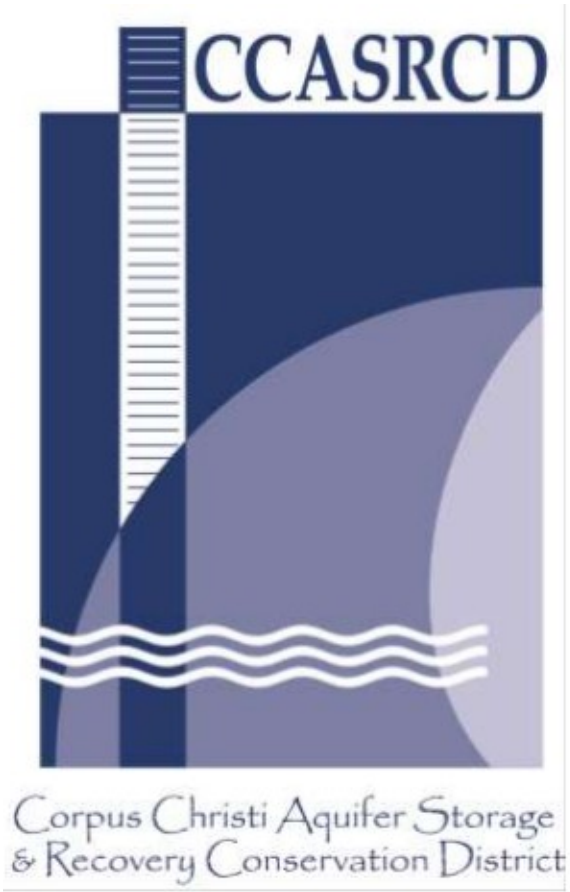


Groundwater Management Plan

for the Corpus Christi Aquifer Storage and Recovery Conservation District (CCASRCD)

Updated from 2014 Groundwater Management Plan to include Five-Year Plan

April 18, 2019

This page is intentionally left blank.

Contents

Tables

Figures

Appendices

Appendix A: Enabling Legislation SB 1831

Appendix B: Interlocal Agreement between the City of Corpus Christi and Corpus Christi Aquifer Storage and Recovery Conservation District for Groundwater Management within District Boundaries

Appendix C: Corpus Christi ASR Conservation District Rules

Appendix D: Evidence of Public Notice and Adoption by District Board

Appendix E: Evidence of Coordination with Regional Surface Water Entities

Appendix F: GAM Run 17-025 MAG: Modeled Available Groundwater for the Gulf Coast Aquifer in Groundwater Management Area 16 (May 19, 2017)

Appendix G: GAM Run Report 18-012: Corpus Christi Aquifer Storage and Recovery Conservation District Management Plan (June 27, 2018)

Appendix H: Estimate Historical Groundwater Use and 2017 State Water Plan Datasets: Corpus Christi Aquifer Storage and Recovery Conservation District (December 11, 2018)

This page is intentionally left blank.

1 Groundwater Management Plan

This groundwater management plan was developed in accordance with 31 Texas Administrative Code (TAC) 356.51– 356.53 and Texas Water Code (TWC) 36.1071 requirements. The Corpus Christi Aquifer Storage and Recovery Conservation District (District) was formed as a result of enabling legislation through Senate Bill No. 1831 (Appendix A).

1.1 District Mission

The District is a groundwater conservation district (GCD) created in accordance with Texas Water Code (TWC) Chapter 36. The primary purposes of the District are to: (1) provide for conservation, preservation, protection, and recharge, (2) prevent waste, and (3) control land surface subsidence. In accordance with GCD requirements, the District prepared a Groundwater Management Plan in 2008 that was subsequently updated in 2013 and 2014. The previous groundwater management plans were approved by the Texas Water Development Board (TWDB). In accordance with TWC 36 and TAC 356.52, this groundwater management plan is developed as a five-year update that meets statutory requirements and includes goals that are both time-based and quantifiable.

The primary goal of the District is to enhance the City of Corpus Christi's (City) water supply, treatment and distribution system through management of an Aquifer Storage and Recovery District, the boundaries of which were described in Senate Bill No. 1831 to be coextensive with the City of Corpus Christi city limits (Appendix A). Through an interlocal agreement, the City and District cooperatively manage, operate, and administer activities of the District (Appendix B). A major consideration when forming the District was to ensure that water stored in an aquifer storage and recovery (ASR) facility could not be diverted by nearby wells.

The District's mission, as presented in the Rules and Regulations of the District (Appendix C), is as follows– The District is committed to the management and protection of groundwater resources of the District, including those injected into the ground for storage and later use. As a basic tenant of this commitment, the District seeks to maintain a sustainable, adequate, reliable, cost effective, and high quality water source to promote the vitality, economy, and environment of the District and greater Corpus Christi area. The District will work with and for the citizens of the District and cooperate with other local, regional, and state agencies involved in the study and management of groundwater resources. The District shall take no action without a full consideration of the groundwater needs of the citizens of the District.

The District's objectives include:

- Seasonal, long-term, and emergency (strategic reserve) storage
- Augmentation of peak storage capacity
- Improving system water quality by maintaining minimum flows during seasons of low demand

- Deferring expansion of some of the water system infrastructure
- Mitigation of streamflow requirements
- Management of stormwater flow and estuary salinity
- Helping to meet large retail customer demands

The location of the District is shown in Figure 1-1. As illustrated on the map, most of the District is located in Nueces County; however, the District also includes very limited parts of Kleberg and San Patricio Counties.

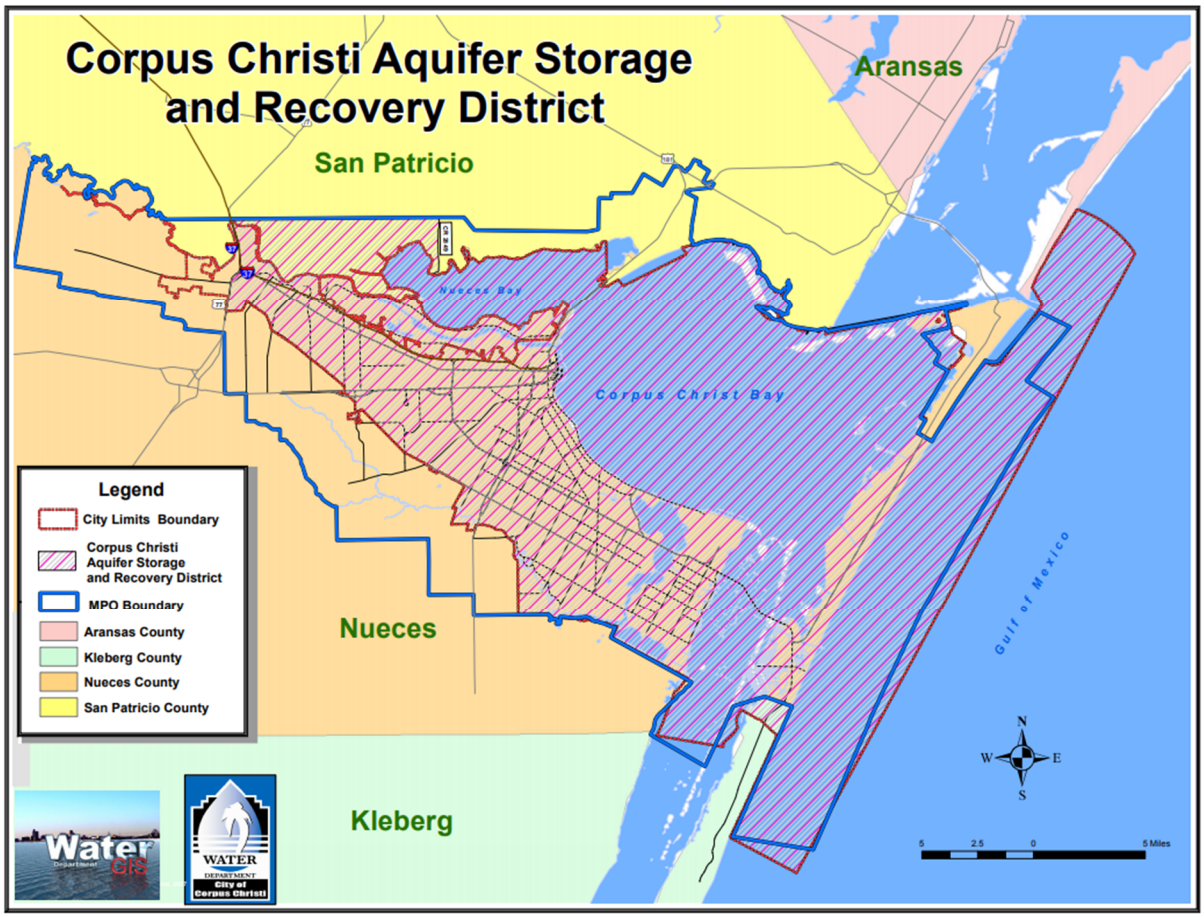


Figure 1-1. Corpus Christi Aquifer Storage and Recovery District

1.2 Purpose and Time Period of the Management Plan

The purpose of the management plan is to specify planning tools and development policies to manage and protect the groundwater resources of the District. The groundwater management plan (GMP) contains estimates of groundwater availability within the District, major groundwater water budget components summarizing water entering and leaving the District's groundwater system, details of how the District manages groundwater, and management goals for the District. The management plan is

supported by technical information provided by the TWDB and other site-specific information available for the District.

The GMP allows the District to act and provide jurisdictional authority and protection in accordance with the requests of the state law. The 75th Texas Legislature (1997) established a statewide comprehensive regional water planning initiative with the enactment of Senate Bill 1 (SB1). SB1 included amendments to Chapter 36 of the Texas Water Code that require groundwater conservation districts to develop a groundwater management plan that shall be submitted to the TWDB for approval as administratively complete. SB1 provides for review and approval of the GMPs by the TWDB. In 2001, the 77th Texas Legislature further clarified the water planning and management provisions of SB1 with the enactment of Senate Bill 2 (SB2) and House Bill (HB) 1763. The administrative requirements of Chapter 36 of the Texas Water Code related to groundwater management plan development are specified in 31 Texas Administrative Code, Chapter 356. This plan has been prepared to fulfill all requirements for groundwater management plans required by SB1, SB2, Chapter 36 Texas Water Code, and 31 Texas Administrative Code Chapter 356.

This plan shall be in effect for a period of five years from the date of approval by the TWDB, unless a new or amended management plan is adopted by the District Board of Directors and certified by the TWDB.

1.3 District Administration

The District is governed by a Board of Directors, comprised of 6 members elected to staggering 2 and 4-year terms. The Board elects officers annually and the officers must be confirmed by the Corpus Christi City Council. If a vacancy occurs, then the Board may appoint a Director to serve the remainder of the term. The District's Board of Directors and Management Staff are listed in Tables 1-1 and 1-2, respectively.

This GMP was considered and adopted at an open meeting on April 18, 2019. Appendix D includes public notice and meeting minutes from the District Board meeting where the GMP was adopted.

The District participates in Region N Regional Water Planning Group meetings, local groundwater management area (GMA) meetings, and with county clerks in counties for which the District has jurisdictional land. Appendix E includes evidence of coordination with regional surface water entities.

Table 1-1. Corpus Christi Aquifer Storage and Recovery Conservation District Board of Directors

Director	Role
Fred Segundo	Chairman/ President
Daniel McGinn	Vice Chairman/ Vice- President
Jeff Edmonds	Secretary
Mark Van Vleck	Director
Sharon Lewis	Director

Table 1-2. Corpus Christi Aquifer Storage and Recovery Conservation District Management Staff

Management Staff	Role
Larijai Francis	Administrator/ General Manager
Lisa Aguilar	Legal Counsel
Itzel Ojeda	Executive Assistant

1.4 Aquifer Setting

1.4.1 Geologic Setting

The Gulf Coast Aquifer system is the primary water-bearing geologic formation beneath the District, with the main hydrogeologic units consisting of the Chicot and Evangeline aquifers. The Beaumont Clay, Lissie Formation, and Goliad Sands are the major stratigraphic units of the Gulf Coast Aquifer, as shown in Figures 1-2 and 1-3. These units are hydrologically interconnected to yield small to moderate supplies of fresh and slightly saline water (Shafer and USGS, 1968). Geologic units of the Gulf Coast Aquifer system dip east toward the coast at a direction roughly perpendicular to the local shoreline and the strike of geologic units is approximately parallel to the shoreline (TWDB, 2010). The source of recharge to groundwater in Nueces County is primarily through precipitation on the outcrop in counties to the northwest and west. The heterogeneous character of the stratigraphic units makes correlation and distinction of individual beds difficult even within short distances, however, it is most important to note that the units are in hydrologic continuity (Shafer and USGS, 1968) as shown in Figure 1-4 and therefore recharge and recovery of an ASR program are likely to impact not only the direct storage zone but adjacent units. This hydrogeologic framework provides a desirable structure for multiple interval well screening to optimize well production performance. The rate of movement of groundwater ranges from tens to hundreds of feet per year, depending on the hydraulic gradient, permeability of sediments, and other factors (Shafer and USGS, 1968). Groundwater flow is in a southeasterly manner towards the Gulf of Mexico.

Water levels in the Gulf Coast Aquifer in Nueces County fluctuate as a result of changes in rates of recharge, pumping, and barometric pressure. As shown in Figure 1-5, there are only a few TWDB-registered wells within the District area. For this reason, it is difficult to determine the current water level and historical water level fluctuations within the study area, but it is estimated to be 10 to 40 feet below land surface.

The Evangeline Aquifer is the most productive water-bearing hydrogeologic unit in the Gulf Coast Aquifer, with well yields of around 800 gallons per minute (gpm) reported in the Nueces and San Patricio County vicinity as compared to 430 gpm reported for Chicot wells (Meyer, 2012). In the study area, the top of the Evangeline Aquifer is roughly 400 to 700 feet below land surface. The Chicot Aquifer overlies the Evangeline Aquifer, and while it provides suitable supplies for domestic and livestock purposes, from a long-term perspective the Chicot Aquifer does not present the most desirable long-term storage opportunity for an ASR system. The general characteristics of major interest are sand

water-bearing zones, which provide the largest opportunity for aquifer storage and recovery and the locations of confining beds of silts and clays. Well logs have been used to assist in characterizing the aquifer and the recent on-going Corpus Christi Aquifer Storage and Recovery Feasibility Project conducted by the District with support from the TWDB has collected additional data, described in Section 2.2, to further characterize the ASR resources of the District.

System	Series	Stratigraphic Units (TWDB, 2012)	Hydrogeologic Units: Galloway (1991)	Estimated Thickness near Study Area (USGS, 1968)	Rock Characteristics	Water-bearing Property Columns
Quaternary	Pleistocene	Alluvium/ Beaumont Clay	Chicot Aquifer	100-200	Clay, interbedded with layers of medium to fine sand.	Yields small to moderate quantities of fresh to moderately saline water.
		Lissie Formation		200-300	Clay, sandy clay, sand and gravel.	Yields small to large quantities of fresh to slightly saline water.
Tertiary	Pliocene	Willis		200-400	Sand, gravel, sandy clay, and clay.	
		Goliad Sand	Evangeline Aquifer	600-2,400(?)	Sand and sandstone interbedded with gravel and clay.	Capable of yielding moderate to large quantities of fresh, slightly saline , and saline water.
	Miocene	Fleming/ Lagarto	Burkeville Confining System	3,600+(?)	Clay, silty calcareous clay, and interbedded sand and gravel. Caliche in the outcrop.	Yields small to large quantities of slightly saline to saline water.
		Oakville Sandstone	Jasper Aquifer	3,000+(?)	Fine to coarse sand, sand-stone and clay.	Capable of yielding moderate to large quantities of slightly saline to saline water.
	Oligocene	Catahoula Tuff	Catahoula Confining System	3,000+(?)	Predominantly tuffaceous clay and tuff, locally sandy clay, bentonitic clay, and thin beds of sand and conglomerate.	Yields small to moderate quantities of saline water.

Gulf Coast Aquifer

Figure 1-2. Geologic and Hydrologic Units of the District (HDR, 2016. Adapted from Baker and USGS, 1979)

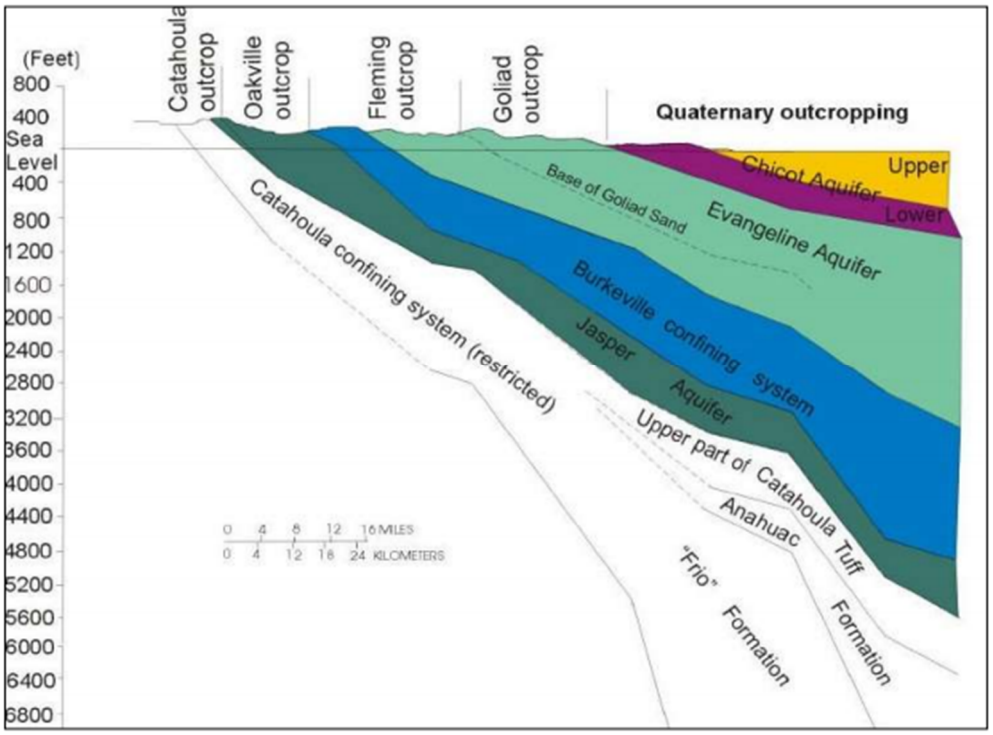


Figure 1-3. Cross-Section of the Gulf Coast Aquifer (CCASRCD, 2014)

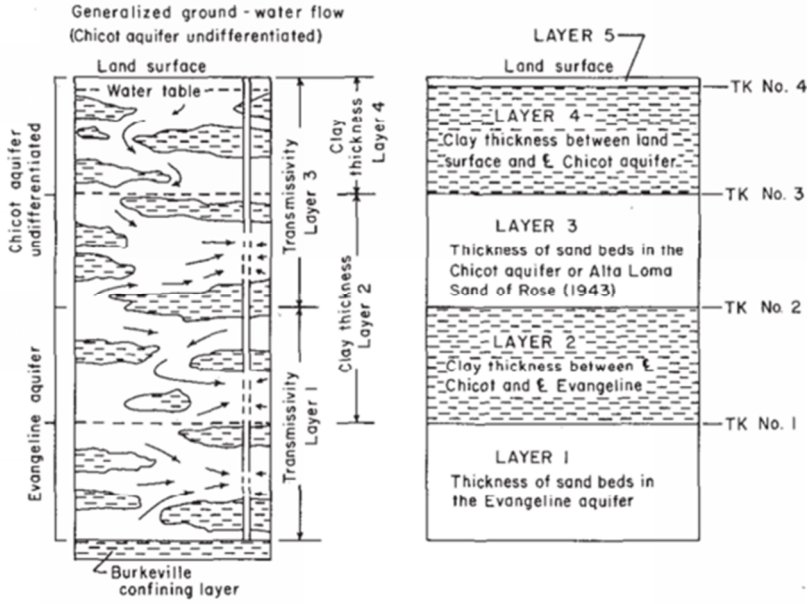


Figure 1-4. Inter-Connectedness in the Gulf Coast Aquifer Structure (USGS, 1985)

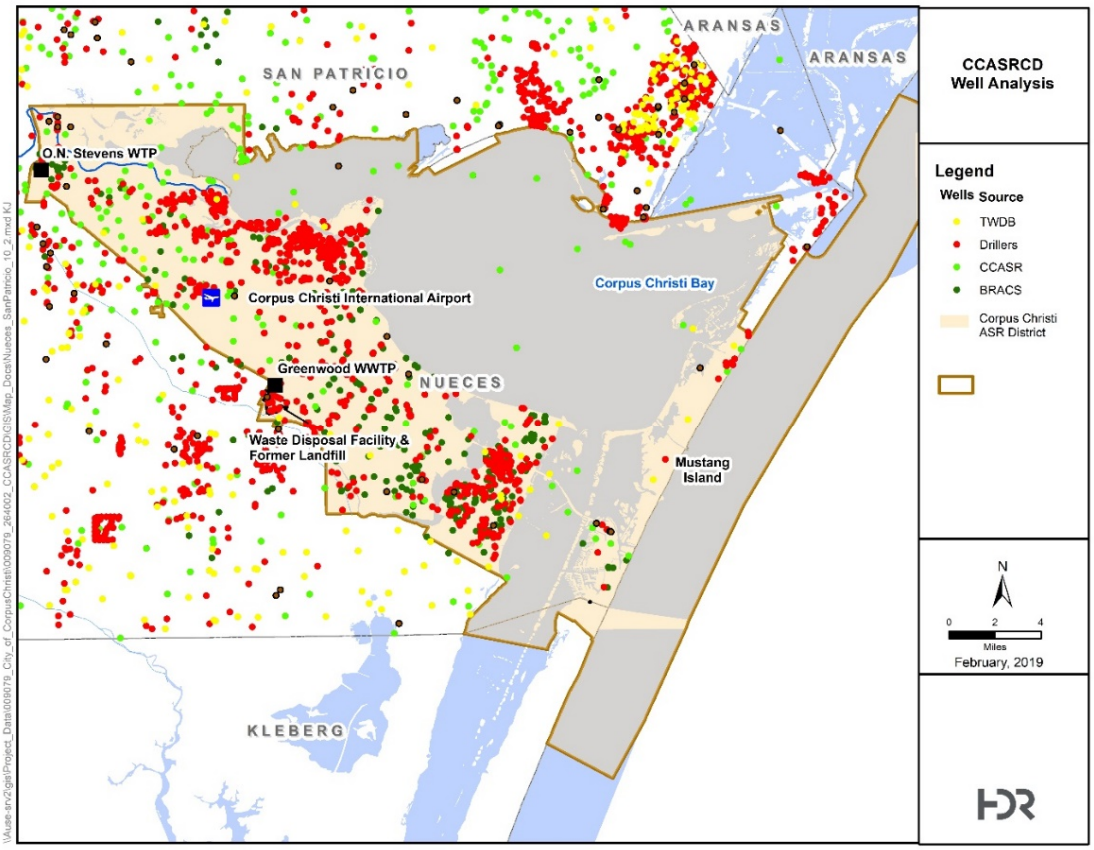


Figure 1-5. Location of Wells (Water Supply Oil and Gas) Located in the District

1.5 District Information

1.5.1 Modeled Available Groundwater (MAG) in the District

(31 TAC 356.52(a)(5)(A) and TWC 36.1071(e)(3)(A))

The Texas Water Code (TWC§36.108) defines "modeled available groundwater" (MAG) as the amount of water that the executive administrator (TWDB) determines may be produced on an average annual basis to achieve a desired future condition (DFC) set forth by local GCDs and GMAs. Based on these DFCs, the TWDB uses the appropriate groundwater availability model (GAM) to develop MAG quantities, which represent the annual availability from regional aquifers based on submitted DFCs.

