2026 SCTRWP
Surface Water	Water Availability Model (WAM) Run 3 may be used for Surface Water Rights Modeling for existing supplies, WMS evaluations, and cumulative effects evaluation. Use of the Region L WAM may be used to establish existing supply for Canyon Reservoir and power plant reservoirs, Braunig, Calaveras, and Coleto Creek (daily time step simulation with no use of effluent or other changes to any water rights).	SCTRWPG used the Texas Commission on Environmental Quality (TCEQ) WAM Run 3 and an alternative surface water model, the "Region L WAM" to assess surface water availabilities. The Region L WAM was used to estimate surface water availabilities for certain reservoirs, including Canyon Reservoir, Victor Braunig Lake, Calaveras Lake, and Coleto-Creek Reservoir. The unmodified WAM Run 3 was used to evaluate firm yields for all other reservoirs in the SCTRWPA.
Surface Water	WAM Run 3 assumes the following: a. Full exercise of surface water rights b. Zero effluent discharges unless specifically required by a surface water right (hydropower, industrial rights, City of Victoria, etc.)	WAM Run 3 assumes the following: a. Full exercise of surface water rights b. Zero effluent discharges unless specifically required by a surface water right (hydropower, industrial rights, City of Victoria, etc.)
Surface Water	Version Dates for WAM Run 3: • Guadalupe-San Antonio River Basin: 10/17/2014 • Nueces River Basin: 1/7/2013 San Antonio-Nueces Coastal Basin: 1/7/2013 • Lavaca-Guadalupe Coastal Basin: 7/30/2015	Version Dates for WAM Run 3: • Guadalupe-San Antonio River Basin: 10/1/2023 • Nueces River Basin: 10/1/2023 • San Antonio-Nueces Coastal Basin: 10/1/2023 • Lavaca-Guadalupe Coastal Basin: 10/1/2023
Surface Water	Period of Record for WAM Run 3: • Guadalupe-San Antonio River Basin: 1934 to 1989 • Nueces River Basin: 1934 to 1996 • San Antonio-Nueces Coastal Basin: 1948 to 1998 • Lavaca-Guadalupe Coastal Basin: 1940 to 1996	Period of Record for WAM Run 3: • Guadalupe-San Antonio River Basin: 1934 to 1989 • Nueces River Basin: 1934 to 1996 • San Antonio-Nueces Coastal Basin: 1948 to 1998 • Lavaca-Guadalupe Coastal Basin: 1940 to 1996
Drought of Record	• Guadalupe- San Antonio River Basin: 1950s • Nueces River Basin: 1990s	• Guadalupe- San Antonio River Basin: 1950s • Nueces River Basin: 1990s

Assumption Category	2021 SCTRWP	2026 SCTRWP
Surface Water	The Region L WAM is used to establish existing supply for Canyon Reservoir and power plant reservoirs of Braunig Lake, Calaveras Lake, and Coleto Creek Reservoir. This model simulates Federal Energy Regulatory Commission (FERC) requirements, a drought contingency trigger at the Spring Branch stream gauge, an agreement with Guadalupe River Trout Unlimited, and various water rights and daily operations dependent on Canyon Reservoir. The model uses a daily time step simulation with no use of effluent or other changes to water rights. The Region L WAM more accurately considers reservoir operations in its analysis, including operation of the power plant reservoirs subject to authorized consumptive uses, with makeup diversions as needed to maintain full conservation storage to the extent possible, subject to senior water rights, instream flow considerations, and/or applicable contractual provisions.	The Region L WAM is used to establish existing supply for Canyon Reservoir and power plant reservoirs of Braunig Lake, Calaveras Lake, and Coleto Creek Reservoir. This model simulates FERC requirements, a drought contingency trigger at the Spring Branch stream gauge, an agreement with Guadalupe River Trout Unlimited, and various water rights and daily operations dependent on Canyon Reservoir. The model uses a daily time step simulation with no use of effluent or other changes to water rights. The Region L WAM more accurately considers reservoir operations in its analysis, including operation of the power plant reservoirs subject to authorized consumptive uses, with makeup diversions as needed to maintain full conservation storage to the extent possible, subject to senior water rights, instream flow considerations, and/or applicable contractual provisions.
Surface Water	The Flow Regime Application Tool (FRAT) will be used, in conjunction with the TCEQ WAM Run 3, to evaluate environmental flows for new surface water WMSs. FRAT converts between monthly time step simulations and daily time step simulations.	The FRAT will be used, in conjunction with the TCEQ WAM Run 3, to evaluate environmental flows for new surface water WMSs. FRAT converts between monthly time step simulations and daily time step simulations.
Surface Water	Anticipated sedimentation was incorporated into WAM Run 3 models and the Region L WAM. The storage volume/surface area (SV/SA) tables for Canyon Reservoir, Victor Braunig Lake, Calaveras Lake, and Coleto-Creek Reservoir were adjusted to reflect sedimentation for the 2020 and 2070 planning decades.	Anticipated sedimentation was incorporated into WAM Run 3 models and the Region L WAM. The SV/SA tables for Canyon Reservoir, Victor Braunig Lake, Calaveras Lake, and Coleto-Creek Reservoir were adjusted to reflect sedimentation for the 2030 and 2080 planning decades.
Surface Water	Evaluations of WMS and cumulative effects were performed in accordance with environmental flow standards adopted in 30 TAC §298, as applicable.	Evaluations of WMS and cumulative effects were performed in accordance with environmental flow standards adopted in 30 TAC §298, as applicable.
Surface Water	Period of record for simulations: Guadalupe- San Antonio River Basin (1934-89, Critical Drought = 1950s) and Nueces River Basin (1934-97, Critical Drought = 1990s)	Period of record for simulations: Guadalupe-San Antonio River Basin (1934-89, Critical Drought = 1950s) and Nueces River Basin (1934-97, Critical Drought = 1990s)

Assumption Category	2021 SCTRWP	2026 SCTRWP
Surface Water	For all areas within the planning region, livestock water demand is generally assumed to be supplied 50% from quantified groundwater sources and 50% from local surface water and unquantified groundwater sources such as stock tanks, streams, and windmills.	For all areas within the planning region, livestock water demand is generally assumed to be supplied 50% from quantified groundwater sources and 50% from local surface water and unquantified groundwater sources such as stock tanks, streams, and windmills.
Groundwater	Groundwater availabilities were provided by TWDB as modeled available groundwater (MAG) estimates or desired future condition (DFC) compatible groundwater availability estimates, except in the following instances where the SCTRWPG developed RWPG-estimated groundwater availabilities: • Trinity Aquifer: Bexar County • Edwards-Balcones Fault Zone (BFZ) Aquifer in Portions Regulated by the Edwards Aquifer Authority (EAA): Atascosa, Bexar, Comal, Guadalupe, Haus, Medina, and Uvalde Counties • Edwards-BFZ Aquifer: Frio County • Leona Gravel Aquifer: Medina County • San Marcos River Alluvium Aquifer: Caldwell County	Groundwater availabilities were provided by TWDB as MAG estimates or DFC compatible groundwater availability estimates, except in the following instances where the SCTRWPG developed RWPG-estimated groundwater availabilities: • Carrizo Wilcox Aquifer: Karnes County • Edwards-BFZ Aquifer in Portions Regulated by the EAA: Atascosa, Bexar, Comal, Guadalupe, Haus, Medina, and Uvalde Counties • Edwards-BFZ Aquifer: Frio County • Leona Gravel Aquifer: Medina County • San Marcos River Alluvium Aquifer: Caldwell County
Groundwater	MAG and DFC-compatible groundwater availabilities were sourced from the following TWDB MAG Reports that were published by TWDB on or before June 1, 2018: • GR16-026 MAG (Groundwater Management Area [GMA] 7); • GR16-023 MAG (GMA 9) • GR16-033 MAG (GMA 10) • GR17-027 MAG (GMA13) • GR16-025 MAG (GMA 15)	MAG and DFC-compatible groundwater availabilities were sourced from the following TWDB MAG Reports that were published on or before April 12, 2023: • GR21-012 MAG (GMA 7); • GR21-014 MAG (GMA 9) • GR21-015 MAG (GMA 10) • GR21-018 MAG (GMA 13) • GR21-020 MAG (GMA 15)
Groundwater	Allocations of existing supplies and future supplies (as WMS supply volumes) in an aquifer/county/basin were performed in accordance with TWDB rules that require total supplies to be less than or equal to groundwater availabilities, preventing any overallocation.	Allocations of existing supplies and future supplies (as WMS supply volumes) in an aquifer/county/basin were performed in accordance with TWDB rules that require total supplies to be less than or equal to groundwater availabilities, preventing any overallocation.

Assumption Category	2021 SCTRWP	2026 SCTRWP
Groundwater	For evaluations of existing supplies, groundwater was allocated to individual WUGs using the process documented in Section 3.1.2 of the 2021 SCTRWP. This methodology uses information from WUG surveys, water demand projections, historical water use groundwater pumping information, and infrastructure capacities.	For evaluations of existing supplies, groundwater was allocated to individual WUGs using the process documented in Section 3.4 of the 2026 SCTRWP. This methodology uses information from WUG surveys, historical water use groundwater pumping information, and infrastructure capacities.
Groundwater	When evaluating existing supplies, WMS evaluations, and cumulative effects evaluation, the SCTRWPG will use the process established during the 2016 Planning Cycle (Section 8.3.1 of the 2016 SCTRWP) to determine the amount of groundwater allocated to individual groundwater permits.	It should be noted that for long-term planning purposes, programs contained within the EAHCP and associated with its fifteen-year incidental take permit may be adjusted as the plan is resubmitted for approval upon the expiration of the permit in 2028.
Reuse	For evaluations of reuse availabilities, existing supplies, and future supplies (as WMS supply volumes), reuse volumes were estimated based on the estimates of water returned to a utility's wastewater treatment plants (WWTPs) for each decade, less the amount of reuse volumes already being utilized as existing supplies. The amount of water returned to a utility's WWTP was estimated using information from WWTP owners and operators, discharge permits, and site-specific information, such as projected water demands, adjusted for water conservation and drought management strategies. If discharge permit information was used, the amount of water returned to a utility was estimated to be 50% of the utility's permitted design flow.	For evaluations of reuse availabilities, existing supplies, and future supplies (as WMS supply volumes), reuse volumes were estimated based on the estimates of water returned to a utility's WWTPs for each decade, less the amount of reuse volumes already being utilized as existing supplies. The amount of water returned to a utility's WWTP was estimated using information from WWTP owners and operators, discharge permits, and site-specific information, such as projected water demands, adjusted for water conservation and drought management strategies. If discharge permit information was used, the amount of water returned to a utility was estimated to be 50% of the utility's permitted design flow. For discharge permits with multiple phases, estimates for the near-term decade (2030) were based on 50% of the design flow in the Existing or Interim I Phase; for decades 2040-2080, estimates were based on 50% of the design flow in the Final Phase.

9.3.3 Source Water Availability

Water sources in the SCTRWPA include groundwater from 16 aquifers and surface water within nine river and coastal basins. Treated effluent from wastewater treatment plants, called reclaimed water or reuse, is also considered as a water supply source. Figure 9-4 shows that groundwater availability has increased during the 2026 planning cycle and remains relatively constant through 2080.

Surface water sources in the SCTRWPA include run-of-river, major reservoirs, and local surface water. Surface water availability accounts for about 15% of water availability in the region and is greater in each decade of the 2026 SCTRWP, compared to the 2021 SCTRWP (Figure 9-5).

The total water availability is notably higher throughout the planning period in the 2026 SCTRWP. Availability ranges from 1,628,668 acft/yr in 2030 to 1,770,607 acft/yr in 2080, averaging 1,721,402 acft/yr in the 2026 SCTRWP. Whereas the average total source availability in the 2021 SCTRWP was 1,484,230 acft/yr (Figure 9-6). Total water availability includes surface water, groundwater, and reuse availabilities. In the 2026 SCTRWP, reuse availability is approximately 100,000 acft/yr higher than in the 2021 SCTRWP, contributing to the difference in total availability between the two plans.