One of the key coordination goals within each GMA is the development of DFCs for the aquifers within their area, as required by the Texas Administrative Code:

"The desired, quantified condition 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, as defined by participating groundwater conservation districts within a groundwater management area as part of the joint planning process." Desired future conditions have to be physically possible, individually and collectively, if different desired future conditions are stated for different geographic areas overlying an aquifer or subdivision of an aquifer." [TAC§356.2(8)]

The District participates in development of DFCs with GMA 16, which includes the area within the District boundaries and jurisdictional authority. The groundwater availability model (GAM) run that calculated the MAG for purposes of this management plan is GAM Run 17-025 MAG (TWDB, 2017b), which is attached as Appendix F of this plan. The GAM Run 17-025 MAG, dated May 19, 2017, used an alternative groundwater availability model developed specifically for GMA 16 (Hutchison and others, 2011) to calculate the difference in water levels at the beginning of 2010 and end of 2060 for the Gulf Coast Aquifer System. The MAG values were determined by extracting pumping rates by decade from the model results using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Drawdown averages were calculated by county and GCD for the entire GMA. Details on methods, assumptions, and results for the GAM Run 17-025 MAG analysis for the portion of the Gulf Coast Aquifer system located in GMA 16 is located in Appendix F.

The DFCs for the Gulf Coast Aquifer System described in Resolution No. 2017-01 and adopted January 17, 2017 by GMA 16 specified that the GMA-wide drawdown from the Gulf Coast Aquifer System shall not exceed an average of 62 feet in December 2060 from estimated year 2010 conditions.

The amount of MAG for the Gulf Coast Aquifer system to meet but not exceed the DFC increases from about 233,000 acre-feet per year in 2020 to 312,000 acre-feet per year in 2060. For the District area, the MAG increases from 328 acre-feet per year in 2010 to 398 acre-feet per year in 2060, as shown in Table 1-3. The MAG for Nueces and San Patricio counties where the District is predominantly located, is shown by river basin in Table 1-4.

Table 1-3. Modeled Available Groundwater for the Gulf Coast Aquifer System in Groundwater Management Area 16 within the Corpus Christi Aquifer Storage and Recovery Conservation District for Each Decade between 2010 and 2060. Values are in Acre-Feet per Year

Groundwater Conservation District (GCD)	County	Aquifer	2010	2020	2030	2040	2050	2060
Corpus Christi ASRCD	Nueces	Gulf Coast Aquifer System	328	342	356	370	384	398

Source: TWDB, 2017b.

Table 1-4. Modeled Available Groundwater by Decade for the Gulf Coast Aquifer System in Groundwater Management Area 16 for Nueces and San Patricio counties. Results are in Acre-Feet per Year

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Nueces	N	Nueces-Rio Grande	Gulf Coast Aquifer System	5,862	6,191	6,522	6,851	7,079
Nueces	N	Nueces	Gulf Coast Aquifer System	727	756	787	816	845
Nueces	N	San Antonio-Nueces	Gulf Coast Aquifer System	0	0	0	0	0
San Patricio	N	Nueces	Gulf Coast Aquifer System	4,130	4,502	4,874	5,247	5,619
San Patricio	N	San Antonio-Nueces	Gulf Coast Aquifer System	39,481	40,514	41,548	42,581	43,615

Source: TWDB, 2017b.

1.5.2 Groundwater Budget Components

(31 TAC 356.52(a)(5)(C-E) and TWC 36.1071(e)(3)(C-E))

In June 2018, the TWDB prepared GAM Run 18-012 to discuss methods, assumptions, and groundwater budget components of the GAM Run for the central portion of the Gulf Coast Aquifer System for use by the District in preparing this GMP (TWDB, 2018a). TWDB GAM Run 18-012 is included in Appendix G. The groundwater budgets summarize the amount of water entering and leaving the aquifers, which were extracted from the GAM for the Gulf Coast Aquifer System located within the District and averaged over the historical calibration period.

- Precipitation recharge—the aerially distributed recharge sourced from precipitation falling on the outcrop areas of the aquifers (where the aquifer is exposed at land surface) within the district.
- Surface-water outflow—the total water discharging from the aquifer (outflow) to surface-water features such as streams, reservoirs, and springs. Additionally, GAM Run 18-012 estimated the outflow to the bays.
- Flow into and out of district—the lateral flow within the aquifer between the district and adjacent counties.
- Flow between aquifers—the net vertical flow between the aquifer and adjacent aquifers or confining units. This flow is controlled by the relative water levels in each aquifer and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs.

A graphical depiction of these water budget components along with the modeled results are summarized in Figure 1-6 and in Table 1-5.

Recharge in the Gulf Coast Aquifer occurs predominantly through the infiltration of rainfall. Researchers have estimated the rate of recharge for the area of the Gulf Coast Aquifer that is proximate to or includes the District. Ryder (1988) estimated that the rate

of recharge was less than 2 inches per year and Dutton and Richter (1990) estimated a range of 0.1 to 0.4 inches per year.

The majority of the rain that falls on the land surface runs off and is not available for recharge to the aquifer. A significant portion of the water that infiltrates the soil is lost through evapotranspiration. Some water that infiltrates the soil recharges the aquifer but is not held in storage because it is discharged through springs or bank seepage in creeks and rivers. Vertical recharge to the aquifer is the fraction of the rainfall that originally infiltrated the soil and reached the aquifer to augment the amount of water in storage or available for use.

According to GAM Run 18-012, the volume of recharge for the District area is estimated to be 7 acre-feet per year. The amount of water flowing into the District is estimated to be 202 acre-feet per year with 89 acre-feet per year estimated to be flowing out of the District, as shown in Table 1-5. The estimated net annual volume of flow between each aquifer in the District from brackish units to the Gulf Coast Aquifer is 396 acre-feet per year. The amount of water discharged from the Gulf Coast Aquifer to surface water bodies is estimated to be 482 acre-feet/year, which includes 417 acre-feet per year to rivers and 65 acre-feet per year to bays.

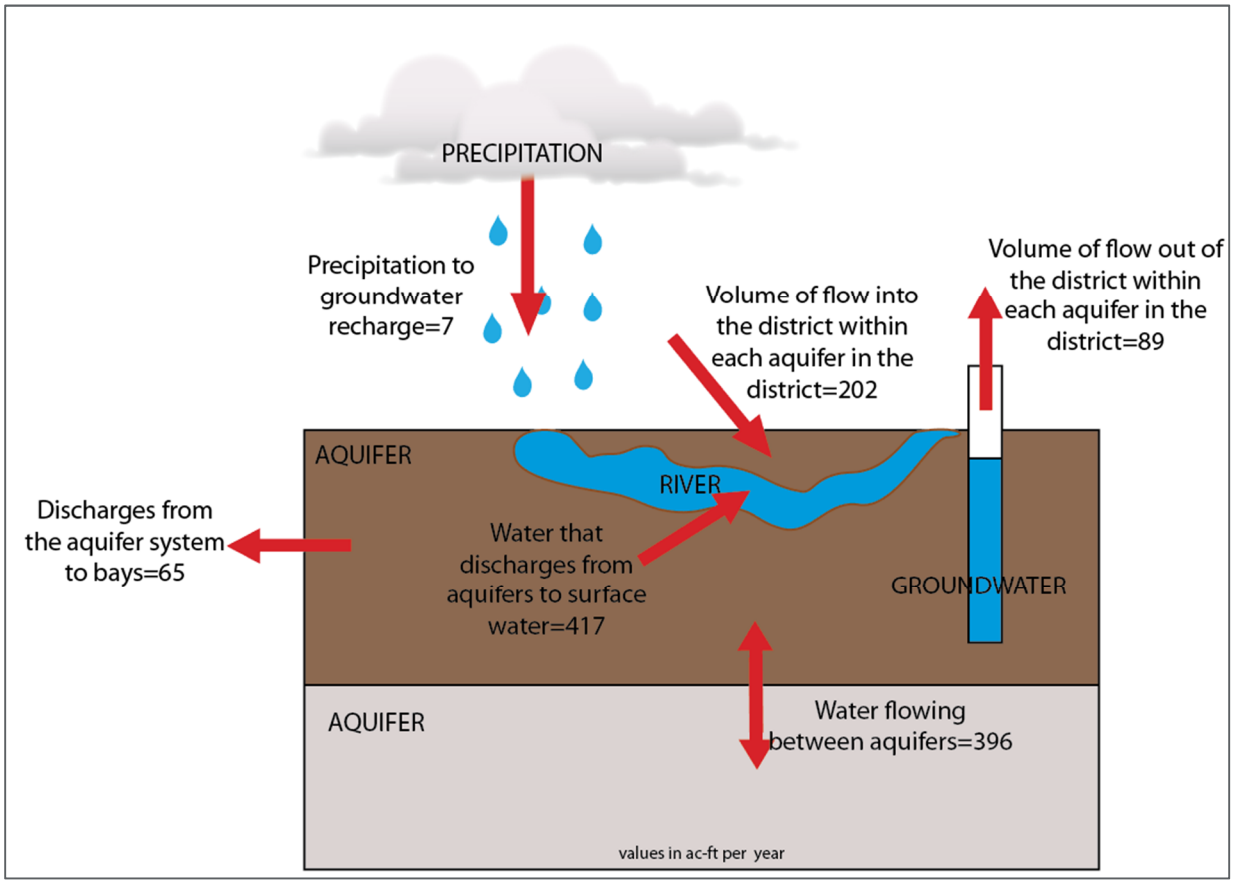


Figure 1-6. Mass Balance in the Corpus Christi Aquifer Storage and Recovery Conservation District (CCASR) based on GAM Run 18-012 and summarized in Table 1.5. Units are in Acre-Feet per Year

Table 1-5. Summarized Information for the Gulf Coast Aquifer System for the Corpus Christi Aquifer Storage and Recovery Conservation District's Groundwater Management Plan. All Values Are Reported In Acre-Feet per Year and Rounded to the Nearest 1 Acre-Foot

Management Plan Requirement	Aquifer or Confining Unit	Results
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	7
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Gulf Coast Aquifer System	417
Estimated annual volume of water that discharges from the aquifer to bays	Gulf Coast Aquifer System	65
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	202
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	89
Estimated net annual volume of flow between each aquifer in the district	Gulf Coast Aquifer System	396

1.5.3 Historical Groundwater Use and 2017 State Water Plan Data

In December 2018, the TWDB prepared a report for the District that included estimated historical groundwater use and information from the 2017 State Water Plan Datasets (TWDB, 2018b). The report, included in Appendix H, included the following information from the 2017 State Water Plan (TWDB, 2017a): estimated historical groundwater use, projected surface water supplies, projected water demands, projected water supply needs, and projected water management strategies. The projected surface water supplies and projected water demands within the District were pro-rated for the District's consideration and use in developing the GMP. Since the District only covers a portion of Nueces and San Patricio counties, the data values were modified with an apportioning multiplier (19.76% for Nueces County and 2.88% for San Patricio County) to create new values that more accurately represent conditions within district boundaries. The TWDB report included data for Nueces and San Patricio counties only, although a small portion of the District boundaries extend into Kleberg County. For projected surface water supplies the county-wide water user group (WUG) data values (county other, steam electric power, manufacturing, irrigation, mining and livestock) are modified using the multiplier. WUG values for municipalities, water supply corporations, and utility districts are not apportioned; instead, their full values are retained when they are located within the district, and eliminated when they are located outside based on District feedback.

1.5.4 Projected Surface Water Supply

(31 TAC 356.52(a)(5)(F) and TWC 36.1071(e)(3)(F))

The TWDB report indicated a projected surface water supply in Nueces County of 81,654 acre-feet per year in 2020 and increasing to 94,713 acre-feet per year in the 2070 projection. In the San Patricio County, the sum of the projected surface water supplies is 8,041 acre-feet per year for the District in 2020 and 8,513 acre-feet per year for 2070 (Appendix H). Surface water supplies by county are summarized in Table 1-6 for Nueces and San Patricio counties.

Table 1-6. Projected Surface Water Supplies by County. Values Are in Acre-Feet per Year (TWDB, 2018b)

County	2020	2030	2040	2050	2060	2070
Nueces County	81,654	87,176	90,909	93,320	94,182	94,713
San Patricio County	8,041	8,184	8,229	8,311	8,418	8,513

1.5.5 Groundwater Usage and Availability

(31 TAC 356.52(a)(5)(B) and TWC 36.1071(e)(3)(B))

The TWDB gathered estimated historical groundwater use for Nueces and San Patricio counties through its annual Water User Survey (TWDB, 2018b). Groundwater use in Nueces County has increased from 347 acre-feet per year in 2001 to 1,135 acre-feet per year in 2016 (average of 993 acre-feet per year). Groundwater use in San Patricio County ranged from 197 acre-feet per year in 2001 to 497 acre-feet per year in 2011 before declining from 2012 to 2016 (average of 311 acre-feet per year). Average groundwater use in Nueces and San Patricio Counties during from 2001 to 2016 is shown in Table 1-7. The most recent water use survey estimates annual groundwater use of 1,135 acre-feet per year in Nueces County and 209 acre-feet per year in San Patricio County for the year 2016 (Appendix H).

Table 1-7. Estimated Historic Groundwater Usage in Nueces and San Patricio Counties. Values Are in Acre-Feet per Year (TWDB, 2018b)

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
Nueces County								
2001-2016	GW	235	448	181	0	83	46	993
San Patricio County								
2001-2016	GW	65	0	1	0	241	4	311

1.5.6 Projected Water Demand

(31 TAC 356.52(a)(5)(G) and TWC 36.1071(e)(3)(G))

The projected water demand within the District in 2020 according to the most recently adopted 2017 State Water Plan is 85,121 acre-feet per year in Nueces County and

10,092 acre-feet per year for San Patricio County. These water demands within the District are projected to increase to 103,478 acre-feet per year and 11,234 acre-feet per year for Nueces and San Patricio counties respectively, by year 2070 (Appendix H). Summaries of the 2017 State Water Plan water demand projections are in Tables 1-8 through 1-10. Currently, the Coastal Bend Regional Water Group is in the process of developing the 2021 Coastal Bend (Region N) Regional Water Plan, which will be assimilated into the 2022 State Water Plan. The county-wide projected water demands from the 2021 Region N Plan and 2022 State Water Plan have been adopted by the TWDB, but have not been apportioned to the District area and therefore are not included in this GMP.

Table 1-8. Total Projected Water Demand in the District. Values Are in Acre-Feet per Year

County	2020	2030	2040	2050	2060	2070
NUECES	85,121	90,652	94,375	97,181	100,423	103,478
SAN PATRICIO	10,092	10,379	10,543	10,739	10,985	11,234

Table 1-9. Water Demands by WUG Type for Nueces County from the 2017 State Water Plan. Values Are in Acre-Feet per Year

County	WUG Type	2020	2030	2040	2050	2060	2070
NUECES	IRRIGATION	86	91	95	100	106	110
NUECES	LIVESTOCK	63	63	63	63	63	63
NUECES	MANUFACTURING	9,934	10,557	11,165	11,688	12,511	13,391
NUECES	MINING	143	169	188	202	224	249
NUECES	MUNICIPAL	71,924	76,297	78,778	80,295	81,776	82,840
NUECES	STEAM ELECTRIC POWER	2,971	3,475	4,086	4,833	5,743	6,825
NUECES Total		**85,121**	**90,652**	**94,375**	**97,181**	**100,423**	**103,478**

Source: TWDB, 2017a.

Table 1-10. Water Demands by WUG Type for San Patricio County from the 2017 State Water Plan. Values Are in Acre-Feet per Year

County	WUG Type	2020	2030	2040	2050	2060	2070
SAN PATRICIO	IRRIGATION	319	352	390	430	476	537
SAN PATRICIO	LIVESTOCK	12	12	12	12	12	12
SAN PATRICIO	MANUFACTURING	1,144	1,241	1,337	1,421	1,527	1,641
SAN PATRICIO	MINING	10	13	13	13	14	15
SAN PATRICIO	MUNICIPAL	8,607	8,761	8,791	8,863	8,956	9,029
SAN PATRICIO	STEAM ELECTRIC POWER	0	0	0	0	0	0
SAN PATRICIO Total		**10,092**	**10,379**	**10,543**	**10,739**	**10,985**	**11,234**

1.5.7 Water Supply Needs and Water Management Strategies
(TWC 36.1071(e)(4))

The 2017 State Water Plan projected that there would be water supply needs for Nueces and San Patricio counties (Appendix H). Current water supplies were prioritized to meet municipal demands first limited by infrastructure constraints, which resulted in supply deficits related to future projected water demands being assigned to non-municipal water user groups (i.e. manufacturing). The projected water supply needs in Nueces County are estimated at -1,583 acre-feet per year for Year 2020 and -28,021 acre-feet per year for Year 2070. In San Patricio County, the projected water need deficiency is greater than Nueces County. The 2017 State Water Plan estimates the projected water supply needs in San Patricio County at -6,451 acre-feet per year for year 2020 and -22,720 acre-feet per year for 2070. The water supply needs are summarized in Tables 1-11 through 1-13 below.

Water management strategies recommended for Nueces and San Patricio Counties, including specific WUGs for which they are recommended and those relevant to District area are shown in provided in Appendix H. The projected supply by implementing water management strategies in Nueces County, according to the most recently adopted 2017 State Water Plan, amounts to 32,764 acre-feet per year for the year 2020 and 58,096 acre-feet per year in the in 2070 if all water management strategies are developed. For San Patricio County, the projected supply attributed to water management strategies in the 2017 State Water Plan is 10,384 acre-feet per year in the District for Year 2020 and 25,707 acre-feet per year for Year 2070.

Table 1-11. Projected Total Water Supply Needs in the TWDB 2017 State Water Plan. Values Are in Acre-Feet per Year

County	2020	2030	2040	2050	2060	2070
NUECES	-1,583	-1,547	-1,511	-3,418	-15,345	-28,021
SAN PATRICIO	-6,451	-8,804	-11,126	-13,671	-17,817	-22,720

Table 1-12. Nueces County Needs from the 2017 State Water Plan. Values Are in Acre-Feet per Year

WUG Type	2020	2030	2040	2050	2060	2070
Mining	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	-2,846	-6,893
Manufacturing	0	0	0	-1,905	-10,981	-19,603
Municipal	-1,095	-1,255	-1,335	-1,405	-1,471	-1,522
Irrigation	262	240	217	193	167	141
Total	-1,583	-1,547	-1,511	-3,418	-15,345	-28,021

Table 1-13. San Patricio County Needs from the 2017 State Water Plan. Values Are in Acre-Feet per Year

WUG Type	2020	2030	2040	2050	2060	2070
Mining	193	144	125	105	73	32
Livestock	0	0	0	0	0	0
Steam Electric Power	0	0	0	0	0	0
Manufacturing	-6,451	-8,804	-11,126	-13,172	-15,754	-18,529
Municipal	566	526	512	497	479	466
Irrigation	3,356	2,197	916	-499	-2,063	-4,191
Total	-6,451	-8,804	-11,126	-13,671	-17,817	-22,720

1.6 District Management Goals

(31 TAC 356.51; 356.52(a)(2-4) and TWC 36.1071(e)(1)

Pursuant to the purpose for which the District was created in 2005 and the District's mission described earlier in this document, the District has developed management goals that will be measured by specific and time-based actions during the five years following adoption of this management plan and consistent with the established DFCs in the District's groundwater management area in accordance with 31 TAC 356.52, TWC 36.1071, and TWC 36.1085. Each goal to be addressed, according to 31 TAC 356.52(a)(1), is outlined below and includes management objectives and performance standards to evaluate the effectiveness and efficiency of District activities. Additional details on how the District will manage groundwater supplies and track progress in achieving its goals are also described, including goals that will be tracked on an annual basis.

1.6.1 Develop and Protect Municipal Aquifer Storage Areas

(Special District Local Laws Code Chapter 8811.002)

Objective: Protect Municipal Aquifer Storage Areas within the boundaries of the District for which jurisdictional authority has been granted to develop and protect municipal aquifer storage areas created by the City of Corpus Christi.

Performance Standard: The District will compile information in a database of known water wells located within the District including status, pumping rate, and water quality data. The District with support from the City of Corpus Christi will mail-out educational information at least once a year to residents and businesses located in ASR areas actively being studied including disseminating maps of areas protected for City's ASR projects. Well owners likely impacted by the City's ASR activities will be notified. If unregistered wells are found to be operating in the area in such a way as to impact District and City projects, the District will discuss remedies with the City of Corpus Christi which may result in enforcement of mitigation procedures which may include well owner suspending pumping operations and/or well abandonment. The District will enforce District Rules. The District will provide for security monitoring, including fencing and other measures, to protect monitoring wells, production and recharge wells owned within the District jurisdiction. The District will continue to maintain and develop the ASR program, including actions necessary to enforce its 5 Year Plan.

1.6.2 Providing the Most Efficient Use of Groundwater

(31 TAC 356.52(a)(1)(A) and TWC 36.1071(a)(1))

Objective: Continue to manage and enforce District Rules and Regulations including, but not limited to: well drilling application requirements, distance and spacing requirements for permits, monitoring well requirements, ownership of stored water, production limits, and transfer of produced groundwater outside District limits.

Performance Standard: District is able to limit permit authorizations to assure no harm or negative impact will occur to the aquifer storage area and landowners holding adjacent properties. Maximum allowable production in operating permit for non-exempt well limited to 0.04 acre-feet per contiguous surface area owned unless exemption is granted. In consideration of maximum allowable production limits, the District will consider service needs and area of the retail utility in lieu of surface area owned or operated by the retail public water utility. The District will periodically review filed State Well Reports and TWDB databases to confirm permitted and/or registered water wells within District jurisdiction. Additionally, the District will periodically review monitored water level reports provided by permit holders to the District.

Objective: Each year, the District will require all new exempt or permitted wells that are constructed within the boundaries of the district to be registered with the District in accordance with the District rules. The District will continue to gather information on all exempt and non-exempt wells located within the District, including encouraging owners of existing, exempt wells to register with the District.

Performance Standard: The District shall, in each of its annual reports, provide the number of exempt and permitted wells registered by the District for the prior year.

Objective: The District requires permits prior to construction for all new non-exempt wells within the limits of the District as outlined in the District Rules and Regulations.

Performance Standard: The District shall in each annual report, provide a summary of the number and type of applications made for the permitted use of groundwater in the District and the number and type of permits issued, and the total number of wells currently permitted within the District.

Objective: The District will establish a monitoring well network within the District over the next two years to monitor water levels and water quality. It is the District's intent to identify existing wells suitable for use as monitoring wells.