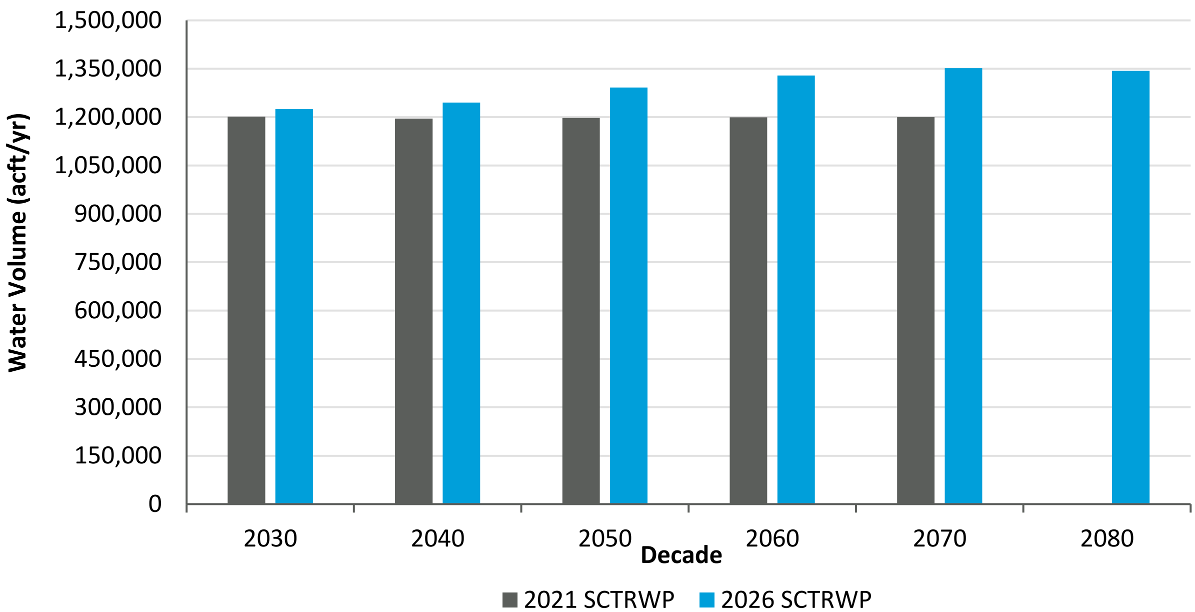

Figure 9-4 Groundwater Availability

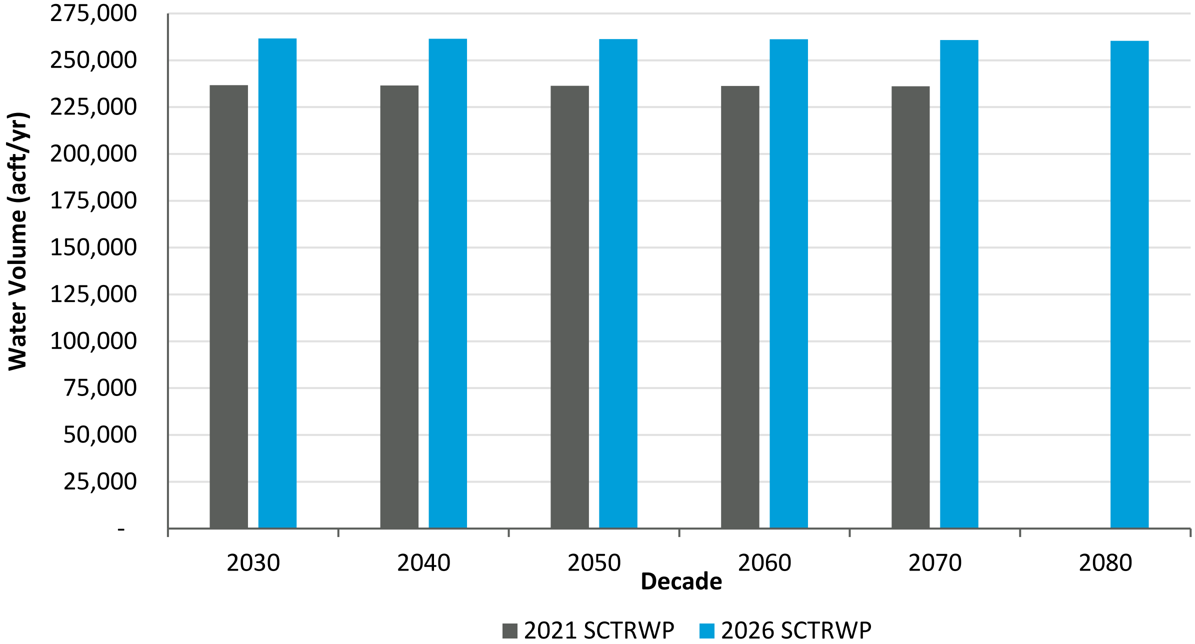

Figure 9-5 **Surface Water Availability**

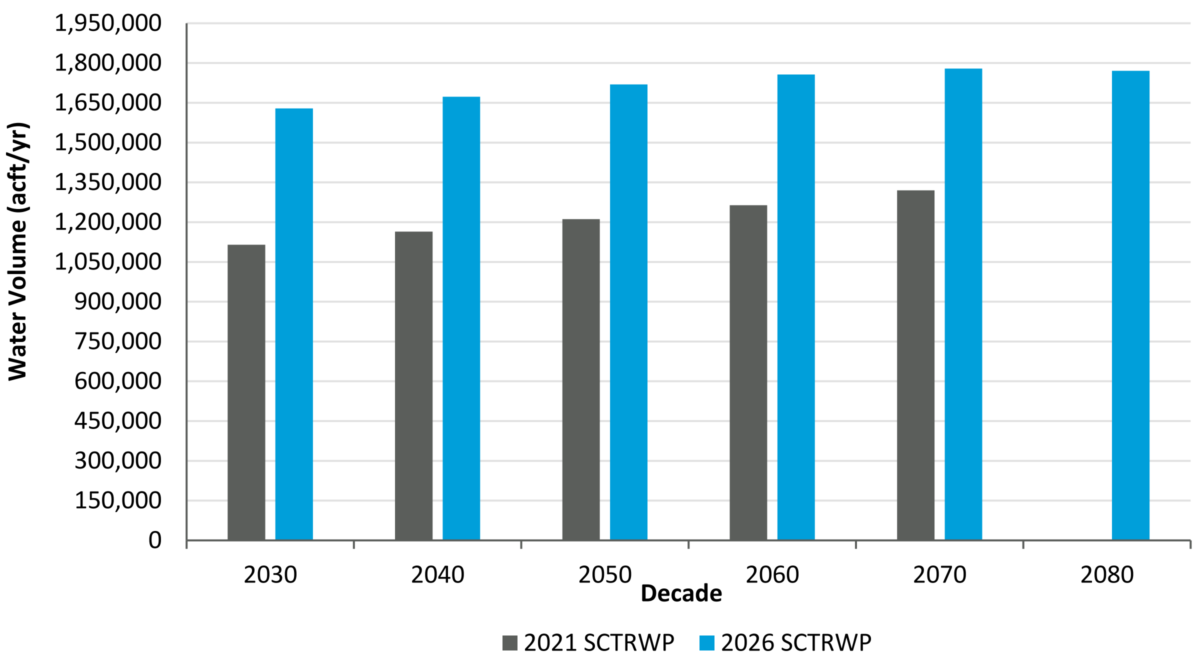

Figure 9-6 **Total Water Availability**

9.3.4 Existing Water Supplies

Existing water supplies in the 2026 SCTRWP have increased since those projected in the 2021 SCTRWP. Existing municipal supplies in the 2026 SCTRWP have increased, on average, by 155,368 acft/yr from 2030 through 2070 compared to the 2021 SCTRWP (Figure 9-7). Existing water supplies for non-municipal WUGs in the 2026 SCTRWP have increased by an average of 59,442 acft/yr from 2030 to 2070 compared to the 2021 SCTRWP (Figure 9-8). Finally, total existing supplies in the 2026 SCTRWP have increased by an average of 214,810 acft/yr compared to the 2021 SCTRWP. The most significant difference is in the 2040 decade where the 2026 SCTRWP projects existing water supplies to be 221,574 acft/yr more than in the 2021 SCTRWP (Figure 9-9).

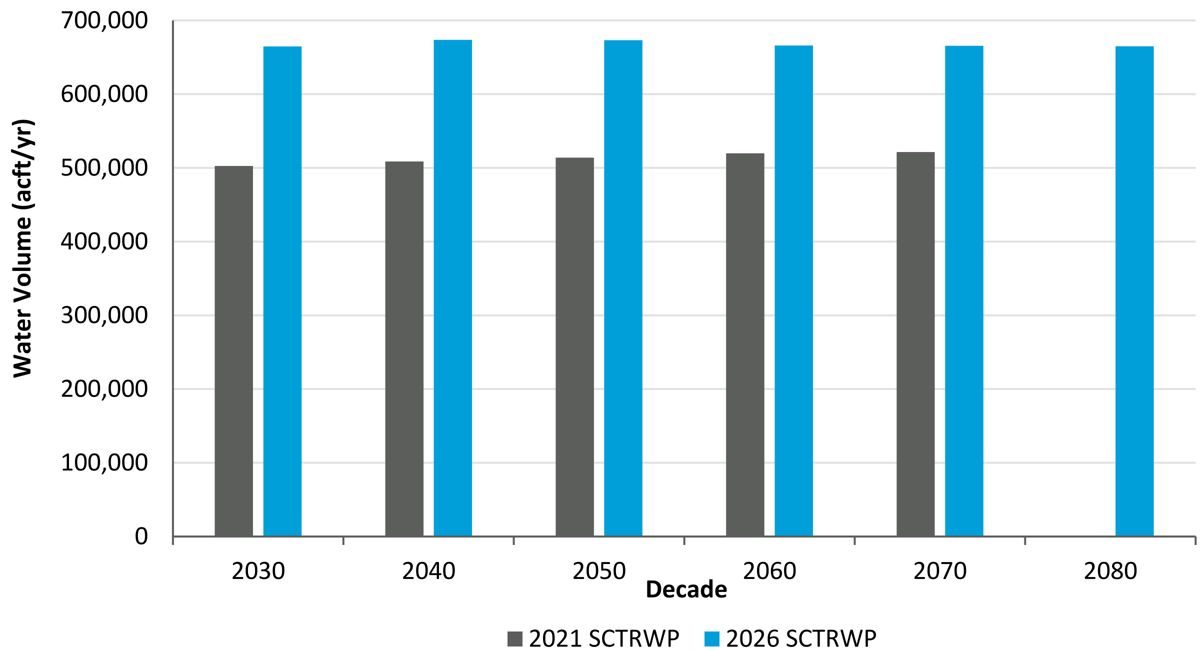

Figure 9-7 Existing Water Supplies for Municipal Water User Groups

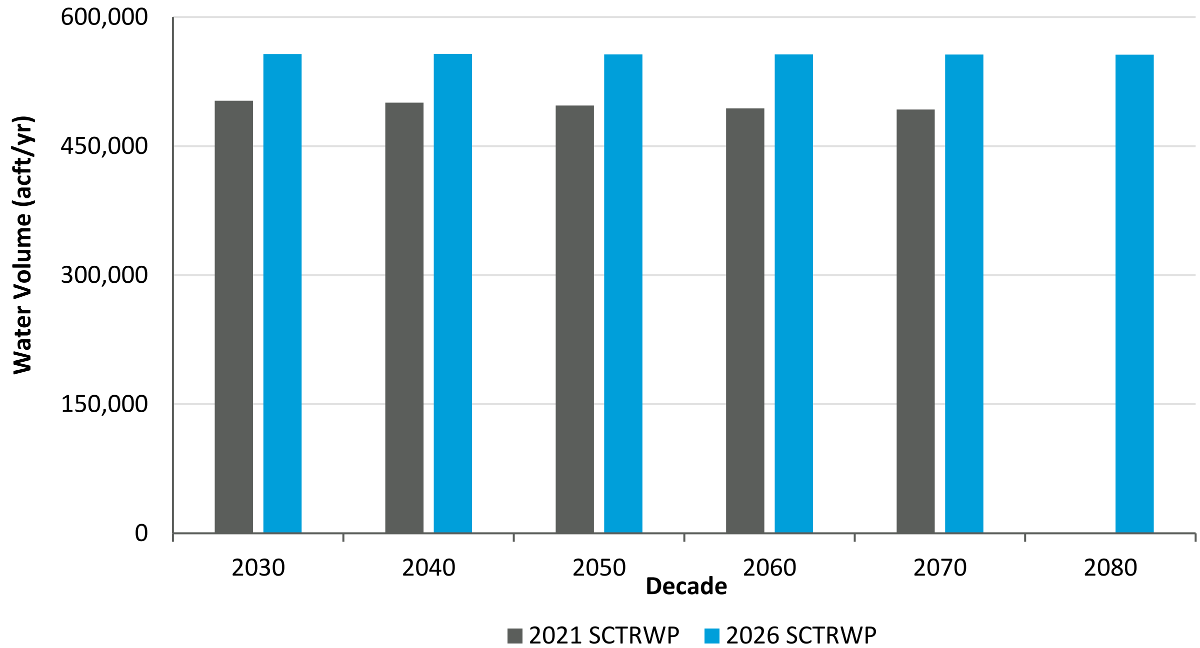

Figure 9-8 Existing Water Supplies for Non-Municipal Water User Groups

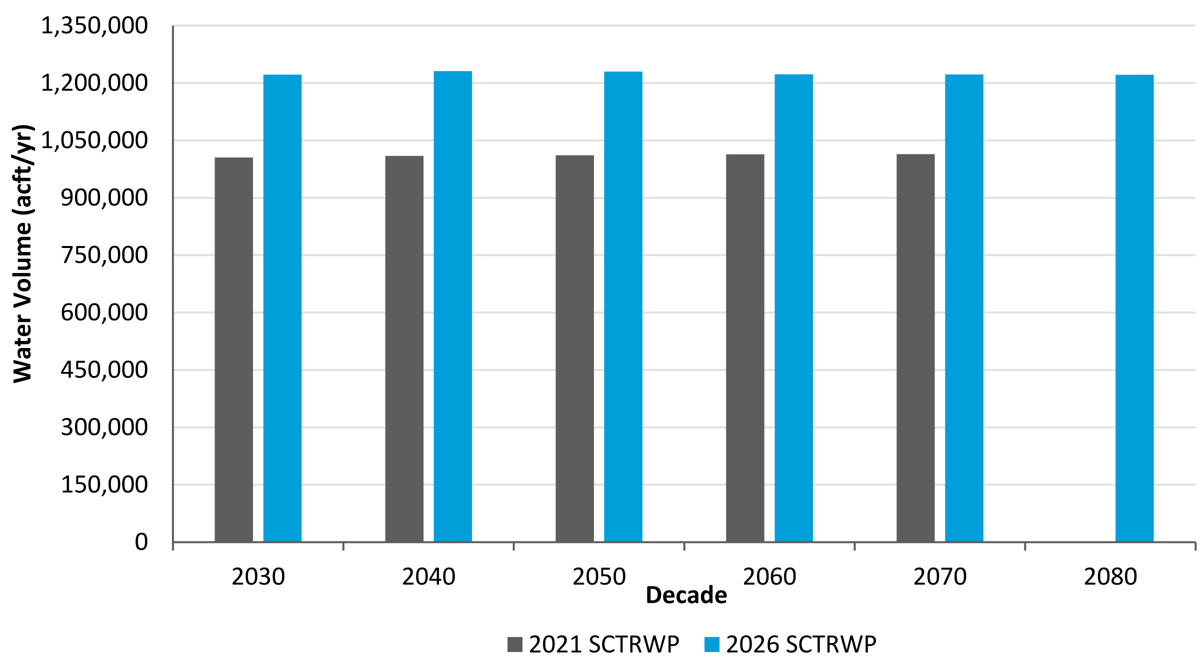

Figure 9-9 Existing Water Supplies for All Water User Groups

9.3.5 Identified Water Needs

Municipal need projections increase for each decade in both the 2021 and 2026 SCTRWPs (Figure 9-10). Non-municipal need projections have decreased in the 2026 SCTRWP compared to the 2021 SCTRWP (Figure 9-11), which is probably a function of the decreased non-municipal demand projections between the 2021 SCTRWP and the 2026 SCTRWP. The total identified water needs in the 2026 SCTRWP increase from 185,132 acft/yr in 2030 to 513,578 acft/yr in the 2080 decade (Figure 9-12).