Performance Standard: The District and City of Corpus Christi, with support from a TWDB grant, constructed three monitoring wells as part of the ongoing Corpus Christi Aquifer Storage and Recovery Feasibility project. These wells will be monitored by the District. The District shall establish a monitoring well program and shall report on the status of the monitoring well network in each annual report.

1.6.3 Controlling and Preventing Waste of Groundwater

(31 TAC 356.52(a)(1)(B) and TWC 36.1071(a)(2))

Objective: The District will annually monitor water levels and production rates consistent with permits within the District area.

Performance Standard: The District will receive and record water level measurements as required by permit holders for wells drilled and rehabilitation of existing wells that pump more than 200 acre-feet per year in accordance with District Rules and Regulations. The District will periodically review monitored water level reports provided by permit holders to the District, and verify production is limited to maximum authorized recharge and withdrawals and instantaneous rate of withdrawal subject to permit and consistent with conditions set forth in the District's Rules and Regulations.

Objective: Each year, the District will meet with the City of Corpus Christi to identify opportunities to send information to the public regarding eliminating and reducing wasteful practices in the use of groundwater.

Performance Standard: The District will seek opportunities to collaborate with the City of Corpus Christi on communication and public awareness programs. Following each meeting with the City, District staff will document topics of discussion with the City including a summary of opportunities for cooperation with the City to promote efficient use of the District's groundwater. The District will include a summary in each annual report of Board's decisions regarding cooperative public information activities with the City including the number of cooperative activities participated in by the District and summary description of each activity, where applicable.

Objective: Each year, the District will review and evaluate District Rules and Regulations to determine whether any amendments are needed to decrease the amount of waste of groundwater within the District. The District's review of its rules will take place during a properly noticed meeting, and any decisions regarding amendments to the District Rules will be through formal District Board action and documented in the minutes of the Board.

Performance Standard: The District will, in each annual report, include a summary discussion of the District Board's review and decisions regarding amendments to the District's Rules and Regulations. Documentation in the annual report will include at minimum, the date, time and location of the District Board meeting, and approved meeting minutes of the Board's review and actions taken regarding rule amendments.

1.6.4 Controlling and Preventing Subsidence

(31 TAC 356.52(a)(1)(C) and TWC 36.1071(a)(3))

Objective: Continue to manage and enforce the District's Rules and Regulations, particularly those relevant to managing groundwater resources to control subsidence and prevent degradation of water quality.

Performance Standard: The District will review permit application materials for non-exempt wells (as needed) related to projected effects of proposed injection or withdrawal on subsidence and effects on existing permit holders or other groundwater users in the District.

Objective: Within two years following adoption of this management plan and approval by the TWDB, the District will consider a subsidence monitoring plan to monitor potential subsidence in the District. The subsidence monitoring plan will include an overall assessment of subsidence potential within the District based on projected groundwater usage and/or ASR operations, protocols for monitoring subsidence, and coordination efforts with USGS, adjacent GCDs and other stakeholders.

Performance Standard: The District will include a summary of subsidence monitoring plan activities in its annual reports, and as data becomes available, will develop a subsidence report to aggregate data gathered for the City of Corpus Christi and other local stakeholders that may be affected. If subsidence monitoring is deemed necessary, the District will take measures to install a subsidence monitoring network and will tabulate and report results in the annual report. If practicable, the District shall coordinate with USGS to implement subsidence monitoring gages. In accordance with District Rules, execute changes in groundwater operation to respond to evidence of regional subsidence.

1.6.5 Conjunctive Surface Water Management Issues

(31 TAC 356.52(a)(1)(D) and TWC 36.1071(a)(4))

Objective: Each year, the District will participate in the regional water planning process by attending Region N Regional Water Planning Group meetings to encourage the development of surface water supplies to meet the needs of water users in the District.

Performance Standard: A representative of the District will attend a minimum of 50% of the Region N Regional Water Planning Group meetings, and a minimum of 10% of the adjacent Region L Regional Water Planning Group meetings to stay abreast of conditions that may impact the District jurisdiction. The District will document attendance and participation of District representatives in Region N and Region L meetings in each annual report. Documentation will include a table of Region N and L meetings scheduled during the preceding 12 months, attendance status of District staff, and name of District staff attending.

1.6.6 Natural Resource Issues that are Impacted by the Use and Availability of Groundwater

(31 TAC 356.52(a)(1)(E) and TWC 36.1071(a)(5))

Objective: The District will continue to investigate and document the location, depth, and uses of existing water wells within the District including groundwater production on non-exempt wells in addition to pumping reports.

Performance Standard: The District will prepare a database that includes a listing of each water well and pertinent data located within the District's jurisdiction. A map will be prepared showing locations of registered and/or permitted wells within the District. Additional information from TWDB well databases will be evaluated periodically and database updated, accordingly. A summary table of each water well and pertinent characteristic of the well, including map showing well locations will be included in the Annual Report.

1.6.7 Drought Conditions

(31 TAC 356.52(a)(1)(F) and TWC 36.1071(a)(6))

Objective: The District will monitor City of Corpus Christi drought triggers on a weekly basis during dry events and respond to District-declared droughts according to the City's Drought Contingency Plan.

Performance Standard: Enforce District's authority if needed to pro-rate groundwater use, place special requirements on, modify, delay, or deny a permit for a new well during

a District-declared drought (CCASRCD, 2016). A brief summary of drought conditions, responses, and actions taken during the year will be summarized in the District's Annual Report.

1.6.8 Conservation

(31 TAC 356.52(a)(1)(G) and TWC 36.1071(a)(7))

Objective: The District will promote water conservation by working with the City of Corpus Christi Water Conservation Team to actively support water conservation and prudent use of water and will report these activities on an annual basis. The District will encourage conservation in accordance with the City's Water Conservation Plan.

Performance Standard: The District will review water conservation plans required to be filed with applicant's permit application. The District will include in each annual report a summary of water conservation efforts, including educational or public awareness efforts in conjunction with City of Corpus Christi outreach.

Objective: Each year, the District will promote water conservation by working with the City of Corpus Christi Water Conservation Team. At least once a year, the District will distribute, through the City, information to the public by means of brochures, public presentations, classroom presentations, displays at local events, and newspaper articles.

Performance Standard: The District will, in each annual report, include a summary of the educational efforts taken, success and outreach details, and copies of the information distributed.

1.6.9 Recharge Enhancement

(31 TAC 356.52(a)(1)(G) and TWC 36.1071(a)(7))

Objective: The District will continue to work collaboratively with the City to evaluate aquifer storage and recovery opportunities to mitigate future drought impacts on water supplies and to support and bolster the City's long-term regional water supply program, including but not limited to implementation of ASR activities set forth in the Five-Year Plan.

Performance Standard: The District will, in each annual report, include a summary of ongoing and completed aquifer storage and feasibility tasks associated with recharge enhancement through well recharge of water into the subsurface aquifer systems.

Objective: Continue to update, manage and enforce the District's Rules and Regulations, particularly those relevant to aquifer storage and recovery operations.

Performance Standard: Pursuant to District Rules, production of water in areas with municipal setting designations is prohibited. The District will address any potential violations during regularly scheduled District meetings held on an estimated quarterly basis. On an annual basis, or more frequently if needed, the District will work with the City to heighten public awareness for protection of aquifer storage and recovery projects by sending mailers or issuing a public information announcement to stakeholders and interested parties likely to be impacted by District-approved projects consistent with ASR management, including rising water levels during recharge and water level declines during recovery.

1.6.10 Rainwater Harvesting

(31 TAC 356.52(a)(1)(G) and TWC 36.1071(a)(7))

Objective: Each year, the District will promote rainwater harvesting consistent with the City of Corpus Christi's Water Conservation by working with the City of Corpus Christi Water Conservation Team. At least once a year, the District will distribute, through the City, information to the public by means of brochures, public presentations, classroom presentations, displays at local events and newspaper articles.

Performance Standard: The District will, in each annual report, include a summary of the educational efforts taken, success and outreach details, and copies of the information distributed.

1.6.11 Precipitation Enhancement

(31 TAC 356.52(a)(1)(G) and TWC 36.1071(a)(7))

At this time, the District is not located in an area with an ongoing, publicly available precipitation enhancement program. The District has determined that this goal is not appropriate or cost-effective. Since this goal is deemed not to be applicable, the District has not developed objectives or performance standards at this time.

1.6.12 Brush Control

(31 TAC 356.52(a)(1)(G) and TWC 36.1071(a)(7))

At this time, the District has determined that this goal is not appropriate or cost-effective. Since this goal is deemed not to be applicable, the District has not developed objectives or performance standards at this time.

1.6.13 Desired Future Conditions

(31 TAC 356.52(a)(1)(H) and TWC 36.1071(a)(8))

Objective: Consider all current and future permits on an annual basis, within a context of managing total groundwater production on a long-term basis to achieve DFCs consistent with the District's Rules and Regulations.

Performance Standard: The District will continue to participate in developing DFCs through the GMA process. Review information provided by the TWDB including: modeled available groundwater (MAG) values, estimates of current and projected amount of groundwater produced within the District, and other data. Continue to monitor amount of groundwater authorized under permits previously issued by the District, yearly precipitation and production patterns, and provide reasonable estimate of the amount of groundwater actually produced from permits issued by the District.

Objective: Monitor existing pumping and resulting water levels on an annual level, where practicable, as to not exceed desired future conditions.

Performance Standard: District Board is authorized to adjust downward the maximum allowable production upon permit renewal to achieve the desired future conditions. Maximum allowable production in operating permit for non-exempt well limited to 0.04 acre-feet per contiguous surface area owned unless exemption is granted.

Objective: Each year, the District will sample water levels of at least three wells within the District. These results will be monitored over five years and used to calculate a five-year average water level.

Performance Standard: The District will, in each annual report, include the monitoring results of the sampled wells and use this information in assessing any changes that may be needed on the District or GMA level.

2 Five-Year Plan for ASR

2.1 Objective

The primary purpose of the District's Five-Year Plan is to provide guidance to the City of Corpus Christi (City) and District on (1) District's day-to-day operations, (2) studies that are needed to identify potential operational issues and gain confidence in developing a successful ASR program, and (3) compliance with TCEQ regulations. The District developed Five Year Plans in 2009 and 2015 as stand-alone documents. In an attempt to stream-line program management and documentation, the Five-Year Plan is combined and added here to the District's Groundwater Management Plan and updated accordingly to reflect findings of site-specific ASR feasibility programs conducted since 2015. In addition to pursing the District management goals described above and enforcing the District's Rules and Regulations, the District will also take deliberate measures to leverage previous and ongoing results from local, aquifer storage and recovery studies conducted within the District jurisdiction to enhance the City's water supply, treatment, and distribution system.

2.2 Background

The District developed an initial 5-year plan in 2009, which included a schedule of major elements of an ASR feasibility plan (HDR, 2009). In support of the five-year plan, the TWDB conducted a geologic characterization of the District and surrounding counties in 2012 (Meyer, 2012). This information was then used by the District to provide an update to the five-year plan (CCASRCD, 2015). The District, with support from the City, has been studying ASR since 2015 to promote water supply resiliency for industrial customer growth, to improve regional system operations, and for cost-effective long-term regional water supply. In 2015 and 2016, HDR performed a desktop aquifer characterization study on behalf of the District at three specific areas within the District boundaries considering the TWDB study findings (HDR, 2016). The study identified a favorable ASR test drilling area located near the Corpus Christi International Airport based on interpretation of nearby geophysical logs that showed favorable permeable zones comprised of sand or mostly sand within the lower Chicot and/or upper Evangeline Aquifers. Existing well logs suggested sand zones that spanned a few hundred feet in either a continuous unit or at multiple intervals considered desirable for ASR development.

In October 2016, the District began a three-year ASR feasibility program with a generous $433,000 grant from the TWDB to collect and evaluate site-specific data to refine the results of the 2016 Study. This project implements the District's Five-Year Plan (CCASRCD, 2015) through site-specific hydrogeological and geochemical testing and modeling to determine the optimal intervals within the subsurface aquifer system for ASR development and operation. The on-going ASR program is scheduled for completion in August 2019. Key tasks include; conducting an exploratory test drilling

program, performing geochemical analysis of the subsurface environment focusing on aquifer storage and recovery suitability, developing a field-scale groundwater model to simulate storage and recovery operations, evaluating ASR operating policy considerations, and preparing ASR policy and operation recommendations. The exploratory drilling program consisted of testing four sites (as shown in Figure 2-1) to depths of 1,200 feet; performing geophysical logging and evaluating cuttings from Phase I wells; drilling Phase II wells and conducting step and constant rate pump tests up to about 400 gpm per interval; and collecting core and water quality samples for laboratory analysis at favorable intervals identified during Phase I. Preliminary results estimate ASR wells drilled to a maximum depth of 800 ft-msl can produce an overall recovery capacity ranging from 7 to 15 MGD with project-phasing. Three permanent monitoring wells were installed during the program to be used by the District and TWDB for future monitoring and testing.

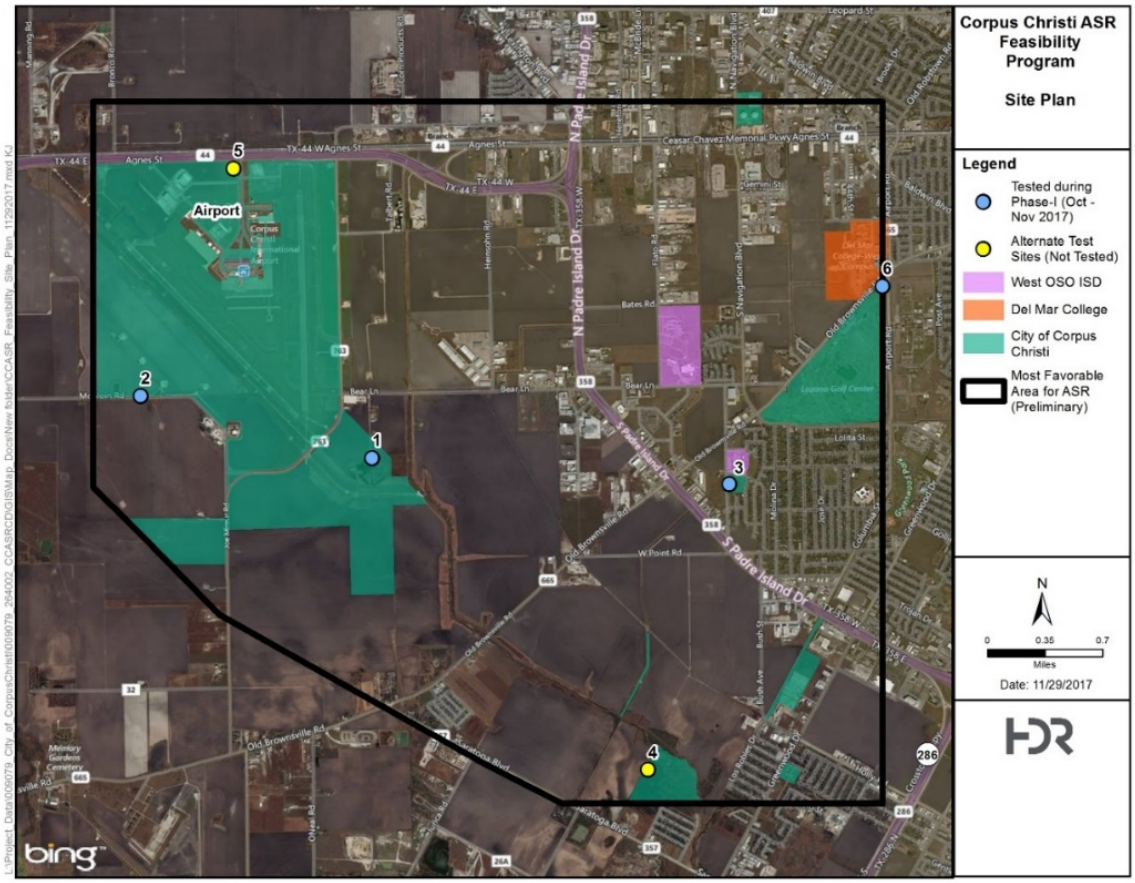


Figure 2-1. Sites Tested during the District's ASR Feasibility Study

2.3 Summary of Proposed Elements and Tasks in the Five-Year Plan

The proposed Five-Year Plan acknowledges the progress made since 2015 and leverages the results from the District's ASR Feasibility program towards project implementation. The primary elements of the proposed Five-Year Plan include:

- Administration and District Operations
  - Rulemaking
  - Well inventory
  - Well registration and permitting
  - Record keeping, including documenting District-wide historic and current water levels and water quality
  - Communications and outreach
  - Review collected data and update District operations if necessary
  - Participation with other water regulatory, management, and planning agencies and groups, including but not limited to:
    - GMA 16
    - Region N Regional Water Planning Group
    - Joint planning with San Patricio County GCD, especially in overlap area with District
    - TWDB
    - Texas Commission on Environmental Quality (TCEQ)
    - Coastal Bend Bays & Estuaries Program/Nueces Estuary Advisory Council
    - Aransas, San Patricio, Nueces, and Kleberg County clerks
    - Local industrial stakeholders
- TCEQ Experimental Permit Application based on Corpus Christi ASR Feasibility Study findings
  - Prepare pilot/cycle testing plan, including additional treatment for piloting to address turbidity, nutrients, pathogens, organics, and other parameters relevant to ASR operations.
  - Meet with TCEQ to discuss and adapt plan and proposed permitting approach
  - Prepare experimental well design
  - Complete experiment permit application
- Coordinate with resource agencies and seek partnership opportunities
  - USGS for subsidence monitoring stations
  - EPA for water quality testing during piloting
  - TWDB for routine monitoring program
- Design and Implement ASR Piloting Program
  - Greenwood WWTP source for potential storage
  - Permitting
  - Water Conditioning System and Surface Facilities Design

  - Pilot Well Design
  - Prepare Bidding Documents and Selection of Contractor
  - ASR Pilot Testing Construction Services
  - Cycle Testing
- Design and Implement ASR Project (near Corpus Christi International Airport; 10 wells (est.))
  - Update ASR Program based on cycle testing findings
  - Consider operational approach to optimize and effectively integration ASR project into the City's regional water supply system; update ASR operational scenarios as needed
  - Verify existing wells located in the vicinity likely impacted by ASR operations
  - Prepare communication plan, including mitigation (if needed)
  - Prepare permitting and monitoring program
  - Design, permit, construct, and implement ASR well field, water conditioning, ASR wells, and surface facilities in accordance with regulatory requirements including 30 TAC 331.181-186 statutes for aquifer storage and recovery projects
  - Prepare operations and maintenance plan

2.4 Proposed Schedule

The overall approach in the preparation of the proposed schedule for the Five-Year Plan is based on:

- Identifying the sequence of data and information needed for later tasks
- Leveraging previous District and City ASR study results. Proceed thoughtfully towards performing next steps to allow the District to develop a comfort and confidence with implementation of the Five-Year Plan
- Addressing important issues or fatal flaws early in the development of an ASR program to mitigate risk and uncertainty
- Deferring some of the less critical tasks and/or more expensive tasks to later stages

Table 2-1 presents an outline of the proposed schedule for major elements in the plan.

Table 2-1. Proposed Schedule for Major Elements of the Five-Year Plan

Element	2019	2020	2021	2022	2023	2024
Administration and District Operations						
TCEQ Experimental Permit Application						

Coordination with resource agencies/partnership opportunities						
Design and Implement ASR Piloting Program						
Construct and Implement ASR Project						

2.5 Estimated Cost

A summary of the estimated costs for the major elements and tasks in the plan are provided in Table 2-2.

Table 2-2 Cost Estimate for Major Elements of the Five-Year Plan

Element	2019	2020	2021	2022	2023	2024	Total
Administration and District Operations	$10,000	$25,000	$25,000	$25,000	$25,000	$25,000	$135,000
TCEQ Experimental Permit Application	$121,600						$121,600
Coordination with resource agencies/partnership opportunities	$8,000						$8,000
ASR Piloting Program		$400,000-$500,000	$400,000-$500,000				$800,000 - $1M
Construct and Implement ASR Project (near CCI Airport)				$2M	$5M	$5M	$12M

3 References

Baker and USGS, 1979, Stratigraphic and Hydrogeologic Framework of Part of the Coastal Plain of Texas.

Corpus Christi Aquifer Storage and Recovery Conservation District (CCASRCD), 2014, Groundwater Management Plan.

Corpus Christi Aquifer Storage and Recovery Conservation District (CCASRCD), 2015, 5 Year Plan Update.

Corpus Christi Aquifer Storage and Recovery Conservation District (CCASRCD), 2016, Rules and Regulations of the Corpus Christi Aquifer Storage and Recovery Conservation District.

Dutton, A. R, and B. C. Richter, 1990. Regional geohydrology of the Gulf Coast Aquifer in Matagorda and Wharton Counties, Texas: Development of a numerical model to estimate the impact of water management strategies, Bureau of Economic Geology, University of Texas at Austin, Final Technical Report prepared for the Lower Colorado River Authority.

Harbaugh, A. W., 2009, Zonebudget Version 3.01, A computer program for computing subregional water budgets for MODFLOW ground-water flow models: U.S. Geological Survey Groundwater Software.

HDR, 2009, A Proposed Five-Year Plan for Corpus Christi Aquifer Storage and Recovery Groundwater Conservation District.

HDR, 2016, Aquifer Characterization Study for ASR Feasibility.

Hutchison, W.R., Hill, M.E., Anaya, R., Hassan, M.M., Oliver, W., Jigmond, M., Wade, S., and Aschenbach, E., 2011, Groundwater Management Area 16 Groundwater Flow Model, Texas Water Development Board, unpublished report.

Meyer, John E., 2012, Geologic Characterization of and Data Collection in the Corpus Christi Aquifer Storage and Recovery Conservation District and Surrounding Counties, TWDB Open File Report 12-01.

Ryder, P., 1988, Hydrogeology and predevelopment flow in the Texas Gulf Coast Aquifer systems.

Shafer, G. and United States Geological Survey, 1968, Groundwater Resources of Nueces and San Patricio Counties.

Texas Water Development Board (TWDB), 2010, Hydrostratigraphy of the Gulf Coast Aquifer from the Brazos River to the Rio Grande.

Texas Water Development Board (TWDB), 2017a, TWDB 2017 State Water Plan (SWP). https://www.twdb.texas.gov/waterplanning/swp/2017/doc/SWP17-Water-for-Texas.pdf

Texas Water Development Board (TWDB), 2017b, GAM Run 17-025 MAG: Modeled Available Groundwater for the Gulf Coast Aquifer System in Groundwater Management Area 16.

Texas Water Development Board (TWDB), 2018a, GAM Run 18-012: Corpus Christi Aquifer Storage and Recovery Conservation District Groundwater Management Plan.

Texas Water Development Board (TWDB), 2018b, Estimated Historical Groundwater Use and 2017 State Water Plan Datasets: Corpus Christi Aquifer Storage and Recovery Conservation District.

United States Geological Survey (USGS), 1985, Digital Models for Simulation of Ground-Water Hydrology of the Chicot and Evangeline Aquifers along the Gulf Coast of Texas.