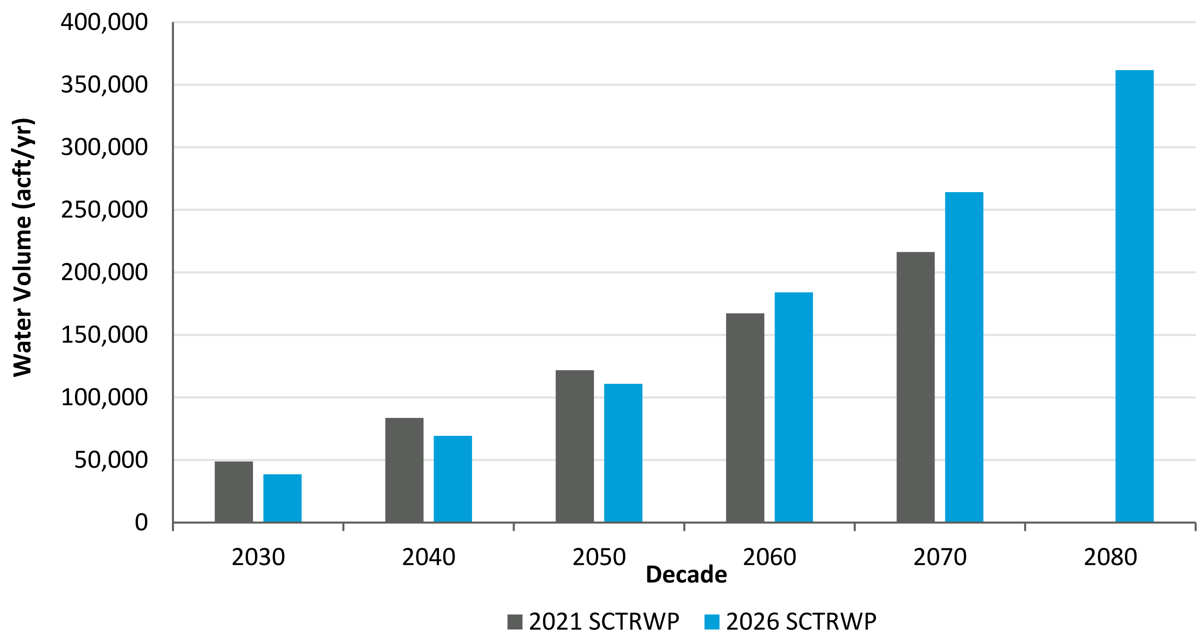

Figure 9-10 Municipal Water Needs

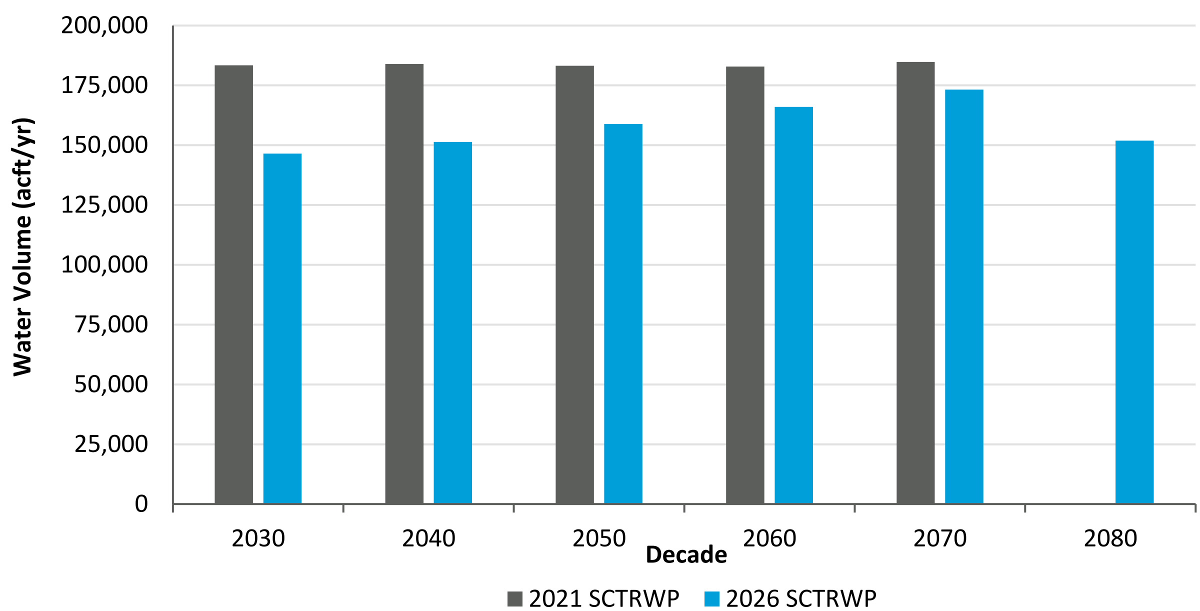

Figure 9-11 Non-Municipal Water Needs

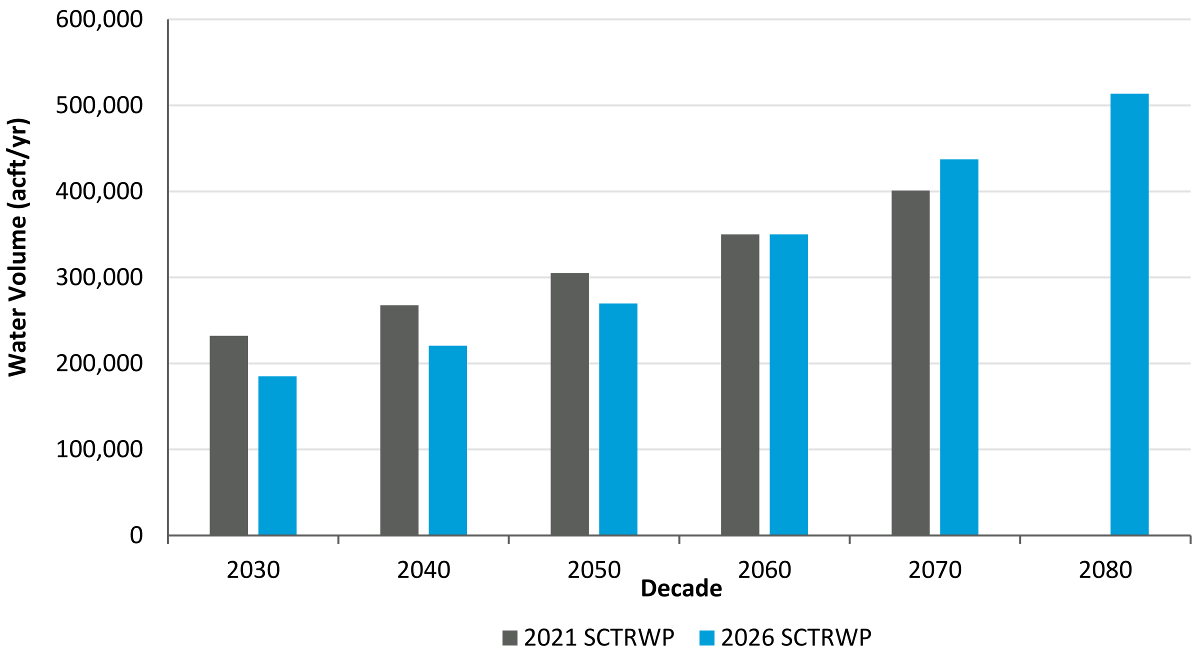

Figure 9-12 Total Identified Water Needs

9.3.6 Recommended and Alternative Water Management Strategies and Water Management Strategy Projects

The volume of recommended and alternative WMSs in the 2026 SCTRWP is 221,011 acft/yr greater than the 2021 SCTRWP. The volume of recommended and alternative strategies in the 2026 Plan for the final decade of the planning horizon (2080) is 932,788 acft/yr and 25,000 acft/yr, respectively. The volume of recommended strategies and alternative strategies in the 2021 SCTRWP for the final decade of the planning horizon (2070) is 736,777 acft/yr and 0 acft/yr, respectively. The 2021 SCTRWP did not include any alternative strategies; whereas the 2026 SCTRWP includes one alternative strategy (Recycled Water – San Antonio Water System, Direct Potable Reuse Project).

The 2021 SCTRWP recommended 92 WMSs and the 2026 SCTRWP recommends 370 WMSs. The greater number of WMSs in the 2026 SCTRWP can primarily be attributed to how the Municipal Water Conservation WMSs were characterized in the 2027 Regional and State Water Planning Database (DB27). In the 2026 SCTRWP, there are 256 Municipal Water Conservation WMSs; generally, each municipal WUG has a water use reduction strategy and a water loss mitigation strategy. However, the 2021 SCTRWP only included one Municipal Water Conservation WMS that benefited municipal WUGs.

The 2021 SCTRWP included 57 WMSPs; whereas the 2026 SCTRWP includes 348 WMSPs. Similarly, the difference in the number of WMSPs between the two SCTRWPs is primarily due to the approach used to characterize Municipal Water Conservation WMSPs in DB27. In the 2021 SCTRWP, there were no Municipal Conservation WMSPs; whereas the 2026 SCTRWP includes 139 Advanced Metering and Water Use Reduction Improvements WMSPs and 116 Leak Detection and Repair-Pipeline Replacement WMSPs. Both of these WMSPs are associated with the Municipal Water Conservation WMSs.

Appendix 9A: Implementation Survey Results

Appendix 9A: Implementation Survey Results

Column A	Column B	Column C	Column D	Column E	Column F	Column G	Column H	Column I	Column J	Column K	Column L	Column M
Planning Region	WMS or WMS Project Name	Database Online Decade	Related Sponsor Entity and/or Benefitting WUGs	Implementation Survey Record Type	Database ID	Has the sponsor taken affirmative vote or actions? (TWC 16.053(h)(10))	What is the status of the WMS project or WMS recommended in the 2022 SWP?	If the project has not been started or no longer is being pursued, please explain why by adding information in this column.	Please select one or more project impediments. If an impediment is not listed, select "Other" and provide information in Column K.	If you selected "Other" in Column J, please provide information about project impediments not shown in the impediment list provided.	What funding type(s) are being used for the project? (Select all that apply)	Optional Comments
L	ARWA Phase 3	2060	Project Sponsor(s): Alliance Regional Water Authority	Recommended WMS Project	4137	No	Project/WMS not started	The project is not needed until the 2060 decade, so effort has not been expended on it at this point in time	Economic feasibility/financing		Unknown	
L	ARWA/GBRA Shared Facilities Project	2020	Project Sponsor(s): Guadalupe-Blanco River Authority; Alliance Regional Water Authority	Recommended WMS Project	2665	Yes	Project/WMS started		Other	Delays in acquiring easements and delays in construction completion.	State	
L	Boerne Non-Potable Reuse Project	2020	Project Sponsor(s): Boerne	Recommended WMS Project	4202	No	Project/WMS completed				Unknown	
L	Brackish Wilcox Groundwater for SS WSC	2060	Project Sponsor(s): S S WSC	Recommended WMS Project	2210	No	Project/WMS not started	Project will start once access to Carrizo waters begins to diminish and/or is no longer viable to support our water provision requirements.	Other	Time has not come to start this backup project yet. When it does, however, the permitting process will not be fun and neither will paying for it.	State; Federal; Private	As to funding, SS WSC will avail itself of any funding available to build out this capacity as needed.
L	Drought Management - Kirby	2020	WUG Reducing Demand: Kirby	Recommended Demand Reduction Strategy Without WMS Project	11148	Yes	Project/WMS completed				Unknown	
L	Drought Management - Leon Valley	2020	WUG Reducing Demand: Leon Valley	Recommended Demand Reduction Strategy Without WMS Project	11152	Yes	Project/WMS completed					We have a critical drought management ordinance which is funded by the city.
L	Drought Management - S S WSC	2020	WUG Reducing Demand: S S WSC	Recommended Demand Reduction Strategy Without WMS Project	32759	Yes	Project/WMS started		Other	Folks who insist on dumping 100,000 gals/mo. of treated water on the ground for St. Augustine lawns in the Texas August heat at noon, and folks who don't care about money (pay $3,000 water bills/mo. and not batting an eye). State needs to mandate zeroscaping or ban watering lawns with municipal/public water resources (private irrigation wells can be exempt).	Private	SS WSC uses year-round conservation via our Drought Response Plan as included in our Tariff.
L	Drought Management - SAWS	2020	WUG Reducing Demand: San Antonio Water System	Recommended Demand Reduction Strategy Without WMS Project	32619	Yes	Project/WMS completed		Other	No impediments. Project completed.	Unknown	