A

Appendix A – Enabling Legislation SB 1831

AN ACT

relating to the creation of the Corpus Christi Aquifer Storage and Recovery Conservation District.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Subtitle H, Title 6, Special District Local Laws Code, is amended by adding Chapter 8811 to read as follows:

CHAPTER 8811. CORPUS CHRISTI AQUIFER STORAGE AND RECOVERY CONSERVATION DISTRICT

SUBCHAPTER A. GENERAL PROVISIONS

Sec. 8811.001. DEFINITIONS. In this chapter:

(1) "Board" means the board of directors of the district.

(2) "Director" means a member of the board.

(3) "District" means the Corpus Christi Aquifer Storage and Recovery Conservation District.

Sec. 8811.002. NATURE OF DISTRICT. The district is a conservation and reclamation district in Kleberg, Nueces, and San Patricio Counties created under and essential to accomplish the purposes of Section 59, Article XVI, Texas Constitution. The district is created to develop and protect municipal aquifer storage areas created by the City of Corpus Christi.

Sec. 8811.003. CONFIRMATION ELECTION NOT REQUIRED. An election to confirm the creation of the district is not required.

Sec. 8811.004. INITIAL DISTRICT TERRITORY. The initial

boundaries of the district are coextensive with the city limits of the City of Corpus Christi and include:

(1) property owned by or under contract to the City of Corpus Christi in Nueces and Kleberg Counties; and

(2) in San Patricio County, property owned by or under contract to the City of Corpus Christi and bounded on the west by Interstate Highway 37 and U.S. Highway 77, on the north by the metropolitan planning organization boundary, on the east by County Road 2849, and on the south by the city limits of the City of Corpus Christi.

Sec. 8811.005. APPLICABILITY OF OTHER LAW. Except as otherwise provided by this chapter, Chapter 36, Water Code, applies to the district.

Sec. 8811.006. CREATION OF GROUNDWATER CONSERVATION DISTRICTS IN SAN PATRICIO COUNTY. (a) This chapter does not preclude the creation of a groundwater conservation district in San Patricio County.

(b) A groundwater conservation district created in San Patricio County may not limit or restrict the district from recovering water stored by the district in a municipal aquifer storage area in the district, even if the municipal aquifer storage area is also located in the groundwater conservation district.

(c) To the extent that the boundaries of the district and a groundwater conservation district in San Patricio County overlap, the power and authority of the two districts are joint and coextensive.

(d) The district and land in the district are exempt from

taxes and fees imposed by a groundwater conservation district created in San Patricio County.

[Sections 8811.007-8811.020 reserved for expansion]

SUBCHAPTER B. BOARD OF DIRECTORS

Sec. 8811.021. DIRECTORS; TERMS. (a) The district is governed by a board of five directors.

(b) Except as provided by Subsection (c), directors serve staggered four-year terms.

(c) The initial directors shall draw lots to determine which three directors shall serve four-year terms that expire at the end of the calendar year four years after the effective date of the Act creating this chapter, and which two directors shall serve two-year terms that expire at the end of the calendar year two years after the effective date of the Act creating this chapter.

Sec. 8811.022. APPOINTMENT OF DIRECTORS. The Corpus Christi City Council shall appoint the directors.

Sec. 8811.023. VACANCY. If a vacancy occurs on the board, the board may appoint a director to serve the remainder of the term.

Sec. 8811.024. OFFICERS. The board shall annually elect officers. The officers must be confirmed by the Corpus Christi City Council.

[Sections 8811.025-8811.050 reserved for expansion]

SUBCHAPTER C. POWERS AND DUTIES

Sec. 8811.051. AQUIFER STORAGE AND RECOVERY PROJECTS. The district may implement and develop aquifer storage and recovery projects.

Sec. 8811.052. MUNICIPAL AQUIFER STORAGE AREAS IN SAN

PATRICIO COUNTY. The district may not allow more water to be recovered from a municipal aquifer storage area in San Patricio County than the amount of water stored by the district at the municipal aquifer storage area.

Sec. 8811.053. TAXES AND BONDS PROHIBITED. The district may not impose a tax or issue bonds.

Sec. 8811.054. EMINENT DOMAIN. The district may not exercise the power of eminent domain.

SECTION 2. (a) The legal notice of the intention to introduce this Act, setting forth the general substance of this Act, has been published as provided by law, and the notice and a copy of this Act have been furnished to all persons, agencies, officials, or entities to which they are required to be furnished under Section 59, Article XVI, Texas Constitution, and Chapter 313, Government Code.

(b) The governor has submitted the notice and Act to the Texas Commission on Environmental Quality.

(c) The Texas Commission on Environmental Quality has filed its recommendations relating to this Act with the governor, lieutenant governor, and speaker of the house of representatives within the required time.

(d) All requirements of the constitution and laws of this state and the rules and procedures of the legislature with respect to the notice, introduction, and passage of this Act are fulfilled and accomplished.

SECTION 3. This Act takes effect immediately if it receives a vote of two-thirds of all the members elected to each house, as

provided by Section 39, Article III, Texas Constitution. If this Act does not receive the vote necessary for immediate effect, this Act takes effect September 1, 2005.

David Dewhurst
President of the Senate

Speaker of the House

I hereby certify that S.B. No. 1831 passed the Senate on April 28, 2005, by the following vote: Yeas 31, Nays 0; and that the Senate concurred in House amendment on May 28, 2005, by the following vote: Yeas 31, Nays 0.

Secretary of the Senate

I hereby certify that S.B. No. 1831 passed the House, with amendment, on May 25, 2005, by the following vote: Yeas 144, Nays 0, two present not voting.

Robert Haney
Chief Clerk of the House

Approved:

17 JUNE '05
Date

RICK Perry
Governor

FILED IN THE OFFICE OF THE
SECRETARY OF STATE
2:10 PM O'CLOCK
JUN 17 2005
Roger Williams
Secretary of State

B

Appendix B – Interlocal Agreement between the City of Corpus Christi and the Corpus Christi Aquifer Storage and Recovery Conservation District for Groundwater Management within District Boundaries

INTERLOCAL AGREEMENT
FOR MANAGEMENT OF GROUNDWATER WITHIN
THE BOUNDARIES OF THE
CORPUS CHRISTI AQUIFER STORAGE AND
RECOVERY CONSERVATION DISTRICT

This Interlocal Agreement is entered into by and between the City of Corpus Christi, Texas ("City") and the Corpus Christi Aquifer Storage and Recovery Conservation District ("CCASRCD").

Recitals

WHEREAS, CCASRCD was established by the Texas Legislature, as an independent political subdivision of the State of Texas, with its own authority and duties established by State law, to develop and protect municipal aquifer storage areas created by the City of Corpus Christi,

WHEREAS, the City appoints the CCASRCD's board of directors,

WHEREAS, CCASRCD does not have the authority to tax, issue bonds, or use the power of eminent domain, but does have the authority to raise revenue through permit fees and fees for service,

WHEREAS, the activities of the CCASRCD are intended to support the City's potable water storage and distribution system, the activities of the CCASRCD need to be closely coordinated between the two entities, and

WHEREAS, the purpose of this Agreement is to clarify the roles of the City and CCASRCD relating to the development and protection of municipal aquifer storage areas created by the City of Corpus Christi,

NOW, THEREFORE in consideration of the mutual covenants in this Agreement, the participating local governments (the "Parties"), authorized by appropriate actions of their governing bodies, hereby agree as follows:

1. Scope of Services.

a. The City will perform the following services for CCASRCD:

(1) Authorize City employees to serve as directors of the CCASRCD, without compensation from CCASRCD.

(2) Allow the City Manager, or the City Manager's designee, to serve as the General Manager of the CCASRCD, without compensation from CCASRCD.

(3) Allow the Assistant City Manager to designate other City employees to perform services for the CCASRCD, without compensation from CCASRCD.

(4) As the agent of the CCASRCD, solicit, negotiate, and contract with consultants to assist with CCASRCD functions.

(a) The City employees involved shall follow normal City procurement policies.

(b) The Assistant City Manager, as CCASRCD General Manager, is authorized to execute contracts for consulting services that do not exceed the limit at which competitive bids are required under the Texas Local Government Code, as amended (which will be referred to in this Agreement as the "procurement limit"), without the approval of the CCASRCD Board of Directors.

(c) Contracts for consulting services over the procurement limit must be approved by the CCASRCD Board of Directors before it is executed.

(d) The City shall reimburse the CCASRCD for the costs of any contracts for consulting services.

(e) Before any contract for consulting services that will involve an expenditure over the procurement limit is executed, the CCASRCD shall obtain the concurrence of the City Council.

(5) All City employees acting as agents for the CCASRCD shall comply with both the City's and CCASRCD's codes of ethics. Acting for both the CCASRCD and City in the same or related matter is not considered a conflict of interest under either code of ethics.

(6) Authorize City employees to travel on CCASRCD business, and reimburse the City employees for any travel expenses under applicable City travel policies and procedures.

(7) Maintain the financial records of the CCASRCD. The records must be maintained as separate funds, and shall be maintained under applicable City policies and procedures as applied to other City funds.

(8) Invest any CCASRCD funds. The CCASRCD funds must be invested under applicable City policies and procedures in the same manner as the City invest its own funds.

(9) Maintain and manage the records of and information acquired by the CCASRCD.

(a) The CCASRCD's Records Management Program and Records Retention Schedule are modeled on the City's Records Management Program and Records Retention Schedule.

(b) The CCASRCD General Manager is the CCASRCD Records Management Officer. The City Secretary will assist the CCASRCD Records Management Officer.

(c) The CCASRCD board designates the City Secretary, or his/her designee, as the Public Information Coordinator to satisfy the training requirement of Texas Government Code, Section 552.012.

(10) As agent for the CCASRCD, build, acquire, or obtain property and install improvements and facilities.

(a) The City shall reimburse the CCASRCD for 100% of the costs incurred to acquire or obtain property and to install or construct improvements and facilities.

(b) Before any property is acquired, capital improvements made, or facilities constructed or installed, which costs more than procurement limit, the CCASRCD shall obtain the concurrence of the City Council.

(11) Develop groundwater management plans, including:

(a) Regional comprehensive management plan with other groundwater and surface water management entities and

(b) CCASRCD management plan.

(12) Provide insurance coverage within the City's insurance plan for CCARSCD, its officers and City staff performing duties for CCARSCD.

b. The CCASRCD will perform the following services for the City:

(1) Adopt rules relating to the following, if necessary to protect the City's aquifer storage and recovery wells and system, before the wells and system are placed into operation:

(a) Limits on groundwater production,

(b) Spacing of wells,

(c) Conservation, preservation, protection, and recharge of groundwater,

(d) Subsidence control,

(e) Prevention of degradation of water quality, and

(f) Prevention of waste of groundwater.

(2) Enforce the CCASRCD rules by injunction, civil penalties, and other remedies.

(3) Build, acquire, or obtain property and install improvements and facilities.

(4) Purchase, sell, transport, and distribute surface water and groundwater, in consultation with the City. All contracts for the purchase, sale, transport, or distribution of surface or groundwater must be approved the City's City Council before it is executed.

(5) Conduct surveys of groundwater.

(6) Conduct research.

(7) Require submission of accurate well driller logs for wells within the CCASRCD boundaries.

(8) Require permits for drilling, equipping, operating, completing, or substantially altering wells and well pumps within the CCASRCD boundaries.

(9) Regulate well spacing and production.

(10) Require the closing or capping of open and uncovered wells.

(11) Regulate the transfer of groundwater outside CCASRCD.

(12) Adopt appropriate permit fees and fees for service to provide revenue for CCASRD activities.

(13) Provide reimbursement to the City for expenses incurred under this Agreement, when sufficient revenue exists in CCASRCD accounts for such reimbursement.

2. Budgets.

a. CCASRCD shall prepare and submit to the City's budget office a budget for its activities that includes projections of expenditures that the City is required to reimburse during the City's next fiscal year.

b. The City Council shall review and approve the portion of the CCASRCD budget that is funded by the City, as part of its approval of the City budget.

c. The expenditure for any items that are specifically identified in the CCASRCD budget that was approved by the City Council is considered to have been approved by the City Council.

d. Amendments to the budget may be made during a fiscal year with the approval of the City Council.

3. Other Agreements, Supplementary Agreements and Protocols. The Parties are encouraged to enter into additional agreements and protocols as convenient or necessary.

4. Implementation. The City Manager and CCASRCD General Manager are authorized and directed to take all steps necessary or convenient to implement this Agreement, and shall cooperate in developing a plan for the implementation of the activities provided for in this Agreement.

5. Participation Notice. Each Party shall notify the other Parties of its participation in this Agreement by furnishing an executed original of the attached Participation Notice.

6. Warranty. The Agreement has been officially authorized by the governing body of each Party, and each signatory to this Agreement guarantees and warrants that the signatory has full authority to execute this Agreement and to legally bind their respective Party to this Agreement.

7. Administrative Services. The City agrees to provide administrative services necessary to coordinate this Agreement, including providing Parties with a current list of contact information for each Party.

8. Federal and State Participation. Federal and state entities and other local governments may participate in this Agreement, to the extent of any limitations of their authority, by furnishing an executed original of the attached Participation Notice to the City.

9. Expending Funds. Each Party, which performs services under this Agreement, will do so with funds available from current revenues of the Party. No Party shall have any liability for the failure to expend funds to provide aid under this Agreement.

10. Term of Agreement.

a. This Agreement shall become effective as to each Party when approved and executed by that Party.

b. Once approved by all Parties, this Agreement shall be for a term of one year, and shall be automatically renewed annually, unless any party its participation by giving written notice to the other parties at least sixty days before the end of each annual term.

c. Termination of participation in this Agreement by any Party does not affect the continued operation of this Agreement between and among the remaining Parties, and this Agreement shall continue in force and remain binding on the remaining Parties.

11. Oral and Written Agreements. All oral or written agreements between the parties relating to the subject matter of this Agreement, which were developed prior to the execution of this Agreement, have been reduced to writing and are contained in this Agreement.

12. Entire Agreement. This Agreement, including Attachments, represents the entire Agreement between the Parties and supersedes any and all prior agreements between the parties, whether written or oral, relating to the subject of this agreement.

13. Interlocal Cooperation Act. The Parties agree that activities contemplated by this Agreement are "governmental functions and services" and that the Parties are "local governments" as that term is defined in the Interlocal Cooperation Act.

14. Severability. If any provision of this Agreement is held invalid for any reason, the invalidity does not affect other provisions of the Agreement, which can be given effect without the invalid provision. To this end the remaining provisions of this Agreement are severable and continue in full force and effect.

15. Validity and Enforceability. If any current or future legal limitations affect the validity or enforceability of a provision of this Agreement, then the legal limitations are made a part of this Agreement and shall operate to amend this Agreement to the minimum extent necessary to bring this Agreement into conformity with the requirements of the limitations, and so modified, this Agreement continue in full force and effect.

16. Not for Benefit of Third Parties. This Agreement and all activities under this Agreement are solely for the benefit of the Parties and not the benefit of any third party.

17. Exercise of Police Power. This Agreement and all activities under this Agreement are undertaken solely as an exercise of the police power of the Parties, exercised for the health, safety, and welfare of the public generally, and not for the benefit of any particular person or persons and the Parties shall not have nor be deemed to have any duty to any particular person or persons.

18. City policies and procedures to control. In activities conducted or performed by City staff under the terms of this Agreement, City staff shall conform to applicable City policies and procedures, as though the staff member was performing a City task or duty.

19. Immunity not Waived. Nothing in this Agreement is intended, nor may it be deemed, to waive any governmental, official, or other immunity or defense of any of the Parties or their officers, employees, representatives, and agents as a result of the execution of this Agreement and the performance of the covenants contained in this Agreement.

20. Civil Liability to Third Parties. Each Responding Party will be responsible for any civil liability for its own actions under this Agreement, and will determine what level, if any, of insurance or self-insurance it should maintain for such situations.

21. No Liability of Parties to One Another. One Party may not be responsible and is not civilly liable to another for not responding, or for responding at a particular level of resources or in a particular manner. Each Party to this Agreement waives all claims against the other Parties to this Agreement for compensation for any loss, damage, personal injury, or death occurring as a consequence of the performance of this Agreement, except those caused in whole or in part by the negligence of an officer, employee, or agent of another Party.

22. Notices.

a. Notices under this agreement may be delivered by mail as follows:

City:

City of Corpus Christi
Attn: City Manager
P.O. Box 9277
Corpus Christi, Texas 78469-9277

CCASRCD:

Corpus Christi Aquifer Storage and Recovery Conservation District
Attn: General Manager
P.O. Box 9277
Corpus Christi, Texas 78469-927

b. The parties to this agreement may specify to the other party in writing another address for notice.

23. Amendments to Agreement.

a. This Agreement may not be amended except by written agreement approved by the governing bodies of the Parties.

b. No officer or employee of any of the Parties may waive or otherwise modify the limitations in this Agreement, without the express action of the governing body of the Party.

24. Captions. Captions to provisions of this Agreement are for convenience and shall not be considered in the interpretation of the provisions.

25. Governing Law and Venue. This Agreement shall be governed by the laws of the State of Texas. Venue for an action arising under this Agreement shall be in accordance with the Texas Rules of Civil Procedure.

CORPUS CHRISTI AQUIFER STORAGE AND RECOVERY CONSERVATION DISTRICT

By: Oscar R. Martinez
Oscar Martinez, President

Date: 3-3-08

ATTEST:

By: _____
Fred Segundo, Secretary

Date: 3-3-08

CITY OF CORPUS CHRISTI

ATTEST

Armando Chapa
City Secretary

By:
George K. Noe
City Manager

APPROVED AS TO FORM:

This 29th day of February, 2008

Gary W. Smith
Assistant City Attorney
For City Attorney

Res. 027606 AUTHORIZED BY COUNCIL 03/11/08
A.C.
SECRETARY

PARTICIPATION NOTICE

I hereby notify the Parties that Corpus Christi Aquifer Storage and Recovery Conservation District has approved participation in the Interlocal Agreement for Management of Groundwater within the Boundaries of the Corpus Christi Aquifer Storage and Recovery Conservation District, by lawful action of its governing body, a true copy of which is attached and incorporated in this Agreement.

Fred Segundo
Secretary

3-3-08
Date

PARTICIPATION NOTICE

I hereby notify the Parties that the City of Corpus Christi has approved participation in the Interlocal Agreement for Management of Groundwater within the Boundaries of the Corpus Christi Aquifer Storage and Recovery Conservation District, by lawful action of its governing body, a true copy of which is attached and incorporated in this Agreement.

Armando Chapa
City Secretary

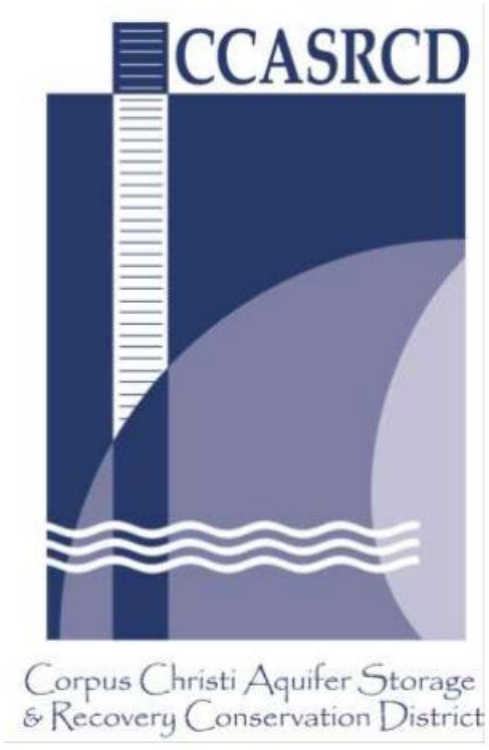
3/14/08
Date

This page is intentionally left blank.

C

Appendix C – Corpus Christi ASR Conservation District Rules

Rules and Regulations of the Corpus Christi Aquifer Storage and Recovery Conservation District



Original: April 18, 2013
Amended: December 1, 2016

CORPUS CHRISTI AQUIFER STORAGE AND RECOVERY CONSERVATION DISTRICT
RULES AND REGULATIONS
TABLE OF CONTENTS

CORPUS CHRISTI AQUIFER STORAGE AND RECOVERY CONSERVATION DISTRICT
RULES AND REGULATIONS

INTRODUCTION

Groundwater conservation Districts (GCDs) are the state's preferred method of groundwater management in order to protect property rights, balance the conservation and development of groundwater to meet the needs of the state, and use the best available science in the conservation and development of groundwater through rules developed, adopted, and promulgated by a District in accordance with the provisions of The Texas Water Code, Title 2: Water Administration, Subtitle E: Groundwater Management, Chapter 36: Groundwater Conservation Districts. As with other GCDs, the major purposes of the District are to:

1) Provide for conservation, preservation, protection, and recharge;
2) Prevent waste; and,
3) Control land surface subsidence.

The Corpus Christi Aquifer Storage and Recovery Conservation District (District) was created in 2005 by the 79th Texas Legislature enactment of SB 1831, Section 1, Subtitle H, Title 6. Special District Local Laws Code was amended by adding Chapter 8811 to include the District. The District is located in Aransas, Kleberg, Nueces, and San Patricio Counties, Texas. The initial boundaries of the District (also known as CCASRCD) are coextensive with the city limits of the City of Corpus Christi and are bound:

1) To the north, by the metropolitan planning organization (i.e., Corpus Christi Metropolitan Planning Organization) boundary;
2) To the east, by the Gulf of Mexico and the city limits of Corpus Christi;
3) To the south, by the city limits of Corpus Christi; and,
4) To the west, by property owned by, or under contract to, the City of Corpus Christi.

The District's jurisdictional boundary covers four counties, including Aransas, Kleberg, Nueces, and San Patricio counties. The total land surface area of the District and the surface area of the District within each of these counties was calculated using a spatial analysis tool within GIS. The total area of the District is distributed in percentage of land in each county as follows: Aransas County: 0.01 %, Nueces County: 48.92 %, Kleberg County: 5.67 %, and San Patricio County: 45.40 %. The surface area of the District within each of these counties are as follows: Aransas County: 2.32%, Nueces County 35.43 %, Kleberg County: 2.38 %, and San Patricio County 2.92%.

Neighboring Districts include Kenedy County Groundwater District and San Patricio County Groundwater District, both Districts formed via legislation passed during the 2007 legislative session.

The District is committed to the management and protection of the groundwater resources of the District, including those injected into the ground for storage and later use. The District is committed to maintaining a sustainable, adequate, reliable, cost effective, and high quality source of groundwater to promote the vitality, economy, and environment of the District. The District will work with and for the citizens of the District and cooperate with other local, regional, and state agencies involved in the study and

management of groundwater resources. The District shall take no action without a full consideration of the groundwater needs of the citizens of the District.

The District's objectives are to enhance the City of Corpus Christi's (City) water supply, treatment, and distribution. A major concern when forming the District was to ensure that water stored in an aquifer storage and recovery (ASR) facility could not by diverted by nearby wells. According to the District's Groundwater Management Plan, the District's objectives include:

1) Seasonal, long-term, and emergency (strategic reserve) storage;
2) Augmentation of peak storage capacity;
3) Improving system water quality by maintaining minimum flows during seasons of low demand;
4) Deferring expansion of some of the water system infrastructure;
5) Mitigation of streamflow requirements;
6) Management of stormwater flow and estuary salinity; and,
7) Helping to meet large retail customer demands.