Planning Region	WMS or WMS Project Name	Database Online Decade	Related Sponsor Entity and/or Benefitting WUGs	Implementation Survey Record Type	Database ID	Has the sponsor taken affirmative vote or actions? (TWC 16.053(h)(10))	What is the status of the WMS project or WMS recommended in the 2022 SWP?	If the project has not been started or no longer is being pursued, please explain why by adding information in this column.	Please select one or more project impediments. If an impediment is not listed, select "Other" and provide information in Column K.	If you selected "Other" in Column J, please provide information about project impediments not shown in the impediment list provided.	What funding type(s) are being used for the project? (Select all that apply)	Optional Comments
L	Drought Management - Seguin	2020	WUG Reducing Demand: Seguin	Recommended Demand Reduction Strategy Without WMS Project	32764	Yes	Project/WMS completed		Contract/permit constraints		Private	
L	Drought Management - The Oaks WSC	2020	WUG Reducing Demand: The Oaks WSC	Recommended Demand Reduction Strategy Without WMS Project	32769	No	Project/WMS started		Economic feasibility/financing		Private	
L	Drought Management - Universal City	2020	WUG Reducing Demand: Universal City	Recommended Demand Reduction Strategy Without WMS Project	11178	Yes	Project/WMS completed		Water supply constraints		Unknown	
L	Edwards Transfers	2020	WMS Supply Recipient: Leon Valley	Recommended WMS Supply Without WMS Project	18461	Yes	Project/WMS not started	Not sure how to answer these questions.	Water supply constraints		Private	The City funds all water transfers.
L	Edwards Transfers	2020	WMS Supply Recipient: Leon Valley	Recommended WMS Supply Without WMS Project	18463	Yes	Project/WMS not started	Not sure how to answer these questions.	Water supply constraints		Private	The City funds all water transfers.
L	Edwards Transfers	2020	WMS Supply Recipient: Universal City	Recommended WMS Supply Without WMS Project	100612	Yes	Project/WMS completed		Economic feasibility/financing; Water supply constraints; Contract/permit constraints		Unknown	
L	Edwards Transfers	2030	WMS Supply Recipient: Universal City	Recommended WMS Supply Without WMS Project	100614	Yes	Project/WMS completed		Economic feasibility/financing; Water supply constraints; Contract/permit constraints		Unknown	
L	Entity Purchase to Meet Shortages - SAWS	2020	WMS Seller: San Antonio Water System; WMS Supply Recipient: Kirby	Recommended WMS Supply Without WMS Project	101055	Yes	Project/WMS completed				Unknown	
L	Entity Purchase to Meet Shortages - SAWS	2020	WMS Seller: San Antonio Water System; WMS Supply Recipient: The Oaks WSC	Recommended WMS Supply Without WMS Project	101028	No	Project/WMS no longer being pursued					
L	Fair Oaks Ranch Non-Potable Reuse Project	2030	Project Sponsor(s): Fair Oaks Ranch	Recommended WMS Project	4203	Yes	Project/WMS started		Shift in timeline; Contract/permit constraints; Other	Easement acquisition	Unknown	City plans to issue bonds to fund this project.
L	FE - CPS Direct Recycle Pipeline	2030	Project Sponsor(s): San Antonio Water System	Recommended WMS Project	2107	Yes	Project/WMS not started	TBD. This water management strategy is assigned to CPS Energy. This should not have been included in SAWS implementation survey	Other	TBD	Unknown	This is a CPS Energy Water Management Strategy.

Planning Region	WMS or WMS Project Name	Database Online Decade	Related Sponsor Entity and/or Benefitting WUGs	Implementation Survey Record Type	Database ID	Has the sponsor taken affirmative vote or actions? (TWC 16.053(h)(10))	What is the status of the WMS project or WMS recommended in the 2022 SWP?	If the project has not been started or no longer is being pursued, please explain why by adding information in this column.	Please select one or more project impediments. If an impediment is not listed, select "Other" and provide information in Column K.	If you selected "Other" in Column J, please provide information about project impediments not shown in the impediment list provided.	What funding type(s) are being used for the project? (Select all that apply)	Optional Comments
L	FE - NBU Seguin Interconnect	2020	Project Sponsor(s): New Braunfels	Recommended WMS Project	4244	Yes	Project/WMS not started	The supply is available; however, it is not immediately needed for NBU's system. NBU is currently working through infrastructure options with other entities to make best use of this water for others or for NBU in the future.	Shift in timeline		Unknown	
L	FE - NBU South WTP Expansion	2030	Project Sponsor(s): New Braunfels	Recommended WMS Project	4243	No	Project/WMS not started	Not scheduled to start.				
L	FE - SAWS Expanded ASR Treatment Plant	2030	Project Sponsor(s): San Antonio Water System	Recommended WMS Project	4245	Yes	Project/WMS started		Other	No impediments at this time. On schedule.	Unknown	Project on time for 2030 completion.
L	FE - SAWS Western Integrated Pipeline (Phase 2)	2020	Project Sponsor(s): San Antonio Water System	Recommended WMS Project	2339	Yes	Project/WMS completed		Other	No impediments as the project is completed and online	Unknown	Project Completed.
L	Municipal Water Conservation	2020	WUG Reducing Demand: Fair Oaks Ranch	Recommended Demand Reduction Strategy Without WMS Project	31652	Yes	Project/WMS started					City Water Conservation Plan and Drought Contingency Plan revised in 2023, and additional water use restrictions being considered in 2025.
L	Municipal Water Conservation	2050	WUG Reducing Demand: Kyle	Recommended Demand Reduction Strategy Without WMS Project	31703	Yes	Project/WMS started		Other	This is an evergreen WMP		Funded through City funds
L	Municipal Water Conservation	2020	WUG Reducing Demand: New Braunfels	Recommended Demand Reduction Strategy Without WMS Project	31805	Yes	Project/WMS started					
L	Municipal Water Conservation	2060	WUG Reducing Demand: S S WSC	Recommended Demand Reduction Strategy Without WMS Project	8734	Yes	Project/WMS started		Other	See response in previous section regarding water conservation.	Private	See previous responses about drought conservation.
L	Municipal Water Conservation	2020	WUG Reducing Demand: San Antonio Water System	Recommended Demand Reduction Strategy Without WMS Project	31860	Yes	Project/WMS completed		Other	No impediments.	Unknown	Ongoing water management strategy.
L	Municipal Water Conservation	2050	WUG Reducing Demand: Seguin	Recommended Demand Reduction Strategy Without WMS Project	31883	Yes	Project/WMS completed		Contract/permit constraints		Private	
L	Municipal Water Conservation	2020	WUG Reducing Demand: Sunko WSC	Recommended Demand Reduction Strategy Without WMS Project	8716	Yes	Project/WMS completed				Private	
L	Municipal Water Conservation	2060	WUG Reducing Demand: Universal City	Recommended Demand Reduction Strategy Without WMS Project	31934	Yes	Project/WMS completed		Economic feasibility/financing; Water supply constraints		Unknown	