This document outlines the rules and regulations set forth by the Corpus Christi Aquifer Storage and Recovery Conservation District, as they apply to their District.

SECTION 1. DEFINITIONS AND MATTERS OF GENERAL APPLICABILITY

Rule 1.1 Definitions

In the administration of its duties, the Corpus Christi Aquifer Storage and Recovery Conservation District (District) follows the definitions of terms set forth in Chapter 36, Texas Water Code, with modifications. The definitions are as follows:

1. "Acre-foot" means the amount of water necessary to cover one acre of land to the depth of one foot, or 325,851 U.S. gallons of water.

2. "Act" means the Corpus Christi Aquifer Storage and Recovery Conservation District's enabling legislation, the 79th Texas Legislature enactment of SB 1831, Section 1, Subtitle H, Title 6. Special District Local Laws Code was amended by adding Chapter 8811 to include the District.

3. "Additional production" means the amount of water produced from an excluded well in excess of that amount produced under permit by the Railroad Commission of Texas.

4. "Affected person" means, for any matter before the District, a person who has a personal justifiable interest related to a legal right, duty, privilege, power, or economic interest that is within the District's regulatory authority and affected by the matter before the District, not including a person who has an interest common to members of the public.

5. "Agricultural crop" means food or fiber commodities grown for resale or commercial purposes that provide food, clothing, animal feed, or other products.

6. "Agricultural use" or purposes means the use of groundwater for irrigation to produce an agricultural crop.

7. "Aquifer" means a geologic formation, group of formations, or part of a formation that is capable of yielding a significant amount of water to a well or spring, and also includes subdivision(s) of an aquifer.

8. “Aquifer storage area” means an area demarcated and agreed upon by the District and permittee for the purpose of groundwater storage, which must abide by applicable rules outlined herein.

9. “Aquifer storage and recovery project” means a project involving the injection of water into a geologic formation for the purpose of subsequent recovery and beneficial use by the project operator.

10. "Beneficial use" or "beneficial purpose" means use of groundwater for:
    a. Agricultural, gardening, domestic, stock raising, municipal, mining, manufacturing, industrial, commercial, or recreational purposes;
    b. Exploring for, producing, handling, or treating oil, gas, sulfur, lignite, or other minerals; or,
    c. Any other purpose that is nonspeculative, useful, and beneficial to the user that does not commit or result in waste as that term is defined in these rules.

11. “Best available science” means conclusions that are logically and reasonably derived using statistical or quantitative data, techniques, analyses, and studies that are publicly available to reviewing scientists and can be employed to address a specific scientific question.

12. "Board" means the Board of Directors of the Corpus Christi Aquifer Storage and Recovery Conservation District.

13. "Casing" means a tubular, water tight structure installed in the excavated or drilled hole to maintain the well opening and, along with cementing, to confine the groundwater to their zones of origin and to prevent the entrance of surface pollutants.

14. "Cement" means a neat Portland or construction cement mixture of not more than seven gallons of water per ninety-four (94) pound sack of dry cement, creating a cement slurry in which bentonite, gypsum, or other additives may be included.

15. “Desired future condition” means a quantitative description, adopted in accordance with Texas Water Code Section 36.108, of desired condition of the groundwater resources in a management area at one or more specified future times.

16. "Deteriorated well" means a well, the condition of which will cause, or is potentially likely to cause, pollution of any water in the District.

17. "Director" means a person appointed by the City Council of the City of Corpus Christi (City Council), or by the Board in the case of a resignation, and who is qualified and has taken the Constitutional oath of office.
18. "District" means the Corpus Christi Aquifer Storage and Recovery Conservation District as authorized under Acts 2005, 79th Legis., R.S., ch. 897, p. 3088. The legislation is codified as Chapter 8811, Vernon's Texas Codes Annotated, Special District Local Laws Code.

19. "District office" means the office of the District, which may be changed from time to time by resolution of the Board.

20. "Domestic use" means the use of groundwater by an individual or a household to support essential domestic activity.

21. "Drilling permit" means a permit for a water well to be drilled, including test wells, or an existing well that is to be re-drilled.

22. "Drilling registration" means the registration required for an exempt well that is to be drilled.

23. "Essential domestic activity" includes water for use inside the home, watering domestic animals, protecting foundations, and recreation only for swimming pools. The term does not include water use activities for which consideration is given or for which the product is to be sold, irrigation of lawns and landscaped areas, filling or refilling ponds, lakes, tanks, reservoirs, or other confinements that have a capacity greater than 25,000 gallons, or non-closed system geothermal heating/cooling systems.

24. "GPM" means gallons per minute.

25. "Groundwater" means water percolating below the surface of the earth.

26. "Groundwater reservoir" means a specific subsurface water-bearing stratum.

27. "Hearing body" means the Board, any committee of the Board, or a hearing examiner at any hearing held under the authority of law.

28. "Hearing examiner" means the person appointed by the Board of directors to conduct a hearing or other proceeding.

29. "Landowner" means the person who holds possessory rights to the land surface or the groundwater.

30. "Modeled available groundwater" means the amount of water that the executive administrator determines may be produced on an average annual basis to achieve a desired future condition established under Texas Water Code Section 36.108.

31. "Municipal setting designation" means an area designated by the City Council under the authority of Section 551.005, Texas Local Government Code and Subchapter W, Chapter 361, Texas Health and Safety Code.
32. "Municipal use" means the use of groundwater through public water supply systems authorized by the State of Texas and includes individual wells supplying water for irrigation for non-agricultural purposes.

33. "New well application" means an application for a permit for a water well that has not been drilled or an injection well permit to inject water into a groundwater aquifer.

34. "Open Meetings law" means Chapter 551, Texas Government Code, as it may be amended from time to time.

35. "Operating permit" means any type of permit issued by the District that relates to the operation of or production from a water well, which may include authorization to drill or complete a water well if the District does not require a separate permit for drilling or completing a water well.

36. "Party" means a person who is an automatic participant in a proceeding before the District or a person who is an affected person as defined under these rules and who has been designated as a participant in the proceeding before the District.

37. "Person" means an individual, corporation, Limited Liability Company, organization, government or governmental subdivision or agency, business trust, estate, trust, partnership, association, or any other legal entity.

38. "Pollution" means the alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any water in the District, that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property or to public health, safety, or welfare, or impairs the usefulness or public enjoyment of the water for any lawful or reasonable use.

39. “Project Operator” means a person holding an authorization under Section 15 to undertake an aquifer storage and recovery project.

40. "Presiding officer" means the president, vice-president, secretary or other Board member presiding at any hearing or other proceeding or a hearing examiner conducting any hearing or other proceeding.

41. “Production limit” means a numerical limitation of the annual amount of Groundwater authorized to be produced under an operating permit. The production limit is generally expressed in acre-feet per year or gallons per year.

42. "Public Information Act" means Chapter 552, Texas Government Code, also called the "Open Records law," as it may be amended from time to time.

43. "Quorum" means a majority of the members of the Board of Directors.

44. "Registration" means the recordation of a certificate issued by the District for a well that is exempt from an operating permit.

45. "Rule" or "rules" mean the rules and regulations of the District.

46. “Subsidence” means the lowering in elevation of the land surface caused by withdrawal of groundwater.

47. "Texas Rules of Civil Procedure" and "Texas Rules of Evidence" mean the civil procedure and evidence rules, as adopted by the Supreme Court of Texas, as amended, and in effect at the time of the action or proceeding. Except as modified by these District rules, the rights, duties and responsibilities of the presiding officer acting under the Texas Rules of Civil Procedure and the Texas Rules of Evidence are the same as a court acting under those rules, without a jury.

48. “Transfer Permit” means a permit issued by the District allowing the transfer of groundwater outside of the District’s boundaries.

49. "Waste" means any one or more of the following:
    a. Withdrawal of groundwater from a groundwater reservoir at a rate and in an amount that causes or threatens to cause intrusion into the reservoir of water unsuitable for agricultural purposes, gardening, domestic use, stock raising purposes, or other beneficial purposes;
    b. The flowing or producing of wells from a groundwater reservoir if the water produced is not used for a beneficial purpose;
    c. Escape of groundwater from a groundwater reservoir to any other reservoir or geologic stratum that does not contain groundwater;
    d. Pollution or harmful alteration of groundwater in a groundwater reservoir by saltwater or by other deleterious matter admitted from another stratum or from the surface of the ground;
    e. Willfully or negligently causing, suffering, or allowing groundwater to escape into any river, creek, natural watercourse, depression, lake, reservoir, drain, sewer, street, highway, road, or road ditch, or onto any land other than that of the owner of the well unless such discharge is authorized by permit, rule, or other order issued by the Texas Commission on Environmental Quality, its predecessors or successors, under Chapter 26, Texas Water Code;
    f. Groundwater pumped for irrigation that escapes as irrigation tailwater onto land other than that of the owner of the well unless permission has been granted by the occupant of the land receiving the discharge;
    g. For water produced from an artesian well, "waste" has the meaning assigned by Section 11.205, Texas Water Code;
        i. Section 11.205. Wasting Water from Artesian Well: Unless the water from an artesian well is used for a purpose and in a manner in which it may be lawfully

used on the owner's land, it is waste and unlawful to willfully cause or knowingly permit the water to run off the owner's land or to percolate through the stratum above which the water is found.

h. Groundwater that is discharged into a watercourse for transit to another location when the losses in transit exceed 20%; or,
i. Operating a deteriorated well.

50. "Water meter" or "water measuring device" for large volume users means a water flow measuring device that can within +/- 10% accurately record the amount of groundwater produced during a measured time.

51. "Well" means any facility, device, or method used to withdraw or sample groundwater from, or observe the water level in, a groundwater reservoir in the District.
    a. Types of wells:
        i. "Additional production well" means a well that is otherwise excluded by law from regulation by the District that is also used for additional purposes regulated by the District.
        ii. "Artesian well" means a water well completed in the confined portion of an aquifer such that, when properly cased, water will rise in the well by natural pressure above the base of the overlying impermeable stratum.
        iii. "ASR well" means either an ASR Injection well, ASR Monitoring well, or ASR Recovery well."
        iv. "ASR Injection well" means a well drilled to inject water into an aquifer for storage.
        v. "ASR Monitoring well" means a well drilled to measure the level of stored water within an aquifer.
        vi. "ASR Recovery well" means a well drilled to recover water from aquifer storage.
        vii. "De-watering well" or "depressurizing well" means a well-used to remove water from a construction site or an excavation, or to relieve hydrostatic uplift on permanent structures. De-watering wells may include exempt, non-exempt, and excluded wells.
        viii. "Exempt well" means a well that is:
            1. Drilled or equipped to produce no more than 25,000 gallons per day; or,
            2. Drilled or equipped to produce water for watering livestock and poultry connected with farming, ranching, or dairy enterprises.
        ix. "Existing well" means a well that is in existence or for which drilling has commenced on the day of adoption of these rules.
        x. "Excluded well" means a well drilled for oil, gas, sulfur, uranium, or brine, or for core tests, or for injection of gas, saltwater, or other fluid or for any purpose, under permits issued by the Railroad Commission of Texas.
        xi. "Injection well" means a well into which fluids are injected.
        xii. "Monitoring well" means a well installed to measure some property of the groundwater or the aquifer that it penetrates.

xiii. "New well" means a well not in existence or for which drilling has not commenced on the day of adoption of these rules.
xiv. "Non-exempt well" means either an existing or a new well subject to these rules.

52. "Well operator" means the person who operates a well or a water distribution system supplied by a well.

53. "Well owner" means the person who owns a possessory interest in a well, the land upon which a well is located or to be located, or the beneficial user of the groundwater.

54. "Well system" means a well or group of wells tied to the same distribution system.

55. "Withdraw" means the act of extracting or producing groundwater by pumping or some other method.

Rule 1.2 Purpose of Rules and Mission Statement

The purpose of these rules and regulations is to accomplish the intent of the creation of the District by the Act and to facilitate the purposes of Chapter 36 of the Texas Water Code.

The District's mission statement is as follows: The Corpus Christi Aquifer Storage and Recovery Conservation District (District) is committed to manage and protect the groundwater resources of the District, including those injected into the ground for storage and later use. The District is committed to maintaining a sustainable, adequate, reliable, cost effective, and high quality source of groundwater to promote the vitality, economy, and environment of the District. The District will work with and for the citizens of the District and cooperate with other local, regional, and state agencies involved in the study and management of groundwater resources. The District shall take no action without a full consideration of the groundwater needs of the citizens of the District.

Rule 1.3 Use and Effect of Rules

These rules and regulations are used by the District as guidelines to facilitate the duties assigned to the District by law, the Act, and Chapter 36 of the Texas Water Code. They shall not be construed as a limitation or restriction on the exercise of any discretion, where it exists; nor shall they be construed to deprive the District of the exercise of any powers, duties, or jurisdiction conferred by law; nor shall they be construed to limit or restrict the amount and character of data or information which may be required to be collected for the proper administration of the Act.

Rule 1.4 Amending Rules

The Board may, following notice and public hearing, amend these rules or adopt new rules from time to time.

Rule 1.5 Headings and Captions

The section and other headings and captions contained in these rules are for reference purposes only and do not affect in any way the meaning or interpretation of these rules.

Rule 1.6 Construction

A reference to a title, chapter, or section without further identification is a reference to a title, chapter or section of the Texas Water Code. Construction of words and phrases are governed by the Code Construction Act, Chapter 311, Subchapter B, Texas Government Code. Whenever a singular noun is used, it may refer to a plural; whenever a plural noun is used, it may refer to a singular.

Rule 1.7 Methods of Service under the Rules

Except as otherwise provided in these rules, any notice or document required by these rules to be served or delivered may be delivered to the recipient, or the recipient's authorized representative, in person, by agent, by courier receipted delivery, by certified or registered mail sent to recipient's last known address, or by fax to the recipient's current fax number and shall be accomplished by 5:00 o'clock p.m. of the date on which it is due. Service by mail is complete upon deposit in a post office or other official depository of the United States Postal Service. Service by fax is complete upon transfer, except that any transfer commencing after 5:00 o'clock p.m. shall be deemed complete the following business day. If service or delivery is by mail, and the recipient has the right, or is required, to do some act within a prescribed period of time after service, three days will be added to the prescribed period. Where service by other methods has proved unsuccessful, the service may be complete upon publication of the notice in a newspaper of general circulation in the District, or by such method as the hearing body may provide.

Rule 1.8 Severability

If any one or more of the provisions contained in these rules is for any reason held to be invalid, to be illegal, or to be unenforceable in any respect, the invalidity, illegality, or unenforceability may not affect any other rule or provision of these rules and these rules will be construed as if such invalid, illegal, or unenforceable rule or provision had never been contained in these rules.

SECTION 2. BOARD OF DIRECTORS

Rule 2.1 Purpose of the Board

The purpose of the Board is to facilitate the implementation of these rules and regulations, to accomplish the intent of the creation of the District by the Act, and to facilitate the purposes of Chapter 36 of the Texas Water Code.

Rule 2.2 Board Structure and Officers

The District Board of Directors is composed of 5 members initially elected to staggered 2- and 4-year terms. All directors are appointed by the Corpus Christi City Council. The Board shall elect officers annually and the officers must be confirmed by the City Council. If a vacancy occurs on the Board, then the Board may appoint a Director to serve the remainder of the term.

The District's Board of Directors is comprised of a Chairman, Vice Chairman, Secretary, General Manager, and Member(s). The Board of Directors holds regular meetings at City Hall located at 1201 Leopard Street, Corpus Christi, Texas on a quarterly basis, unless otherwise posted. All meetings of the District's Board of Directors are public meetings noticed and held in accordance with all public meeting requirements. The District Board of Directors meetings are posted in each county along with other items of interest by the District.

Rule 2.3 Meetings

The Board will hold a regular meeting at least quarterly on a day and place that the Board may establish from time to time by resolution. At the request of the Chairman, or by written request of at least three members, the Board may hold special meetings. All Board meetings will be held in accordance with the Open Meetings law.

Rule 2.4 Committees

The Chairman may establish committees for formulation of policy recommendations to the Board, and appoint the chair and membership of the committees, which may be derived from the Board or outside of the Board. Committee members serve at the pleasure of the Chairman.

Rule 2.5 Ex Parte Communications

A Board member may communicate ex parte with other members of the Board and staff.

SECTION 3. GENERAL MANAGER

Rule 3.1 General Manager

The person employed by the Board as General Manager shall be the chief operating officer of the District and shall have full authority to manage, operate, and execute the affairs of the District, subject only to decisions made by the Board. The General Manager is responsible for employing all persons necessary to conduct the function, operation, and business of the District and for determining their compensation.

The General Manager is empowered to obtain official or legal status in matters of concern or interest to the District in public hearing processes or other proceedings. This will only occur when Board action cannot be obtained in a timely manner to establish an official Board or District position or when the

opportunity to obtain such status presents itself. Such matters will be brought to the Board for action at the earliest possible convenience.

Rule 3.2 Delegation of Authority

The General Manager may delegate his/her administrative duties in order to effectively and expeditiously execute his/her duties, providing that no such delegation shall ever relieve him/her of responsibilities which are ultimately his/hers under the Act, Rules and Regulations, or Board Orders.

SECTION 4. DISTRICT

Rule 4.1 Minutes and Records of the District

All documents, reports, records, and minutes of the District are available for public inspection and copying in accordance with the Public Information Act. Persons who are furnished copies may be assessed a copying charge, pursuant to policies established by the Board. A list of charges for copies will be furnished by the District.

Rule 4.2 Certified Copies

Requests for certified copies must be in writing. Certified copies may be made by the Secretary, Assistant Secretary, or the General Manager and will be affixed with the seal of the District. Persons furnished with certified copies may be assessed a certification charge, in addition to the copying charge, pursuant to policies established by the Board.

Rule 4.3 Official Office and Office Hours

The Board, by resolution, shall establish an official office for the District, and the office will maintain regular business hours.

SECTION 5. DISTANCE AND SPACING REQUIREMENTS

Rule 5.1 Required Distance from Aquifer Boundary

An applicant proposing to develop an aquifer storage area shall provide to the District the location of the storage area described by metes and bounds and the District shall enter an order demarcating the boundaries of the aquifer storage area. The order shall be recorded in the real property records of the affected county and, thereafter, no well shall be permitted to be drilled within one mile of the boundaries of the demarcated aquifer storage area except by the person who developed the storage area, but the Board may, if good cause is shown by clear and convincing evidence, that no harm or negative impact will occur to the aquifer storage area, allow drilling activity by others upon entering special orders or adding special permit conditions and requirements.

Rule 5.2 Required Distance from Property Lines

Except as provided in Rule 5.3, a new well may not be drilled within 50 feet from the property line of any adjoining landowner or an area designated with a municipal setting designation. This spacing may be reduced or increased by the Board upon demonstration either that such spacing is overly protective of neighboring wells or is insufficiently protective of neighboring wells. All other non-excluded wells completed in other aquifers in the District will be considered on a case by case basis.

Rule 5.3 Exceptions to Spacing Requirements

(a) Provided that an applicant presents waivers signed by the adjoining landowner(s) or the developer of the demarcated aquifer storage area, stating that they have no objection to the proposed location of the well site, the minimum distance from the property line requirements will not apply to the new proposed well location, subject to the right of the Board to limit production of the well to prevent or minimize injury to adjoining landowners or the aquifer.

(b) Provided that an applicant shows good cause why a new well should be allowed to be drilled closer than the required minimum distance of 50 feet from the property line of the adjoining landowner(s), or closer than the distances stated in Rules 5.1 and 5.2, the issue of distance requirements will be considered during the technical review process and/or the contested case process. If the Board chooses to grant a permit to drill a well that does not meet the distance requirements, the Board may limit the production of the well to prevent or to minimize injury to adjoining landowners or the aquifer.

(c) In addition, the Board may, if good cause is shown by clear and convincing evidence, enter special orders or add special permit conditions increasing or decreasing the distance requirements.

(d) ASR wells that are a part of an ASR project authorized by the Texas Commission on Environmental Quality are subject to the rules stated in Section 15.

Rule 5.4 Requirement of Monitor Well(s)

Applications for wells drilled and existing wells when reworked, equipped to pump more than 200 acre-feet per year, or the equivalent on a daily basis, shall include provisions for monitoring, on as frequent a basis as reasonably possible, water levels in the aquifer from which withdrawals are to be made using one or more existing wells, subject to more detailed orders of the Board as set forth in the permit and all applicable rules, including but not limited to Rules 7.3 and 8.3(b)(2)(D). The Board may, upon application, exempt an applicant from this rule.

Rule 5.5 Ownership of Water Stored in an Aquifer Storage Area

Water injected into an aquifer storage area is owned by the person who injected the water and is not percolating groundwater.

SECTION 6. PRODUCTION LIMITATIONS

Rule 6.1 Maximum Allowable Production from Aquifers in District

(a) The amount of annual maximum production specified in the operating permit for a non-exempt well may be up to 0.04 acre-feet per contiguous surface acre[1] owned or operated by the applicant, unless a small amount is requested. Applicants may request that greater amounts of production per surface acre be authorized provided the applicant can demonstrate to the District's satisfaction that local hydrogeologic conditions will allow the withdrawal of a greater amount of groundwater per annum without negatively affecting water levels of adjoining properties or otherwise interfering with an adjacent landowner's ability to withdraw and use groundwater. If necessary, the Board may adjust downward the maximum allowable production upon permit renewal to achieve the desired future conditions under Section (b) below. In establishing the maximum allowable production for a retail public water utility, the District will consider the service needs and service area of the retail public water utility in addition to or in lieu of surface area owned or operated by the retail public water utility.

(b) In issuing permits, the District shall manage total groundwater production on a long-term basis to achieve the desired future condition and the District will also consider:

1. The modeled available groundwater determined by the executive administrator of the Texas Water Development Board;
2. The executive administrator's estimate of the current and projected amount of groundwater produced under exemptions granted by District rules;
3. The amount of groundwater authorized under permits previously issued by the District;
4. A reasonable estimate of the amount of groundwater that is actually produced under permits issued by the District; and,
5. Yearly precipitation and production patterns.

Rule 6.2 Areas of Depletion and Proration Orders

In order to protect public health and welfare and to conserve and manage the groundwater resources in the District during times of drought or depletion, the District may pro-rate groundwater use, place special requirements on, modify, delay, or deny a permit for a new well during a District-declared drought.

Rule 6.3 Additional Production Wells

An applicant must follow the rules and regulations outlined in this Section and Section 5 concerning the addition of production wells.

[1] Calculated by dividing the Gulf Coast Aquifer System (central portion) Groundwater Availability Model derived amount of water that flows through the system (620,000 acre-feet) by the total area of the GCAS (central portion; approximately 15,000,000 acres), providing amount of water available (in acre-feet) by area (acre). This is an estimation that requires further study.

Rule 6.4 Storage and Recovery Aquifers

Certain demarcated aquifer storage areas are to be designated for the specific purpose of aquifer storage and later recovery. These aquifers are to be deliberately injected with fresh water which are likely to cause the water levels to rise and, during withdrawal, cause the water levels to drop. In these areas, the rise and drop of water is normal and to be expected. Section 6 is not applicable to these demarcated areas.

Rule 6.5 Municipal Setting Designations

Production of water in areas with municipal setting designations is prohibited.