Planning Region	WMS or WMS Project Name	Database Online Decade	Related Sponsor Entity and/or Benefitting WUGs	Implementation Survey Record Type	Database ID	Has the sponsor taken affirmative vote or actions? (TWC 16.053(h)(10))	What is the status of the WMS project or WMS recommended in the 2022 SWP?	If the project has not been started or no longer is being pursued, please explain why by adding information in this column.	Please select one or more project impediments. If an impediment is not listed, select "Other" and provide information in Column K.	If you selected "Other" in Column J, please provide information about project impediments not shown in the impediment list provided.	What funding type(s) are being used for the project? (Select all that apply)	Optional Comments
L	Municipal Water Conservation	2020	WUG Reducing Demand: Boerne	Recommended Demand Reduction Strategy Without WMS Project	8610	No	Project/WMS completed				Unknown	
L	Municipal Water Conservation	2020	WUG Reducing Demand: Kenedy	Recommended Demand Reduction Strategy Without WMS Project	8682	No	Project/WMS not started	not aware of any project. need more information	Other	not enough details about project	Unknown	need more information about the project to make a more inform decision.
L	Municipal Water Conservation	2020	WUG Reducing Demand: Leon Valley	Recommended Demand Reduction Strategy Without WMS Project	31709	No	Project/WMS not started	We are experiencing a major increase in development and are increasing our water supply accordingly	Water supply constraints			The City Purchases all water rights.
L	Municipal Water Conservation	2020	WUG Reducing Demand: Moore WSC	Recommended Demand Reduction Strategy Without WMS Project	31815	No	Project/WMS completed		Economic feasibility/financing		Federal	
L	Municipal Water Conservation	2020	WUG Reducing Demand: Schertz	Recommended Demand Reduction Strategy Without WMS Project	31887	No	Project/WMS not started	Projects are planned for subsequent planning cycles. We are supporting other sponsors for regional needs.	Shift in timeline		Unknown	
L	Municipal Water Conservation	2020	WUG Reducing Demand: The Oaks WSC	Recommended Demand Reduction Strategy Without WMS Project	8736	No						
L	NBU - Trinity Development	2030	Project Sponsor(s): New Braunfels	Recommended WMS Project	1815	Yes	Project/WMS started				State	
L	New Braunfels Utilities ASR	2020	Project Sponsor(s): New Braunfels	Recommended WMS Project	2437	Yes	Project/WMS started				State	
L	Recycled Water Program - SAWS	2030	Project Sponsor(s): San Antonio Water System	Recommended WMS Project	2105	No	Project/WMS not started	Not yet the decade identified for implementation	Other	Not yet the decade identified for implementation	Unknown	
L	SAWS - Expanded Brackish Wilcox Project	2040	Project Sponsor(s): San Antonio Water System	Recommended WMS Project	2338	Yes	Project/WMS not started	Not yet the identified decade of need.	Other	Not yet the decade identified for implementation	Unknown	Not yet the decade identified for implementation
L	SAWS - Expanded Local Carrizo	2040	Project Sponsor(s): San Antonio Water System	Recommended WMS Project	2103	Yes	Project/WMS not started	Included in future CIP budget. Project comes on line in approx 2031 and 2032 for Phases 1 and 2	Other	No impediments at this time.	Unknown	Project on schedule for implementation.
L	SAWS Advanced Meter Infrastructure	2020	Project Sponsor(s): San Antonio Water System	Recommended WMS Project	4322	Yes	Project/WMS completed		Other	No impediments as the project is to be completed by the end of 2025.	Unknown	Project on schedule for completion by the end of 2025.

INITIALLY PREPARED PLAN

CHAPTER 10: PUBLIC PARTICIPATION AND PLAN ADOPTION

South Central Texas Regional Water Plan

B&V PROJECT NO. 411170

PREPARED FOR

South Central Texas Regional Water Planning Group

3 MARCH 2025

BLACK & VEATCH

Table of Contents

List of Abbreviations

IPP	Initially Prepared Plan
Region J	Plateau Region
Region K	Lower Colorado Region
Region L	South Central Texas Region
Region M	Rio Grande Region
Region N	Coastal Bend Region
Region P	Lavaca Region
RWPG	Regional Water Planning Group
SCTRWP	South Central Texas Regional Water Plan
SCTRWPG	South Central Texas Regional Water Planning Group
TAC	Texas Administrative Code
TWDB	Texas Water Development Board
WMS	Water Management Strategy
WUG	Water User Group
WWP	Wholesale Water Provider

10.0 Public Participation and Plan Adoption

Public participation and engagement are foundational elements of the regional water planning process. Development of the 2026 South Central Texas (Region L) Regional Water Plan (SCTRWP) was accomplished through quarterly South Central Texas Regional Water Planning Group (SCTRWPG) meetings, workgroup meetings, coordination with water user groups (WUGs) and wholesale water providers (WWPs), coordination with other planning regions, and active public participation throughout the planning process. This chapter documents these key activities, including the Plan Enhancement Process, Interregional Coordination, public participation, and adoption of the Initially Prepared Plan (IPP) and Final SCTRWP.

10.1 Plan Enhancement Process

Beginning in 2015 and following submittal of the final 2016 SCTRWP, the SCTRWPG undertook the 2021 Plan Enhancement Process whereby the planning group, as a whole, discussed and took appropriate action to (1) thoroughly consider comments received from agencies and members of the public; and (2) improve the 2021 SCTRWP. The 2021 Plan Enhancement Process sought to improve and clarify the principles that guide SCTRWPG decisions. The result of the 2021 Plan Enhancement Process was establishment of the SCTRWPG Guiding Principles. These Guiding Principles were subsequently reviewed and updated for the 2026 planning cycle, and are included in Appendix 5A of Chapter 5.

The Guiding Principles serve as a touchstone for which to reference when the SCTRWPG makes decisions. The Guiding Principles also seek to reconcile competing interests at the onset of the planning process, develop a shared understanding of the approach to regional water planning, and encourage consensus-based decision making throughout the planning cycle.

The following provides a list of the 11 Guiding Principles:

- Appropriateness and adequacy of how demand and need are determined;
- Role of Regional Water Planning Groups in influencing population growth and land use;
- Conflicts of interests with respect to planning group members;
- The role of the planning group in influencing water development plans of water suppliers;
- The role of the planning group in influencing permitting entities;
- The adequacy of evaluating the plan's effects on freshwater inflows to San Antonio Bay, and the adequacy of environmental assessments of individual water management strategies (WMSs);
- Minimum standards for WMSs;
- Recommended WMSs;
- Management supply;
- The role of reuse within the Regional Water Plan; and
- Identifying special studies or evaluations deemed important to enhance the 2021 Plan, the identification of outside funding sources, and the extent to which innovative strategies should be used.

10.2 Interregional Coordination

The SCTRWPA is bordered by five adjacent planning areas, including: Plateau (Region J), Lower Colorado (Region K), Rio Grande (Region M), Coastal Bend (Region N), and Lavaca (Region P). Notably, Hays County is split between Region L and Region K. Coordination with Region K was required for existing water supplies from Canyon Lake, as well as for shared WUGs in Hays and Caldwell Counties. Coordination with Region P was required for existing water supplies and potential water management strategy supplies provided by the Lavaca-Navidad River Authority. Coordination with Region N was necessary for shared WUGs in Karnes and Atascosa Counties.

To the extent necessary, coordination with each of these regions was accomplished through chair correspondence, regional water planning group (RWPG) liaisons, and/or technical consultant collaboration. Subjects of coordination, correspondence, or collaboration included projected demands, confirmation of WUG allocations among regions, and specific WMSs of interest. The 2026 SCTRWP includes two recommended WMSs – ARWA Phase 2 and ARWA Phase 3 – that allocate yield to Buda, which is a WUG in Hays County within Region K. The SCTRWPG is aware of no interregional conflicts involving recommended WMSs included in the 2026 SCTRWP.

10.3 Public Participation

Public participation was integral to all phases of development of the 2026 SCTRWP. In accordance with Title 31 of the Texas Administrative Code (TAC) §357.21, the SCTRWPG conducted all business in meetings posted and held in accordance with the Texas Open Meetings Act, Texas Government Code Chapter 551, with a copy of all meeting materials presented or discussed available for public inspection prior to and following public meetings.

The SCTRWPG abides by the Open Meetings Act [1] and Public Information Act [2], which require members of governmental bodies to participate in education training and open records training pursuant to Sections 551.005 and 552.012 of the Texas Government Code, respectively. These Acts in conjunction determine how open meetings are operated and public information is made available to the public. More information can be found on the Office of the Texas Attorney General website (https://www.texasattorneygeneral.gov/). The SCTRWPG met all requirements under the Texas Open Meetings Act and Public Information Act in accordance with 31 TAC §§357.12, 357.21, and 357.50(f).

10.3.1 Regional Water Planning Group Meetings

The SCTRWPG holds quarterly meetings to convene all members of the SCTRWPG to consider and act on items to develop the SCTRWP. To develop the 2026 SCTRWP the SCTRWPG held 18 meetings beginning in February 2021 until the IPP was adopted in February 2025. All SCTRWPG meetings were preceded by required notice and open to the public. Opportunities for public comment were available at the beginning and end of every SCTRWPG meeting, and summaries of public comments received were included in the approved minutes of each meeting. Communication of information was facilitated and supported by the Region L website [3] maintained by the San Antonio River Authority and by the Texas

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[1] Office of the Texas Attorney General. "Open Meetings Act." https://www.texasattorneygeneral.gov/open-government/open-meetings-act-training.

[2] Office of the Texas Attorney General. "Public Information Act." https://www.texasattorneygeneral.gov/open-government/governmental-bodies/pia-and-oma-training-resources/public-information-act-training.

[3] San Antonio River Authority, 2025. "South Central Texas Regional Water Planning Group." Region L Website - http://www.regionltexas.org/.

Water Development Board (TWDB) website [4]. Throughout the planning process, SCTRWPG members, San Antonio River Authority, and the technical and public participation consultants provided responses to inquiries from the public.

10.3.2 Workgroups

As in previous planning cycles, the SCTRWPG established workgroups focused on issues of particular importance or concern to the SCTRWPG. Each workgroup was charged to identify issue(s) and to develop potential resolutions and consensus recommendations for consideration and potential action by the SCTRWPG. Topics of discussion by each workgroup are reflected in the minutes of the SCTRWPG meetings and throughout the 2026 SCTRWP. Support for these workgroups was provided by the plan administrator (San Antonio River Authority), technical and public participation consultants, water utilities, state agencies, groundwater conservation districts, contracted researchers, and other stakeholders. The four workgroups assembled for the 2026 SCTRWP are listed, in alphabetical order, below along with their respective workgroup and/or relevant technical consultant meeting date(s).

- Groundwater Availabilities – April 2024
- Policy and Legislative Recommendations – April 2024, June 2024, July 2024, August 2024, September 2024, December 2024, January 2025
- Population and Water Demands – April 2022, November 2022, December 2022 (three meetings), January 2023, March 2023, April 2023, May 2023, June 2023, July 2023
- Rural Community Outreach – July 2023, April 2024, June 2024, July 2024
- Staff Workgroup – January 2021, April 2021, July 2021, October 2021, January 2022, April 2022, July 2022, October 2022, January 2023, April 2023, July 2023, October 2023, January 2024, April 2024, July 2024, October 2024, January 2025, February 2025

The Staff Workgroup comprises the SCTRWPG Executive Committee, representatives of the plan administrator, the TWDB, water suppliers, and the technical and public participation consultants. The Staff Workgroup meetings are convened at least 1 week in advance of each SCTRWPG meeting. The Staff Workgroup meetings provided an opportunity for preliminary review of materials prepared by the technical and public participation consultants, refinement of SCTRWPG meeting agendas, and preparation of administrative matters for consideration and potential action by the SCTRWPG. Over the course of the 6th planning cycle, there were 41 workgroup meetings.

10.3.3 Coordination with Water User Groups and Wholesale Water Providers

The technical consultant met and/or corresponded with representatives of WWPs and WUGs throughout the development of the 2026 SCTRWP. All WWPs and WUGs were afforded opportunities to provide information and feedback regarding preferred contact information, population projections, water demand projections, existing supplies, drought contingency plans, emergency interconnections, WMSs, and implementation status of WMSs. The majority of these touch points were facilitated through emailed surveys. Outreach efforts included the following:

- Contact survey;
- Overview of regional water planning webinar;

[4] Texas Water Development Board, 2025. "Regional Water Planning." TWDB Website, Regional Water Planning page - http://www.twdb.texas.gov/waterplanning/rwp/index.asp.

- Population and demands survey;
- Evaluation of infeasible projects from the 2021 RWP survey;
- Supplies and strategy survey;
- Water management strategy project implementation surveys;
- Request for updated Drought Contingency Plans;
- Rural outreach letters; and
- Personalized emails to WUGs and WWPs regarding needs and the development of individualized strategies.

The SCTRWPG has been in continuous communication with WWPs and WUGs with regards to contract demands, WMSs, and population and demand projections. These meetings and correspondence generally focused on accurate representation of existing water supplies and contractual commitments, projected water demands, and potentially feasible WMSs sponsored by the WWPs or WUG to meet future needs.

10.3.4 Rural Outreach

The SCTRWPG supports input from all stakeholder groups in the development of this plan. Throughout the planning cycle, the SCTRWPG offered hybrid in-person/virtual planning group and workgroup meetings. As it is important for stakeholders to attend these regular SCTRWPG meetings, this model facilitated greater attendance across the region's geographic area.

The SCTRWPG conducted outreach specifically to rural entities in the planning area to support plan development. The SCTRWPG established the Rural and Community Outreach Workgroup to bring together rural stakeholders to introduce the regional water planning process, facilitate engagement and coordination, gather feedback from stakeholders, and develop strategies to support rural communities. The Rural and Community Outreach Workgroup held four meetings in 2023 and 2024 to discuss WMSs to benefit rural communities and entities. Members of the committee included Adam Yablonski, Travis Pruski, Dianne Wassenich, Roland Ruiz, and Thomas Jungman. The workgroup partnered with or invited the following interest groups to these meetings:

- Region L Members with interests in Agriculture, River Authorities, Water Districts, Small Business, Counties, and Public;
- AgriLife Extension;
- Texas Department of Agriculture;
- TWDB Agricultural Water Conservation Program;
- Texas State Soil & Water Conservation Board;
- Texas Farm Bureau;
- GCD Representatives; and
- County judges.

In March 2024, TWDB identified and compiled a list of 122 entities within the planning area that meet the rural political subdivision definition in accordance with Texas Water Code 15.001(14). As 84 of these entities are also WUGs, these entities also received other surveys and outreach as described in Section 10.3.3. The general response rate to surveys was approximately 40 percent. In May 2024, the SCTRWPG sent letters to these rural entities providing general information regarding Regional and State Water Planning, how to engage with the planning process, and TWDB resources providing key water supply planning information for the recipient's county.

10.4 Initially Prepared Plan Adoption

The IPP was adopted by the SCTRWPG during the regularly-scheduled meeting on February 20, 2025. The approved IPP was submitted to the TWDB and made available for review and comment on March 3, 2025, in accordance with 31 TAC §357.21(h)(7). Copies of the IPP were made available to county clerks and public libraries throughout the region.

10.4.1 Public Hearings and Responses to Comments on Initially Prepared Plan

After submittal of the IPP, a public hearing will be scheduled, and comments will be accepted for a minimum of 60 days following the public hearing. TWDB, other agency, and public comments and responses will be included in an appendix upon final adoption of the 2026 SCTRWP.

10.5 Final Regional Water Plan Adoption

The 2026 SCTRWP will be adopted by a majority vote of the SCTRWPG and submitted to the TWDB by October 20, 2025, for approval and integration into the 2027 State Water Plan.