Rule 6.6 Subsidence

(a) Permittees will follow the rules and regulations set forth in order to provide for the conservation, preservation, protection, recharge, and prevention of waste of groundwater, and of groundwater reservoirs or their subdivisions, to control subsidence caused by withdrawal of water from those groundwater reservoirs or their subdivisions, and to prevent degradation of water quality.

(b) Permittees will drill for and produce the groundwater below the surface of real property without causing waste or malicious drainage of other property or negligently causing subsidence.

(c) The District reserves the right to amend these rules and regulations, following notice and public hearing, to reflect changes caused by regional subsidence.

SECTION 7. DEPOSITS AND FEES FOR OPERATING PERMITS, FEES, and FILING REPORTS

Rule 7.1 Initial Application Fee and Filing of State Well Reports and Plugging Reports

(a) Each application for an operating permit of any type issued by the District or drilling registration must be accompanied by a one-time non-refundable application fee of $250.00, which will be accepted and deposited in the District account by the General Manager. The purpose of the application fee is to cover the cost of reviewing an application and processing an operating permit and to ensure receipt by the District of the information set out herein. Such administrative deposit or fee shall not unreasonably exceed the cost to the District for such administrative acts. The applicant may be required by the Board to deposit with the District additional funds if the amount of the original deposit is expended prior to the Board's final action on the operating permit.

(b) In the event that neither the driller's logs or completion logs of the well nor the operating permit marked "abandoned" is returned to the District office within 180 calendar days after the issuance date of the operating drilling permit or operating drilling registration, the deposit becomes the property of the District and the operating drilling permit or operating drilling registration is deemed cancelled without further action by the Board, unless an extension has

been granted. Extensions may be granted by the Board to the extent of 180 days or less, as the Board determines is appropriate.

(c) As an additional fee for administrative acts of the District, after an application for any operating permit issued by the District has been determined to be administratively complete by the Board, the applicant shall deposit with the District an amount of money determined by the Board to cover the cost associated with an uncontested or contested hearing regarding the operating permit application. The amount of the deposit shall be sufficient to pay legal fees, expert fees, court reporter fees, hearing facility rental fees, and other expenses. The remaining deposit balance, if any, is refundable following approval of the operating permit, disposal of any motions for rehearing, and receipt of anticipated expenses. The applicant may be required by the Board to deposit with the District additional funds if the amount of the original deposit is expended prior to the Board's final action on the permit.

Rule 7.2 Regulatory Fees

(a) Regulatory fees shall be paid to the District on a monthly basis for the amount of water actually produced from non-exempt wells under operating permits and transfer permits, which fees shall be established by resolution of the Board and paid to the District within 15 days after the end of the reporting month.

(b) An exempt or excluded well is not excused from regulatory pumping fees if the groundwater is exported from the District. The owner of the well shall identify to the District the amount of water exported from the District on a monthly basis and pay a regulatory pumping fee to the District in an amount equal to the pumping fee of a non-exempt well plus the surcharge, as defined in Rule 7.2(e), which shall be paid to the District within 15 days after the end of the reporting month. Groundwater that is discharged pursuant to a permit issued by the Texas Commission on Environmental Quality or its predecessors and not sold is not considered to have been transferred from the District unless the discharge is part of an overall water transfer and sale.

(c) The owner of all wells exporting water out of the District shall report the amount of water actually produced on a monthly basis under operating permits and transfer permits, which fees shall be established by resolution of the Board and paid to the District within 15 days after the end of the reporting month.

(d) Regulatory fees not paid by 25 days after the end of the reporting month are considered delinquent and the fee payer shall be assessed a late fee of 5 percent of the amount due.

(e) The District may impose a surcharge equivalent of up to 50 percent of the District's production fee for water transported out of the District.

Rule 7.3 Filing Reports

(a) The driller's log and completion log, referred to by the Texas Department of Licensing and Regulation State Water Well Driller's Board as a "State Well Report," shall be filed with the

District within 30 days from the preparation of the report pertaining to groundwater production, groundwater quality, or aquifer testing. In the event a well is plugged, the person who plugs the well shall within 30 days after plugging and abandonment is complete, submit a plugging report to the District in accordance with the Rules of the Texas Department of Licensing and Regulation, unless an extension has been granted.

(b) Water levels in monitoring wells designated under these rules shall be reported to the District at the same time as regulatory fees are paid to the District unless provided otherwise in the permit or in a written agreement with the District.

SECTION 8. OPERATING PERMITS, REGISTRATIONS, AND AMENDMENTS

Rule 8.1 Drilling Registrations and Drilling Permits

(a) After the effective date of these rules, no person shall drill an exempt water well before filing an application for a drilling registration and receiving the registration or drill a non-exempt water well before filing an application for a drilling permit and receiving the drilling permit. Each original application for a water well drilling registration or drilling permit requires a separate application. Application forms will be provided by the District and furnished to the applicant upon request.

(b) Contents of an application: An application for a drilling registration or drilling permit shall be in writing and sworn, and shall contain:

1. The name and mailing address of the applicant and the name and address of the owner of the land, if different from the applicant, on which the well is to be located;
2. If the applicant is other than the owner of the property, documentation establishing the applicable authority to construct and operate a well on the owner's property for the proposed use;
3. For exempt wells, a statement regarding the basis for asserting that the well will be exempt under Rule 8.6;
4. A statement of the nature and purpose of the proposed well, its use and the amount of water to be used for each purpose;
5. Except for exempt wells, availability of feasible and practicable alternative supplies to the applicant;
6. Except for exempt wells, the projected effect of the proposed injection or withdrawal on the aquifer or any other aquifer conditions, depletion, subsidence, or effects on existing permit holders or other groundwater users in the District;
7. Except for exempt and injection wells, the applicant's water conservation plan and, if any subsequent user of the water is a municipality or entity providing retail water services, the water conservation plan of that municipality or entity shall also be provided and a declaration that the applicant will comply with the District's Groundwater Management Plan;
8. The location of the well and the estimated or proposed rate at which water will be injected and/or withdrawn and where the water is proposed to be used; and,

9. A well closure plan or a declaration that the applicant will comply with well plugging guidelines and report closure to the applicable authorities, including the District.

(c) The General Manager will assist the applicant for a voluntary registration for a well exempt under these rules and for a monitoring well and issue the registration.

(d) A drilling registration or drilling permit application may be changed by the applicant by submitting a written, sworn amendment to the application, calling the attention of the District to the proposed changes. For drilling permit applications, if an amendment is filed, new notice may be required to be given if significant changes are requested. All amendments must be approved by the District and appropriate fees may be assessed to review the amendment. Such administrative deposit or fee shall not unreasonably exceed the cost to the District for such administrative acts.

(e) An individual or entity may mitigate or make emergency repairs to an existing well provided that the mitigation or repair is required by the Railroad Commission of Texas and the mitigation or repair does not violate Rule 10.1.

Rule 8.2 Registrations

(a) This subsection concerns wells which are exempt pursuant to Rule 8.6 and in existence on the effective date of these rules or which are no longer subject to the rules of the Railroad Commission of Texas, but will continue to be used, provided they will be exempt wells according to these rules. All existing water wells exempt under these rules from the requirement of an operating permit may be registered with the District by the well owner or the well operator. If the exempt well is in existence on the effective date of these rules, the well owner or operator may file with the District an application for a certificate of registration. After review and the determination by the General Manager that the well is exempt, the owner or operator shall be issued a certificate of registration by the General Manager. A registration may be amended by following the procedures for a new registration and identifying the changes requested.

(b) For proposed, exempt wells, not in existence on the effective date of these rules, the owner shall apply for a drilling registration and request that the well be registered. The application shall include the information set out in Rule 8.1(b). The General Manager shall review the drilling registration application and make a preliminary determination on whether the well meets the exemptions provided in Rule 8.6. If it is concluded that the applicant seeks a drilling registration for a well that will be exempt under these rules, the General Manager shall issue the drilling registration to the applicant. After the well is drilled and upon the filing of the driller's log and completion report with the District, the General Manager shall issue to the owner or operator a certificate of registration.

(c) The driller's log and completion report (and on abandonment, if drilled, the plugging and abandonment report) shall be filed with the District as provided in Rule 7.3.

Rule 8.3 General Permitting Policies and Procedures

(a) Operating Permit Requirement: The well owner or well operator must file a written, sworn application for an operating permit prior to operating any well for either injection of water or the withdrawal of water, not otherwise exempt under Rule 8.6 or excluded, unless additional production is obtained from the well. The connection of a water well to any means of distributing the water, whether temporary or permanent, shall be deemed as operating the well. Pumping tests of a well are not deemed operating the well. The operating permit may be approved by the General Manager under such terms and conditions as the Board shall direct, and the well shall remain permitted until an operating permit term has expired and is no longer required for the well/well system. For non-exempt wells in existence on the effective date of the creation of the District, an application for an operating permit or, after the District's Groundwater Management Plan is approved, an operating permit must be filed on or before August 31, 2007.

(b) Operating Permit Applications: Every well shall have a separate application for an operating permit, unless it is an exempt well or an excluded well having no additional production. Every well requires a separate application for an operating permit. Application forms will be provided by the District and furnished to the applicant upon request. The application shall be in writing, sworn, and provide the following information:

1. For non-exempt wells in existence on the effective date of these rules, the information provided for drilling permits stated in Rule 8.1, and any additional information requested by the General Manager.
2. For non-exempt wells not in existence on the effective date of these rules:
    a. Any corrections to the information supplied in the drilling permit application;
    b. The date the well was drilled and its location;
    c. The instantaneous (gallons per minute; gpm), daily, and annual rate at which the applicant seeks to inject into the well or pump the well and/or withdraw from the well;
    d. For wells to be drilled and equipped to produce more than 200 acre-feet per year, or the equivalent on a daily basis, excluding irrigation wells, such information must include, to the extent practical, the transmissivity and storativity of the aquifer from which groundwater is to be withdrawn and also shall include an assessment of the impact on the aquifer of the proposed pumpage. It is expected that these aquifer parameters be determined based on a pumping test of at least twenty-four hours duration. Any observation well used for determining transmissivity and storativity of an aquifer must be sufficiently close to the well being pumped to discern the effects of the pumping well on water levels in the aquifer in accordance with the anticipated transmissivity and storativity of the aquifer and duration of the pumping test. All testing is to be performed under the direction and control of a licensed professional engineer or a licensed professional geoscientist in the State of Texas, who shall affix his or her signature and seal to the test results and assessment

of aquifer impact. For recognized well fields, defined as two or more wells operated by the same entity at or within plus thirty percent of the minimum spacing prescribed in Section 5 of these rules, a single aquifer test will be sufficient.; and,

e. Any additional information requested by the Board or the General Manager.

(c) Notice of Permit Hearing: Once the District has received an original application for a drilling permit to withdraw water or to inject water or an operating permit for a non-exempt water well and the application is deemed administratively complete, the General Manager, with Board orders, will prepare a written notice of the application and public hearing as provided in Rule 13.2.

(d) Decision and Issuance of Permit: In deciding whether or not to grant a permit or permit amendment, and in setting the terms of the permit, the Board shall consider the Texas Water Code and the District rules, including:

1. The application conforms to the requirements prescribed by Chapter 36, Water Code, and is accompanied by the prescribed fees;
2. The proposed injection or use of water unreasonably affects existing groundwater and surface water resources or existing permit holders;
3. The proposed use of water is dedicated to any beneficial use;
4. The proposed use of water is consistent with the District's approved Groundwater Management Plan;
5. The applicant has agreed to avoid waste and achieve water conservation;
6. The applicant has agreed that reasonable diligence will be used to protect groundwater quality and that the applicant will follow well plugging guidelines at the time of well closure; and,
7. The terms and conditions that shall be attached to the permit or permit amendment to protect the groundwater resources of the District and the users within the District.

(e) Operating Permit Provisions: The operating permit will contain the name and address of the well owner or operator, the location of the well, the maximum rate at which water may be injected, where the water will be used and the purpose of use of the water, other criteria deemed necessary by the Board for the protection of the public health, safety, welfare, conservation, and management of the groundwater resources in the District, and the standard provisions listed in Rule 8.4. The operating permit may also contain provisions relating to the means and methods of transportation of water produced within the District, and any other provisions that the Board may direct.

(f) Aggregation of Withdrawal: In issuing a permit, the authorized withdrawal for a given well may be aggregated, at the discretion of the District, with the authorized withdrawal from other permitted wells designated by the District. Geographic location of wells, operational or legal control of the wells, ownership or legal control of the property where the wells are

located, and use of the wells for a common purpose will be considered in determining whether or not to allow aggregation of withdrawal. For the purpose of categorizing wells by the amount of groundwater production, where wells are permitted with an aggregate withdrawal, the total authorized withdrawal shall be assigned to wells in aggregate, rather than allocating to each well a pro-rata share or estimated production.

(g) Effect of Acceptance of Permit: Acceptance of the permit by the person to whom it is issued constitutes acknowledgment by that person and agreement to comply with all of the terms, provisions, conditions, limitations, and restrictions stated in the permit and in these rules.

Rule 8.4 Operating Permit Provisions

All operating permits are granted subject to these rules, orders of the Board, and the laws of the State of Texas. An operating permit may be modified at any time by the Board in accordance with the District's Groundwater Management Plan. In addition to any special provisions or other requirements incorporated into the permit, each permit issued shall contain the following standard permit provisions:

1. This operating permit is granted in accordance with the provisions of the rules of the District, and acceptance of this permit constitutes an acknowledgment and agreement that the permittee accepts the terms and conditions of the permit and will comply with the rules and Groundwater Management Plan of the District.

2. This permit confers only the right to operate the well described in this permit under these rules, and its terms may be amended pursuant to the provisions of these rules. To protect the permit holder from illegal use by a new landowner, within 10 days after the date of sale, the operating permit holder must notify the District in writing of the name and address of the new owner. Any person who becomes the owner of a currently permitted well must, within 20 calendar days from the date of the change in ownership, file an application for a permit amendment to effect a transfer of the permit.

3. The operation of the well for the authorized withdrawal must be conducted in a non-wasteful manner.

4. Injections or withdrawals from all non-exempt wells must be measured by a water meter or estimated by the owner or operator using a water measuring device or method that is within plus or minus 10% of accuracy. Measured or estimated water use shall be reported to the District monthly and the applicable fee paid. Permittees shall keep accurate records of the groundwater injected or withdrawn and the purposes of the withdrawal. Such records shall be available for inspection by District representatives.

5. The well site must be accessible to District representatives for inspection, and the permittee agrees to cooperate fully in any reasonable inspection of the well and well site.

6. The application for which this operating permit has been issued is incorporated by reference in this permit, and this operating permit is granted on the basis of and contingent upon the

accuracy of the information provided in that application. A finding that false or inaccurate information has been provided is grounds for immediate revocation of the operating permit. Operating permits are subject to the imposition of additional provisions in accordance with the District's approved Groundwater Management Plan.

7. The maximum authorized withdrawal is limited to the amount stated in the permit on an annualized basis and the instantaneous rate of withdrawal can be no more than 1.25 times the amount authorized on an annual basis, except when groundwater production from wells is aggregated in accordance with Rule 8.3(g), unless otherwise authorized by the permit.

8. Violation of this permit's terms, conditions, requirements, or special provisions, including pumping amounts in excess of authorized withdrawal, is grounds for revocation of the permit and/or punishable by civil penalties as provided by the District Rule 14.4.

9. Wherever special provisions in this permit are inconsistent with other provisions or rules of the District, the special provisions of the permit shall prevail.

Rule 8.5 Operating Permit Limitations

(a) Maximum Authorized Withdrawal: No operating permittee shall inject, pump or withdraw any groundwater on an annual basis in excess of the amount of groundwater authorized in the operating permit and no rate of pumping shall be in excess of 1.25 times the instantaneous rate necessary to produce the authorized withdrawal on an annual basis, except when groundwater production from wells is aggregated in accordance with Rule 8.3(g) or unless otherwise authorized by the operating permit.

(b) Operating Permit Required: Unless otherwise exempt or excluded, no person shall operate a well without an operating permit issued by the District. However, if there is additional production from an exempt or excluded well, the operating permit requirement of these rules do apply.

(c) When an operating permit is granted, the permittee shall begin and complete construction of the permitted well diligently and, if the permit is for withdrawal, produce water from the well for the purpose(s) authorized within 24 months from the date the permit is issued. Failure of a permittee to begin and complete construction, and pump water from the permitted well for the authorized purpose(s) within the time period specified shall cause the permit to terminate and the permittee shall lose all rights thereunder without further action by the District; however, permittees may, upon a showing that it is not technically or economically feasible to connect the well to existing infrastructure or to a reasonably necessary extension of existing infrastructure within the 24 month period, be granted the full five year term of the operating permit to complete construction, and pump water from the permitted well for the authorized purpose(s). The permittee who has been granted an operating permit pursuant to this subsection must record a copy of the operating permit and the applicable spacing rule in effect at the time the operating permit is granted in the county real property records.

Rule 8.6 Exemptions

(a) Except as otherwise provided in these rules, the operating permit requirements of this Section 8 do not apply to exempt wells, however, the drilling registration requirements of Rule 8.1 and the registration requirements of Rule 8.2 do apply to a well-used solely for domestic use or for providing water for livestock or poultry on a tract of land larger than ten (10) acres that is either drilled, completed, or equipped so that it is incapable of producing more than 25,000 gallons of groundwater per day.

(b) New and existing exempt wells may be registered with the District.

Rule 8.7 Registration or Operating Permit Not Required

Wells drilled for oil, gas, sulfur, uranium, lignite, or brine or core tests, or for injection of gas, saltwater, or other fluids, or for any other purpose under permits issued by the Railroad Commission of Texas, other than additional production, are excluded under these rules. The District may not require a drilling permit for a well to supply water for drilling any wells permitted by the Railroad Commission of Texas, except as allowed by the Texas Water Code. Any well that ceases to be used for these purposes and is then used or additionally used as an ordinary water well, is subject to the rules of the District to the extent of the non-excluded purposes.

Any water well drilled and operated under the authority of the Railroad Commission of Texas that produces water in excess of that quantity necessary and for purposes other than the Railroad Commission permitted activity shall be subject to the rules and fees of the District to the extent excess water is produced and the purposes of use that are different than the Railroad Commission permitted activity.

Water wells drilled to supply water for hydrocarbon production activities, including lignite, must meet the spacing requirements of the District, including the limitations imposed by the designation of an aquifer storage area, unless no space is available within 300 feet of the production well or central injection station, in which event the applicant must demonstrate to the Board that the storage aquifer will not be impacted.

Rule 8.8 Change in Operating Permits

(a) If the holder of an operating permit, in connection with the renewal of a permit or otherwise, requests a change that requires an amendment to the permit under District rules, the permit as it existed before the permit amendment process remains in effect until the later of:
    1. The conclusion of the permit amendment or renewal process, as applicable; or,
    2. Final settlement or adjudication on the matter of whether the change to permit requires a permit amendment.

(b) If the permit amendment process results in the denial of an amendment, the permit as it existed before the permit amendment process shall be renewed under Rule 8.9 without penalty, unless Subsection (b) of that section applies to the applicant.

(c) The District may initiate an amendment to an operating permit, in connection with the renewal of a permit or otherwise, in accordance with the District's rules. If the District initiates

an amendment to an operating permit, the permit as it existed before the permit amendment process shall remain in effect until the conclusion of the permit amendment process, as applicable.

Rule 8.9 Operating Permit Renewal

(a) Except as provided by Subsection (b), the District shall, without a hearing, renew or approve an application to renew an operating permit before the date on which the permit expires, provided that:

1. The application, if required by the District, is submitted in a timely manner and accompanied by any required fees in accordance with District rules; and,
2. The permit holder is not requesting a change related to the renewal that would require a permit amendment under District rules.

(b) The District is not required to renew a permit under this section if the applicant:

1. Is delinquent in paying a fee required by the District;
2. Is subject to a pending enforcement action for a substantive violation of a District permit, order, or rule that has not been settled by agreement with the District or a final adjudication; or,
3. Has not paid a civil penalty or has otherwise failed to comply with an order resulting from a final adjudication of a violation of a District permit, order, or rule.

(c) If the District is not required to renew a permit under Subsection (b)(2) above, the permit remains in effect until the final settlement or adjudication on the matter of the substantive violation.

SECTION 9. PERMITS FOR TRANSFER OF GROUNDWATER OUT OF THE DISTRICT

Rule 9.1 Permit Required

Groundwater produced from within the District may not be transferred outside the District's boundaries unless the Board has issued the well owner/operator a transfer permit. The requirements of this rule are applicable without regard to the manner in which the water is transferred out of the District and specifically includes discharges into watercourses to convey water, as well as pipelines and aqueducts.

Rule 9.2 Applicability

A groundwater transfer permit is not required for transportation of groundwater that is part of a manufactured product, or if the groundwater is to be used on contiguous property with the same property ownership, that straddles the District boundary line or within the City of Corpus Christi.

Rule 9.3 Application

(a) An application for a transfer permit must be filed in the District office, be in writing and sworn, and include the following information:

1. The name and mailing address of the applicant and the name and address of the owner of the land from which the transfer is to be made, if different from the applicant, on which the well is to be located;
2. If the applicant is other than the owner of the property, documentation establishing the applicable authority to construct and operate a well on the owner's property for the proposed transfer;
3. A statement of the nature and purpose of the proposed use and the amount of water to be used for each purpose and the period of time each purpose is expected to continue;
4. Availability of water in the District and in the proposed receiving area during the period for which the water supply is requested;
5. Availability of feasible and practicable alternative supplies to the applicant, municipality or entity;
6. The amount and purposes of use for which water is needed in the proposed receiving area for which water is needed;
7. The projected effect of the proposed withdrawal on the aquifer or any other aquifer conditions, depletion, subsidence, or effects on existing permit holders or other groundwater users within the District as determined by a licensed professional engineer or a licensed professional geoscientist in the State of Texas;
8. The indirect costs and economic and social impacts associated with the proposed transfer of water from the District;
9. The approved regional and state water plan, if one has been approved, and the approved District Groundwater Management Plan;
10. Other facts and considerations deemed necessary by the District's Board or General Manager for protection of the public health and welfare and conservation and management of natural resources in the District;
11. The applicant's water conservation plan and, if any subsequent user of the water is a municipality or entity providing retail water services, the water conservation plan of that municipality or entity shall also be provided;
12. The location of the well; and,
13. The period of time for which the permit is sought.

(b) The Board, at its discretion, may combine permit applications.

Rule 9.4 Hearing and Permit Issuance

(a) Applications for transfer permits are subject to the hearing procedures provided by these rules.

(b) In determining whether to issue a permit to transfer groundwater out of the District, the Board shall consider the information provided in Rule 9.3, the Texas Water Code, the District's Groundwater Management Plan, the District's mission statement and such other information the Board deems relevant.

Rule 9.5 Transfer Permit Amendments

Amendment to a Transfer Permit: It is a violation of these rules to transfer any amount of water in excess of the amount, withdrawal rate, or by any means or route not authorized by a transfer permit. A written, sworn application for an amendment to a transfer permit must be filed and the amendment granted before any deviation in the transfer permit occurs. The applicant must demonstrate that the originally authorized terms and conditions in the transfer permit have proven inadequate and why there is a need to change the authorization.

(1) Submission of application: The applicant for an amendment to modify the transfer permit shall provide sufficient documentation that the original authorizations have proven inadequate and the reasons for the need to make the change(s).

(2) Action on Amendment: The General Manager shall prepare a notice to be given of the amendment, which shall be given as in the original application, and a public hearing conducted in the manner prescribed for permit issuance.

Rule 9.6 Duration of Transfer Permit

The period for which water may be transferred under a transfer permit shall be at least three (3) years if construction of a conveyance system has not been initiated within the period specified in the permit or at least thirty years if construction of a conveyance system has been initiated prior to the issuance of the permit. Initiation of construction means letting of contracts for construction of facilities from the point of the well to at least the District boundary and the commencement of actual construction under the contract.

Rule 9.7 Transfer Permit Assessments

The fees for the transfer of water out of the District will be set forth by resolution of the Board.

SECTION 10. REWORKING AND REPLACING A WELL

Rule 10.1 Procedures

(a) An existing, permitted or exempt well may not be reworked or re-equipped in a manner that will change the authorizations contained in the operating permit or registration without a written, sworn application for an amendment that is approved by the Board in the case of an operating permit, or the General Manager in the case of a registration. Re-drilling a well requires a new permit.

(b) An operating permit must be applied for, if a party wishes to increase the rate of production of an exempt well to the point of increasing the size of the column pipe and gallon per minute rate by reworking or re-equipping the well such that the well is no longer exempt.

(c) A drilling permit or a drilling registration must be applied for and granted if a party wishes to replace an existing well with a new, replacement well.

(d) A replacement well, in order to be considered such, must be drilled within 30 feet of the existing well and shall not be drilled nearer the property line, provided the original well was not "grandfathered," if it meets distance requirements (Rule 5), production (Rule 6), when production rules are adopted, and completion (Rule 11) requirements. The Board may grant such application without further notice and/or variances to this rule on a case by case basis.

(e) After the effective date of these rules, upon commencing reworking or replacing permitted wells drilled and equipped to produce more than 200 acre-feet of water per year, the reworked or replacement well also shall be equipped to allow measurement of water levels in the well, and such water levels shall be measured on as frequent a basis as reasonably possible, preferably on a daily, but no greater than weekly, basis between the time the water level in the well first can be measured after the pump fails or is turned off to just before the pump is restarted for production. Reporting of water levels measured in accordance with this rule shall be coincident with payment of regulatory fees.

Rule 10.2 Emergency Reworking or Replacing of a Well

An emergency replacement or reworking of a well under the auspices of the Railroad Commission of Texas may be performed with notice to the District so long as there is no change to the rate or amount of withdrawal. New driller's logs and completion logs must be filed with the District within the same period of time as the logs are required to be filed with the Texas Water Development Board.

SECTION 11. WELL LOCATION AND COMPLETION

Rule 11.1 Responsibility

After an application for a well drilling permit or drilling registration has been granted, the well, if drilled, must be drilled within 30 feet of the location specified in the permit or registration application, and not elsewhere; however, the well shall not be drilled within 50 feet of the property line of the adjoining landowner, except as provided in Rule 5.3 or within an aquifer storage demarcated area. If the well should be commenced or drilled at a different location, the drilling or operation of such well is contrary to the authorizations contained in the permit and may be enjoined by the Board pursuant to Chapter 36, Texas Water Code and these rules. As described in the Rules of Texas Department of Licensing and Regulation, all well drillers and persons having a well drilled, deepened, or otherwise altered shall adhere to the provisions of the rule prescribing the location of wells and proper completion and these rules.

Rule 11.2 Location of Domestic, Industrial, Injection, and Irrigation Wells

(a) A new well must be located a minimum horizontal distance of 50 feet from any water- tight sewage facility and liquid-waste collection facility.

(b) A new well may not be located closer than a minimum horizontal distance of 150 feet from any potential source of contamination, such as existing or proposed livestock or poultry yards, privies, and septic systems, including tanks, piping, any evapo-transpiration pits, and pressure-dose distribution systems.

(c) A new well must not be located at a site generally subject to flooding; provided, however, that if a well must be placed in a flood prone area, it must be completed with a watertight sanitary well seal and steel casing extending a minimum of 24 inches above the known flood level, unless the well is approved by the Texas Commission on Environmental Quality.

(d) No new well may be located within five-hundred (500) feet of a sewage treatment plant, solid waste disposal site, or land irrigated by sewage plant effluent, or within three hundred (300) feet of a sewage wet well, sewage pumping station, or a drainage ditch that contains industrial waste discharges or wastes from sewage treatment systems.

Rule 11.3 Standards of Completion for Domestic, Industrial, Injection, and Irrigation Wells

Water well drillers must indicate the method of completion on the Well Report filed through the Texas Water Development Board's Texas Well Report Submission and Retrieval System. Domestic, industrial, Class V injection, and irrigation wells must be completed in accordance with the stricter of the following specifications or Texas Department of Licensing and Regulation rules set forth at 16 Texas Administrative Code, Chapter 76, local county or incorporated city ordinances:

(a) The annular space between the borehole and the casing shall be filled with cement slurry from the ground level to a depth of not less than 10 feet below the land surface or well head.

(b) All wells shall have a concrete slab or sealing block above the cement slurry around the well at the ground surface.

(c) The slab or block shall extend at least two (2) feet from the well in all directions and have a minimum thickness of four inches and shall be separated from the well casing by a plastic or mastic coating or sleeve to prevent bonding of the slab to the casing.

(d) The surface of the slab shall be sloped to drain away from the well.

(e) In all wells:
    1. the casing shall extend a minimum of one foot above the original ground surface; and
    2. A slab or block as described in Rule 11.3(b) is required above the cement slurry except when a pitless adapter is used. Pitless adapters may be used in such wells provided that:
        a. Pitless adapter is welded to the casing or fitted with another suitably effective seal; and,
        b. The annular space between the borehole and the casing is filled with cement to a depth not less than 15 feet below the adapter connection.

(f) All wells, especially those that are gravel packed, shall be completed so aquifers or zones containing waters that differ are not allowed to commingle through the borehole-casing annulus or the gravel pack so as to result in pollution as defined in these rules.

(g) The well casing shall be capped or completed in a manner that will prevent pollutants from entering the well.

(h) The mix of cement shall conform to the definition contained in these rules.

(i) In addition, all new wells permitted after the effective date of these rules that are drilled and equipped to produce more than 200 acre-feet of water per year also shall be equipped to allow measurement of water levels in the well.

Rule 11.4. Re-Completions

(a) The landowner shall have the continuing responsibility of insuring that a well does not allow commingling of undesirable water and fresh water or the unwanted loss of water through the wellbore to other porous strata.

(b) If a well is allowing the commingling of undesirable water and fresh water or the unwanted loss of water, and the casing in the well cannot be removed and the well re- completed within the applicable rules, the casing in the well shall be perforated and cemented in a manner that will prevent the commingling or loss of water. If such a well has no casing, then the well shall be cased and cemented, or plugged in a manner that will prevent such commingling or loss of water.

(c) The Board may direct the landowner to take steps to prevent the commingling of undesirable water and fresh water, or the unwanted loss of water.

(d) In an aquifer storage unit, some commingling of undesirable water and fresh water will occur and is authorized by an injection permit.

SECTION 12. WASTE AND BENEFICIAL USE

Rule 12.1 Waste Defined

Waste has the meaning as defined in Rule 1.1.

Rule 12.2 Waste Prevention

(a) Groundwater shall not be produced in or used within or without the District, in such a manner as to constitute waste as defined in Rule 1.1.

(b) No person shall cause pollution of the groundwater reservoir or aquifer in the District as defined in Rule 1.1.

(c) No person shall allow, cause, suffer, or permit waste as that term is defined herein.

(d) No person shall allow the continued existence of a deteriorated well.

Rule 12.3 Use for a Beneficial Purpose

Groundwater produced in the District shall be used for a beneficial purpose as defined in Rule 1.1.

SECTION 13. HEARINGS

Rule 13.1 Types of Hearings

The District conducts two general types of public hearings: (1) Permit hearings involving permit matters,

in which the rights, duties, or privileges of a party are determined after an opportunity for an adjudicative hearing, and (2) Rulemaking hearings involving matters of general applicability that implement, interpret, or prescribe the law or District policy, or that describe the procedure or practice requirements of the District. Any matter designated for hearing before the Board may be referred by the Board for hearing before a hearing examiner. The general list of public hearings includes:

(a) Permit Hearings.

1. Permit Applications, Amendments, and Revocations: The District will hold hearings on water well drilling permits, operating permits, transfer permits or amendments and permit revocations or suspensions. Hearings involving permit matters may be scheduled before a hearing examiner. A permit application or an amendment to a permit is considered contested when a person with a personal justiciable interest files a protest and seeks a contested case hearing, unless the Board determines otherwise.
2. Hearings on Motions for Rehearing: Motions for rehearing will be heard by the Board pursuant to Rule 13.8(b).

(b) Rule-making Hearings.

(c) District Groundwater Management Plan: At its discretion, when authorized by law, after giving notice, the Board shall hold a public hearing to adopt or revise the Groundwater Management Plan.

(d) District Rules: The District shall hold a public hearing in accordance with these rules to adopt or revise these rules.

(e) Other Matters: A public hearing may be held on any matter within the jurisdiction of the duties and responsibilities of the Board, if the Board deems a hearing to be in the public interest, or necessary to effectively carry out the duties and responsibilities of the Board.

RULE 13.2 Notice and Scheduling of Public Hearings

(a) Notices of all public hearings of the District shall be prepared by the General Manager.

1. For all applications, except drilling registrations and registrations, the notice will be provided to the applicant, who has the responsibility for giving the notice. At a minimum, the notice shall state the following information:
    a. The name and address of the applicant;
    b. The name or names of the owner or owners of the land, if different from the applicant;
    c. The date the application was filed and the number assigned to it;
    d. The time and date when and place where the hearing will be held;
    e. The address or approximate location of the proposed well;
    f. A brief summary of the information included in the application;
    g. A brief explanation of the proposed permit or permit amendment, including any requested amount of groundwater, the purpose of the proposed use and any change in use;

h. The time, date and location of the hearing; and,
i. Any other information requested by the Board.

2. For rule-making hearings, the General Manager is responsible for giving the notice. The notice shall be given not less than 20 days before the rule-making hearing. The notice shall be posted in a place readily accessible to the public at the District office, be provided to the county clerks of Nueces, San Patricio, Aransas, and Kleberg Counties, published in one or more newspapers of general circulation in each county, provide notice by mail, facsimile, or electronic mail to any person who has requested notice, and a copy of the proposed rule shall be made available at the District office. The notice shall include the time, date and place of the rule-making hearing, a brief explanation of the subject of the rule-making hearing, and a location or internet site at which a copy of the proposed rule(s) may be reviewed or copied.

(b) The applicant shall give the notification to adjacent property owners and landowners as shown in the county tax rolls as of the date the application is filed and, in addition, to all existing registered and permitted well owners within 3,000 feet of the proposed well as shown in the records of the District on the day the application is filed not less than 10 days before the public hearing and provide the District with proof of service. The applicant shall also publish the notice once in a newspaper(s) in general circulation in each county in the District not be less than 10 calendar days before the date set for the hearing. A publisher's affidavit and tear sheet of the notice shall be provided to the District. Proof of service and the publisher's affidavit and tear sheet of the notice shall be filed with the District prior to the commencement of the hearing. In considering whether notice has been given, the Board may evaluate the good faith effort of the applicant to give the notice. The General Manager shall also post notice in a publicly accessible place at the District's office, provide notice to the county clerk of the county in which the proposed well is located, give regular mail, facsimile, or electronic mail notice to any person who has requested notice and regular mail notice to any other person entitled to receive notice under these rules. An officer or employee of the District shall make an affidavit establishing attempted service of the notice by first class mail, facsimile or electronic mail in accordance with the information provided by the person as proof that the notice was provided. However, the failure to provide the notice to persons requesting the notice does not invalidate an action taken by the District.

(c) Notice will be given to each person who requests in writing copies of public hearing notices pursuant to the procedures set forth in this rule, and any other person the Board deems appropriate. The date of delivery or mailing of notice may not be less than 10 calendar days before the date set for the hearing.

(d) Requests for notices:

1. Any person having an interest in the subject matter of a permit application or amendment hearing or hearings may receive written notice of such hearing or hearings by submitting a request in writing. The request must identify with as much specificity as possible the hearing or hearings for which written notice is

requested. The request remains valid for a period of one year from the date of the request, after which time a new request must be submitted. Failure to provide written notice under this subsection does not invalidate any action taken by the Board.

2. Any person may submit a written request for notice of a rule-making hearing. The request is effective for the remainder of the calendar year in which the request is received. The request for a rule-making notice must be renewed by making a new request each year. An affidavit of an officer or employee establishing the attempted service of notice by first class mail, facsimile, or electronic mail is proof that notice was provided by the District. However, the failure to provide the notice shall not invalidate an action taken by the District at a rule-making hearing.

(e) Public hearings may be scheduled during the District's regular business hours, Monday through Friday of each week, except District holidays. All permit hearings will be held at the District office, unless the Board directs otherwise. However, the Board may from time to time change or schedule additional dates, times, and places for permit hearings. Other hearings will be scheduled at the dates, times and locations set at a regular Board meeting, unless an emergency meeting becomes necessary, which shall be publicized and held as required by law. The District may schedule as many applications for consideration at one hearing as deemed desirable. Hearings may be continued from time to time and date to date without additional mailed or published notice.

Rule 13.3 Board Action, Contested Case Hearing Requests, and Preliminary Hearing

(a) The Board may take action on any uncontested application at a properly noticed public meeting held at any time after the public hearing at which the application is scheduled to be heard. The Board may issue a written order to:

1. Grant the application;
2. Grant the application with special conditions; or,
3. Deny the application.

(b) The Board shall schedule a preliminary hearing to hear a request for a contested case hearing filed in accordance with rules adopted under Texas Water Code Section 36.415. The preliminary hearing may be conducted by:

1. A quorum of the Board;
2. An individual to whom the Board has delegated in writing the responsibility to preside as a hearing examiner over the hearing or matters related to the hearing; or,
3. The State Office of Administrative Hearings under Texas Water Code Section 36.416.

(c) Following a preliminary hearing, the Board shall determine whether any person requesting the contested case hearing has standing to make that request and whether a justiciable issue related to the application has been raised. If the Board determines that no person who

requested a contested case hearing had standing or that no justiciable issues were raised, the Board may take any action authorized in Subsection (a) above.

(d) An applicant may, not later than the 20th day after the date the Board issues an order granting the application, demand a contested case hearing if the order:

1. Includes special conditions that were not part of the application as finally submitted; or,
2. Grants a maximum amount of groundwater production that is less than the amount requested in the application.

Rule 13.4 General Procedures

(a) Authority of the Presiding Officer: The presiding officer may conduct the hearing or other proceeding in the manner the presiding officer deems most appropriate for the particular proceeding. In permit or amendment application hearings, the presiding officer shall designate parties to the proceedings. The applicant shall always be designated a party.

(b) The presiding officer has the authority to:

1. Set hearing dates, other than the initial hearing date for permit matters in accordance with Rule 13.2;
2. Convene the hearing at the time and place specified in the notice for public hearing;
3. Set any necessary additional hearing dates;
4. Establish the jurisdiction of the District concerning the subject matter under consideration;
5. Rule on motions and on the admissibility of evidence and amendments to pleadings;
6. Designate and align parties and establish the order for presentation of evidence;
7. Administer oaths to all persons presenting testimony;
8. Examine witnesses;
9. Issue subpoenas when required to compel the attendance of witnesses or the production of papers and documents;
10. Require the taking of depositions and compel other forms of discovery under these rules;
11. Ensure that information and testimony are introduced as conveniently and expeditiously as possible, without prejudicing the rights of any party to the proceeding;
12. Conduct public hearings in an orderly manner in accordance with these rules;
13. Recess any hearing from time to time and place to place;
14. Reopen the record of a hearing for additional evidence when necessary to make the record more complete;
15. Exercise any other appropriate powers necessary or convenient to effectively carry out the responsibilities of presiding officer; and,
16. Determine how to apportion among the parties the costs related to:
    a. Contract for the services of a presiding officer; and,

b. The preparation of the official hearing record.

(c) Hearing Registration Forms: Each individual who participates in a hearing or other proceeding of the District must submit a form providing the following information: name; address; whether the person plans to testify; who the person represents if the person is not there in the person's individual capacity; and any other information relevant to the hearing or other proceeding.

(d) Appearance and Representative Capacity: Any interested person may appear in person or may be represented by counsel, engineer, or other representative provided the representative is fully authorized to speak and act for the principal. Such person or representative may present evidence, exhibits, or testimony, or make an oral presentation in accordance with the procedures applicable to the particular proceeding. Any partner may appear on behalf of the partnership. A duly authorized officer or agent of a public or private corporation, Limited Liability Company, political subdivision, governmental agency, municipality, association, firm, or other entity may appear for the entity. A fiduciary may appear for a ward, trust, or estate. A person appearing in a representative capacity may be required to prove proper authority.

(e) Alignment of Parties and Number of Representatives Heard: Participants in a proceeding may be aligned according to the nature of the proceeding and their relationship to it. The presiding officer may require the participants of an aligned class to select one or more persons to represent them in the proceeding or on any particular matter or ruling and may limit the number of representatives heard, but must allow at least one representative of an aligned class to be heard in the proceeding or on any particular matter or ruling.

(f) Appearance by Applicant or Movant: The applicant, movant or party requesting the hearing or other proceeding or their representative should be present at the hearing or other proceeding. Failure to so appear may be grounds for withholding consideration of a matter and dismissal without prejudice or may require the rescheduling or continuance of the hearing or other proceeding if the presiding officer deems it necessary in order to fully develop the record.

(g) Reporting: Public hearings and other proceedings will be recorded on audio cassette tape or, at the discretion of the presiding officer, may be recorded by a certified shorthand reporter. The District does not prepare transcripts for the public of hearings or other proceedings recorded on audio cassette tape on District equipment, but the District will arrange access to the recording. Subject to availability of space, any party may, at their own expense, arrange for a reporter to report the hearing or other proceeding or for recording of the hearing or other proceeding. The cost of reporting or transcribing a permit hearing may be assessed in accordance with Rule 13.5(b). In all District matters, if a proceeding is recorded by a reporter, and a copy of the transcript of testimony is ordered by any person, the testimony will be transcribed and the original transcript filed with the papers of the proceeding at the expense

of the person requesting the transcript of testimony. Copies of the transcript of testimony of any hearing or other proceeding thus reported may be purchased from the reporter.

(h) Continuance: The presiding officer may continue hearings or other proceedings from time to time and from place to place without the necessity of publishing, serving, mailing or otherwise issuing a new notice. If a public hearing or other proceeding is continued and a time and place (other than the District office) for the public hearing or other proceeding to reconvene are not publicly announced at the hearing or other proceeding by the presiding officer before it is recessed, the presiding officer must provide a notice giving the time, date, and location of the continued public hearing by regular mail to the parties. It is not necessary to post at the county courthouses or publish a newspaper notice of the new setting.

(i) Filing of Documents and Time Limit: Applications, motions, exceptions, communications, requests, briefs or other papers and documents required to be filed under these rules or by law must be received in hand at the District's office within the time limit, if any, set by these rules or by the presiding officer for filing. Mailing within the time period is insufficient if the submissions are not actually received by the District within the time limit.

(j) Computing Time: In computing any period of time specified by these rules, by a presiding officer, by Board orders, or by law, the day of the act, event, or default after which the designated period of time begins to run is not included, but the last day of the period computed is included, unless the last day is a Saturday, Sunday or legal holiday as determined by the Board, in which case the period runs until the end of the next day which is neither a Saturday, Sunday nor a legal holiday.

(k) Affidavit: Whenever the making of an affidavit by a party to a public hearing or other proceeding is necessary, it may be made by the party or the party's representative or counsel. This rule does not dispense with the necessity of an affidavit being made by a party when expressly required by statute.

(l) Broadening the Issues: No person will be allowed to appear in any public hearing or other proceeding that in the opinion of the presiding officer is for the sole purpose of unduly broadening the issues to be considered in the public hearing or other proceeding.

(m) Conduct and Decorum: Every person, party, representative, witness, and other participant in a proceeding must conform to ethical standards of conduct and must exhibit courtesy and respect for all other participants. No person may engage in any activity during a proceeding that interferes with the orderly conduct of District business. If in the judgment of the presiding officer, a person is acting in violation of this provision, the presiding officer will first warn the person to refrain from engaging in such conduct. Upon further violation by the same person, the presiding officer may exclude that person from the proceeding for such time and under such conditions as the presiding officer deems necessary.

Rule 13.5 Uncontested Permit Hearing Procedures

(a) Written Notice of Intent to Contest: Any person who intends to contest a permit application must provide written notice of that intent to the District office and the applicant at least five calendar days prior to the date of the public hearing. If the General Manager intends to contest a permit application, the General Manager must provide the applicant written notice of that intent at least five calendar days prior to the date of the public hearing. If no notice of intent to contest is received five calendar days prior to the public hearing, the General Manager, as instructed by the Board of Directors, will cancel the public hearing and the Board will consider the permit at the next regular Board meeting.

(b) Informal Hearings: Permit hearings may be conducted informally when, in the judgment of the hearing body, the conduct of a proceeding under informal procedures will save time or cost to the parties, lead to a negotiated or agreed settlement of facts or issues in controversy, and not prejudice the rights of any party.

(c) Agreement of Parties: If, during an informal proceeding, all parties reach a negotiated or agreed settlement which, in the judgment of the hearing body, settles the facts or issues in controversy, the proceeding will be considered an uncontested case. The hearing body will summarize the evidence, make findings of fact and conclusions of law based on the existing record and any other evidence submitted by the parties at the hearing.

(d) Decision to Proceed as Uncontested or Contested Case: If the parties do not reach a negotiated or agreed settlement of the facts and issues in controversy or if any party contests a staff recommendation, and the hearing body determines these issues will require extensive discovery proceedings, the hearing body will declare the case to be contested and convene a prehearing conference as set forth in Rule 13.5. The hearing body may also recommend issuance of a temporary permit for a period not to exceed 4 months, with any special provisions the hearing body deems necessary, for the purpose of completing the contested case process. Any case not declared a contested case under this provision is an uncontested case and the hearing body will summarize the evidence, make findings of fact and conclusions of law, and make appropriate recommendations to the Board.

(e) Recordation of the Hearing: In an uncontested case, the presiding officer may substitute minutes or the report required under Texas Water Code 36.410 for the method of recording the hearing.

Rule 13.6 Contested Permit Hearing Procedures

(a) Pre-Hearing Conference: A pre-hearing conference shall be held to consider any matter which may expedite the hearing or otherwise facilitate the hearing process.

1. Matters Considered: Matters which may be considered at a preheating conference include, but are not limited to;
    a. The designation of parties;
    b. The formulation and simplification of issues;
    c. The necessity or desirability of amending applications or other pleadings;

d. The possibility of making admissions or stipulations;
e. The scheduling of discovery;
f. The identification of and specification of the number of witnesses;
g. The filing and exchange of prepared testimony and exhibits; and,
h. The procedure at the hearing.

2. Notice: A prehearing conference may be held at a date, time, and place stated in a separate notice given in accordance with Rule 13.2, or at the date, time, and place for hearing stated in the notice of public hearing, and may be continued from time to time and place to place, at the discretion of the presiding officer.
3. Conference Action: Action taken at a prehearing conference may be reduced to writing and made a part of the record or may be stated on the record at the close of the conference.

(b) Assessing Reporting and Transcription Costs: Upon the timely request of any party, or at the discretion of the hearing body, the hearing body may make a recommendation to the Board regarding the assessment of reporting and transcription costs to one or more of the parties. If the Board is the hearing body, a hearing report with recommendations need not be filed. The hearing examiner must consider the following factors in assessing reporting and transcription costs:

1. The party who requested the transcript;
2. The financial ability of the party to pay the costs;
3. The extent to which the party participated in the hearing;
4. The relative benefits to the various parties of having a transcript;
5. The budgetary constraints of a governmental entity participating in the proceeding; and,
6. Any other factor that is relevant to a just and reasonable assessment of costs.

(c) In any proceeding where the assessment of reporting or transcription costs is an issue, the hearing body must provide the parties an opportunity to present evidence and argument on the issue. A recommendation regarding the assessment of costs must be included in the hearing body's report to the Board.

(d) Designation of Parties: Parties to a hearing will be designated on the first day of hearing or at such other time as the hearing body determines. The General Manager and any person specifically named in a matter are automatically designated parties. Persons other than the automatic parties must, in order to be admitted as a party, appear at the proceeding in person or by representative and seek to be designated. To be designated as a party, the person must be an affected person as defined in Rule 1.1. After parties are designated, no other person may be admitted as a party unless, in the judgment of the hearing body, there exists good cause and the hearing will not be unreasonably delayed.

(e) Rights of Designated Parties: Subject to the direction and orders of the hearing body, parties have the right to conduct discovery, present a direct case, cross-examine witnesses, make oral and written arguments, obtain copies of all documents filed in the proceeding, receive

copies of all notices issued by the District concerning the proceeding, and otherwise fully participate in the proceeding.

(f) Persons Not Designated Parties: At the discretion of the hearing body, persons not designated as parties to a proceeding may submit comments or statements, orally or in writing. Comments or statements submitted by non-parties may be included in the record, but may not be considered by the hearing body as evidence.

(g) Furnishing Copies of Pleadings: After parties have been designated, a copy of every pleading, request, motion, or reply filed in the proceeding must be provided by the author to every other party or the party's representative. A certification of this fact must accompany the original instrument when filed with the District. Failure to provide copies may be grounds for withholding consideration of the pleading or the matters set forth therein.

(h) Disabled Parties and Witnesses: Persons who have special requests concerning their need for reasonable accommodation, as defined by the Americans With Disabilities Act, 42 U.S.C. 12111(9), during a Board meeting or a hearing, shall make advance arrangements with the General Manager of the District. Reasonable accommodation shall be made unless undue hardship, as defined in 42 U.S.C. 12111(10), would befall the District.

(i) Agreements to be in Writing: No agreement between parties or their representatives affecting any pending matter will be considered by the hearing examiner unless it is in writing, signed, and filed as part of the record, or unless it is announced at the hearing and entered into the record.

(j) Discovery: Discovery will be conducted upon such terms and conditions, and at such times and places, as directed by the hearing body. Unless specifically modified by these rules or by order of the hearing body, discovery will be governed by, and subject to the limitations set forth in, the Texas Administrative Procedures Act. In addition to the forms of discovery authorized under the Texas Administrative Procedures Act, the parties may exchange informal requests for information by agreement.

(k) Discovery Sanctions: If the hearing body finds a party is abusing the discovery process in seeking, responding to, or resisting discovery, the hearing body may:

1. Suspend processing of the application for a permit if the applicant is the offending party;
2. Disallow any further discovery of any kind or a particular kind by the offending party;
3. Rule that particular facts be regarded as established against the offending party for the purposes of the proceeding, in accordance with the claim of the party obtaining the discovery ruling;
4. Limit the offending party's participation in the proceeding;
5. Disallow the offending party's presentation of evidence on issues that were the subject of the discovery request; and/or,

6. Recommend to the Board that the hearing be dismissed with or without prejudice.

(l) Compelling Testimony, Swearing Witnesses, and Subpoena Power: The hearing body may compel the testimony of any person which is necessary, helpful, or appropriate to the hearing. The hearing body will administer the oath in a manner calculated to impress the witness with the importance and solemnity of the promise to adhere to the truth. The hearing body may issue subpoenas to compel the testimony of any person and the production of books, papers, documents, or tangible things, in the manner provided in the Texas Rules of Civil Procedure.

(m) Evidence: Except as modified by these rules, the Texas Administrative Procedures Act govern the admissibility and introduction of evidence; however, evidence not admissible under the Texas Administrative Procedures Act may be admitted if it is of the type commonly relied upon by reasonably prudent persons in the conduct of their affairs. In addition, evidence may be stipulated by agreement of all parties.

(n) Written Testimony: When a proceeding will be expedited and the interest of the parties will not be prejudiced substantially, testimony may be received in written form. The written testimony of a witness, either in narrative or question and answer form, may be admitted into evidence upon the witness being sworn and identifying the testimony as a true and accurate record of what the testimony would be if given orally. The witness will be subject to clarifying questions and to cross-examination, and the prepared testimony will be subject to objection.

(o) Requirements for Exhibits: Exhibits of a documentary character must be sized to not unduly encumber the files and records of the District. All exhibits must be numbered and, except for maps and drawings, may not exceed 8-1/2 by 11 inches in size.

(p) Abstracts of Documents: When documents are numerous, the hearing body may receive in evidence only those that are representative and the hearing body may require the abstracting of relevant data from the documents and the presentation of the abstracts in the form of an exhibit. Parties have the right to examine the documents from which abstracts are made.

(q) Introduction and Copies of Exhibits: Each exhibit offered must be tendered for identification and placed in the record. Copies must be furnished to the hearing body and to each of the parties, unless the hearing body rules otherwise.

(r) Excluding Exhibits: In the event an exhibit has been identified, objected to, and excluded, it may be withdrawn by the offering party. If withdrawn, the exhibit will be returned and the offering party waives all objections to the exclusion of the exhibit. If not withdrawn, the exhibit will be included in the record for the purpose of preserving the objection to excluding the exhibit.

(s) Official Notice: The hearing body may take official notice of all facts judicially cognizable. In addition, official notice may be taken of generally recognized facts within the area of the District's specialized knowledge.

(t) Documents in District Files: Extrinsic evidence of authenticity is not required as a condition precedent to admissibility of documents maintained in the files and records of the District.

(u) Oral Argument: At the discretion of the hearing body, oral arguments may be heard at the conclusion of the presentation of evidence. Reasonable time limits may be prescribed. The hearing body may require or accept written briefs in lieu of, or in addition to, oral arguments. When the matter is presented to the Board for final decision, further oral arguments may be heard by the Board, if the Board is not the hearing body.

(v) If a hearing is uncontested, or becomes uncontested during the course of the hearing, the presiding officer may substitute minutes or the report required by law for a method of recording the hearing.

Rule 13.7 Conclusion of the Public Hearing and Report

(a) Closing the Record and Proposal for Decision: At the conclusion of the presentation of evidence and any oral argument, the hearing body may either close the record or keep it open and allow the submission of additional evidence, exhibits, briefs, or proposed findings and conclusions from one or more of the parties. No additional evidence, exhibits, briefs, or proposed findings and conclusions may be filed unless permitted or requested by the hearing body. After the record is closed, the hearing body will prepare a proposal for decision to the Board, and submit the proposal for decision to the Board not later than the 30th day after the date the evidentiary hearing is concluded, if the Board is not the hearing body. The proposal for decision must include a summary of the subject matter of the hearing and evidence, together with the hearing body's findings and conclusions and recommendations for action. Upon completion and issuance of the hearing body's proposal for decision, a copy must be submitted to the Board, delivered to each party to the proceeding and to each party who provided comments. In a contested case, delivery to the parties must be by certified mail.

(b) Exceptions to the Hearing Body's Proposal for Decision and Reopening the Record: Prior to Board action, any party in a contested case or a party who provided comments may file written exceptions to the hearing body's proposal for decision, and any party in an uncontested case may request an opportunity to make an oral presentation of exceptions to the Board. Upon review of the proposal for decisions and exceptions, the hearing body may reopen the record for the purpose of developing additional evidence, or may deny the exceptions and submit the proposal for decision and exceptions to the Board. The Board may, at any time and in any case, remand the matter to the hearing body for further proceedings.

(c) Time for Board Action on Certain Permit Matters: In the case of hearings involving new permit applications, original applications for existing wells, or applications for permit renewals or

amendments, the hearing body's proposal for decision should be submitted, and the Board shall act, within 60 calendar days after the close of the hearing record.

(d) The Board shall consider the proposal for decision at a final hearing. Additional evidence may not be presented during a final hearing. The parties may present oral argument at a final hearing to summarize the evidence, present legal argument, or argue an exception to the proposal for decision. A final hearing may be continued as provided by Rule 13.3 (h).

(e) The Board may change a finding of fact or conclusion of law made by the administrative law judge, or may vacate or modify an order issued by the administrative judge, only if the Board determines:

1. That the administrative law judge did not properly apply or interpret applicable law, District rules, written policies provided under Texas Water Code Section 36.416(e), or prior administrative decisions:
2. That a prior administrative decision on which the administrative law judge relied is incorrect or should be changed; or,
3. That a technical error in finding of fact should be changed.

(f) The Board may take action on uncontested application at a properly noticed public meeting held at any time after the public hearing at which the application is scheduled to be heard. The public hearing may be held in conjunction with a regularly scheduled or special called Board meeting. The Board action may occur at the same Board meeting as the public meeting. The Board may issue a written order to grant an application, grant an application with special conditions, or deny the application.

(g) Following an uncontested hearing, an applicant may, no later than the 20th day after the date the Board issues an order granting the application, demand in writing a contested case hearing if the order:

1. Includes special conditions that were not a part of the application as finally submitted; or,
2. Grants a maximum amount of groundwater production that is less than the amount requested in the application.

Rule 13.8 Rule-Making Public Hearing Procedures

(a) General Procedures: The presiding officer will conduct the rule-making public hearing in the manner the presiding officer deems most appropriate to obtain all relevant information pertaining to the subject of the hearing as conveniently, inexpensively, and expeditiously as possible. The presiding officer may follow the guidelines of Robert's Rules of Order, Newly Revised.

(b) Submission of Documents: Any interested Person may submit written statements, protests or comments, briefs, affidavits, exhibits, technical reports, or other documents relating to the subject of the hearing. Such documents must be submitted no later than the time of the hearing, as stated in the notice of hearing given in accordance with Rule 13.2; provided,

however, that the presiding officer may grant additional time for the submission of documents.

(c) Oral Presentations: Any person desiring to speak on the subject of the hearing must so indicate on the registration form provided at the hearing. The presiding officer establishes the order of testimony and may limit the number of times a person may speak, the time period for oral presentations, and the time period for raising questions. In addition, the presiding officer may limit or exclude cumulative, irrelevant, or unduly repetitious presentations.

(d) Conclusion of the Hearing, Closing the Record, and Hearing Body's Report: At the conclusion of the testimony, and after the receipt of all documents, the presiding officer may either close the record, or keep it open to allow the submission of additional information. If the presiding officer is a hearing examiner or chairman of a committee, the presiding officer must, after the record is closed, prepare a report to the Board. The report must include a summary of the subject of the hearing and the public comments received, together with the hearing body's recommendations for action. Upon completion and issuance of the hearing body's report, a copy must be submitted to the Board. Any interested person who so requests in writing will be notified when the report is completed, and furnished a copy of the report.

(e) Exceptions to the Hearing Body's Report and Reopening the Record: Any interested person may make exceptions to the hearing body's report, and the Board may reopen the record, in the manner prescribed in Rule 13.6(b).

Rule 13.9 Final Decision and Appeals

(a) Board action: After the record is closed and the matter is submitted to the Board, the Board may then take the matter under advisement, continue it from day to day, reopen or rest the matter, refuse the action sought or grant the same in whole or part, or take any other appropriate action but the Board shall act on an application for any type of permit or permit amendment not less than 60 days after the date the final hearing is concluded. The Board action takes effect at the conclusion of the meeting and is not affected by a motion for rehearing.

(b) Requests for Rehearing or Findings and Conclusions: Any decision of the Board on a matter may be appealed by requesting a rehearing before the Board within 20 calendar days of the date of the Board's decision, in the case of a contested or uncontested hearing on an application, the applicant, or a party to a contested hearing, may administratively appeal. Such a rehearing request must be filed at the District office in writing and must state clear and concise grounds for the request. Such a rehearing request is mandatory with respect to any decision or action of the Board before any appeal may be brought. The Board's decision is final if no request for rehearing is made within the specified time, or upon the Board's denial of the request for rehearing, or upon rendering a decision after rehearing. If the rehearing request is granted by the Board, the date of the rehearing will be within 45 calendar days thereafter, unless otherwise agreed to by the parties to the proceeding. The failure of the

Board to grant or deny the request for rehearing within 90 calendar days of submission will be deemed to be a denial of the request.

Rule 13.10 Appeal of Desired Future Conditions and Judicial Appeal of Desired Future Conditions

(a) An affected person may file a petition with the District requiring that the District contract with the State Office of Administrative Hearings (SOAH) to conduct a hearing appealing the reasonableness of the desired future condition. The petition must be filed not later than the 120th day after the date on which the District adopts a desired future condition under Texas Water Code Section 36.108(d-4). The petition must provide evidence that the District did not establish a reasonable desired future condition of the groundwater resources in the management area.

(b) In this Rule, "Affected person" means:

1. An owner of land in Groundwater Management Areas 15 and 16;
2. A groundwater conservation District or subsidence District in or adjacent to Groundwater Management Areas 15 and 16;
3. A regional water planning group with a water management strategy in Groundwater Management Areas 15 and 16;
4. A person who holds or is applying for a permit from a District in Groundwater Management Areas 15 and 16;
5. A person with legally defined interest in groundwater in Groundwater Management Areas 15 and 16; or,
6. Any other person defined as affected by the Texas Commission on Environmental Quality rule.

(c) Not later than the 10th day after receiving a petition, the District shall submit a copy of the petition to the Texas Water Development Board. The Texas Water Development Board shall conduct an administrative review and study required by Texas Water Code Section 36.1083(e), which must be completed and delivered to SOAH not later than 120 days after the Texas Water Development Board receives the petition. SOAH shall consider the study described and the desired future conditions explanatory report submitted to the development Board under Texas Water Code Section 36.108(dd)(3) to be part of the administrative record in the SOAH hearing. The Texas Water Development Board shall make available relevant staff as expert witnesses if requested by SOAH or a party to the hearing.

(d) Not later than 60 days after receiving a petition appealing the reasonableness of the desired future conditions filed under Texas Water Code Section 36.1083(b), the District shall submit to SOAH a copy of the petition and contract with SOAF to conduct a contested case hearing.

(e) The petitioner shall pay the costs associated with the contract with SOAH and shall deposit with the District an amount determined by the District, after consultation with SOAH, that is sufficient to pay the contract amount. The deposit must be received within 15 days of written notification by the District to the petitioner specifying the amount of the deposit. Failure to

timely pay the deposit may result in dismissal of the petition. After the hearing is completed and all costs paid to SOAH, the District shall refund any excess money to the petitioner.

(f) Unless provided by SOAH, the District shall provide notice of a hearing appealing the reasonableness of the desired future conditions. Not later than the 10th day before the date of a hearing, the General Manager or Board shall provide notice as follows (unless notice provided by SOAH):

1. General Notice:
    a. Post notice in a place readily accessible to the public at the District office; and,
    b. Provide notice to the county clerk of each county in the District.
2. Individual Notice by Regular Mail, Facsimile, or Electronic Mail to:
    a. The petitioner;
    b. Any person who has requested notice;
    c. Each nonparty District and regional water planning group located in Groundwater Management Areas 15 and 16;
    d. The Texas Water Development Board; and,
    e. The Texas Commission on Environmental Quality.

(g) After the hearing and within 60 days of the receipt of the administrative law judge's findings of fact and conclusions of law in a proposal for decision, including a dismissal of a petition, the District shall issue a final order stating the District's decision on the contested matter and the District's findings of fact and conclusions of law. The District may change a finding of fact or conclusion of law made by the administrative law judge, or may vacate or modify an order issued by the administrative law judge, as provided by Texas Government Code Section 2001.058(e).

(h) If the District vacates or modifies the proposal for decision, the District shall issue a report describing in detail the District's reasons for disagreement with the administrative law judge's findings of fact and conclusions of law. The report shall provide the policy, scientific, and technical justifications for the District's decision

(i) If the District in its final order finds that a desired future condition is unreasonable, not later than the 60th day after the date of the final order, the District shall reconvene in a joint planning meeting with the other Districts in Groundwater Management Areas 15 and 16 for the purpose of revising the desired future condition. The District and other Districts in Groundwater Management Areas 15 and 16 shall follow the procedures in Texas Water Code Section 36.108 to adopt new desired future conditions applicable to the District.

(j) A final order by the District finding that a desired future condition is unreasonable does not invalidate the adoption of a desired future condition by a District that did not participate as a party in the hearing conducted under this Rule.

(k) A final District order issued under this Rule may be appealed to a District court with jurisdiction over any part of the territory of the District that issued the order. An appeal under this subsection must be filled with the District court not later than the 45th day after the date the District issued the final order. The case shall be decided under the substantial evidence standard of review as provided by Texas Government Code Section 2001.174. If the court finds that a desired future condition is unreasonable, the court shall strike the desired future condition and order the Districts in Groundwater Management Areas 15 and 16 to reconvene not later than the 60th day after the date of the court order in a joint planning meeting for the purpose of revising the desired future condition. The District and other Districts in the management area shall follow the procedures in Texas Water Code Section 36.108 to adopt new desired future conditions applicable to the District. A court's finding under this Rule does not apply to a desired future condition that is not a matter before the court.

SECTION 14. INVESTIGATIONS AND ENFORCEMENT

Rule 14.1 Notice and Access to Property

Board members and District agents and employees are entitled to access to all property within the District to carry out technical and other investigations necessary to the implementation of the District rules. Prior to entering upon property for the purpose of conducting an investigation, the person seeking access must give notice in writing or in person or by telephone to the owner, lessee, or operator, agent, or employee of the well owner or lessee, as determined by information contained in the application or other information on file with the District. Notice is not required if prior permission is granted to enter without notice. Inhibiting or prohibiting access to any Board member or District agents or employees who are attempting to conduct an investigation under the District rules constitutes a violation and subjects the person who is inhibiting or prohibiting access, as well as any other person who authorizes or allows such action, to the penalties set forth in the Texas Water Code, Section 36.102, 36.122, or 36.205.

Rule 14.2 Conduction of Investigation

Investigations or inspections that require entrance upon property must be conducted at reasonable times, and must be consistent with the establishment's rules and regulations concerning safety, internal security, and fire protection. The persons conducting such investigations must identify themselves and present credentials upon request of the owner, lessee, operator, or person in charge of the well.

Rule 14.3 Rule Enforcement

If it appears that a person has violated, is violating, or is threatening to violate any provision of the District rules the Board of Directors may institute and conduct a suit in the name of the District for enforcement of rules through the provisions of Section 36.102, Texas Water Code.

Rule 14.4 Penalty for Violating Rules, Permit Condition, or Board Orders

The penalty for violating a rule, permit term or condition, or order of the Board is up to $5,000 per violation per day for each day the violation continues.

Rule 14.5 Sealing of Wells

(a) Following due process, the District may, upon orders from a court of competent jurisdiction, seal wells that are prohibited from withdrawing groundwater within the District by the District rules to ensure that a well is not operated in violation of the District rules. A well may be sealed when:

1. No application has been made for a permit to drill or to register a new well;
2. No application has been made for an operating permit to withdraw groundwater from an existing or new well that is not registered, excluded or exempted from the requirement that a permit be obtained in order to lawfully withdraw groundwater; or,
3. The Board has denied, canceled or revoked a drilling permit or an operating permit.

(b) The well may be sealed by physical means, and tagged to indicate that the well has been sealed by the District, and other appropriate action may be taken as necessary to preclude operation of the well or to identify unauthorized operation of the well.

(c) Tampering with, altering, damaging, or removing the seal of a sealed well, or in any other way violating the integrity of the seal, or pumping of groundwater from a well that has been sealed constitutes a violation of these rules and subjects the person performing that action, as well as any well owner or primary operator who authorizes or allows that action, to such penalties as provided by the District rules.

SECTION 15. AQUIFER STORAGE AND RECOVERY PROJECTS

Rule 15.1 Definitions

In this Rule, “aquifer storage and recovery project”, “ASR injection well”, and “ASR recovery well” have the meanings previously identified.

Rule 15.2 Registration and Reporting of Wells

(a) A project operator shall:

1. Register the ASR injection wells and ASR recovery wells associated with the aquifer storage and recovery project with the District;
2. Each calendar month by deadline established by the Texas Commission on Environmental Quality (TCEQ) for reporting to the TCEQ, provide the District with a copy of the written or electronic report required to be provided to the TCEQ under Texas Water Code Section 27.155; and,
3. Annually by deadline established by the TCEQ for reporting to the TCEQ, provide the District with a copy of the written or electronic report required to be provided to the TCEQ under Section 27.156.

(b) If an aquifer storage and recovery project recovers an amount of groundwater that exceeds the volume authorized by the TCEQ to be revered under the project, the project operator shall

report to the District the volume of groundwater recovered that exceeds the volume authorized to be recovered in addition to providing the report required above in Rule 15.2(a)2.

Rule 15.3 Permitting, Spacing, and Production Requirements

(a) Except as provided by Subsection(b) below, the District may not require a permit for the drilling, equipping, operation, or completion of an ASR injection well or an ASR recovery well that is authorized by the TCEQ.

(b) The ASR recovery wells that are associated with an aquifer storage and recovery project are subject to the permitting, spacing, and production requirements of the District if the amount of groundwater recovered from the wells exceeds the volume authorized by the TCEQ to be recovered under the project. The requirements of the District apply only to the portion of the volume of groundwater recovered from the ASR recovery wells that exceeds the volume authorized by TCEQ to be recovered.

(c) A project operator may not recover groundwater by an aquifer storage and recovery project in an amount that exceeds the volume authorized by the TCEQ to be recovered under the project unless the project operator complies with the applicable requirements of the District as described by this section.

Rule 15.4 Fees and Surcharges

(a) The District may not assess a production fee, transportation or export fee, or surcharge for groundwater recovered from an ASR recovery well, except to the extent that the amount of groundwater recovered under the aquifer storage and recovery project exceeds the volume authorized by the commission to be recovered.

(b) The District may assess a well registration fee or other administrative fee for an ASR recovery well in the same manner that the District assesses such a fee for other wells registered with the District.

Rule 15.5 Consideration of Desired Future Conditions

The District may consider hydrogeologic conditions related to the injection and recovery of groundwater as part of an aquifer storage and recovery project in the planning for and monitoring of the achievement of a desired future condition for the aquifer in which the wells associated with the projects are located.

This page is intentionally left blank.

D

Appendix D – Evidence of Public Notice and Adoption by District Board

CORPUS CHRISTI AQUIFER STORAGE AND RECOVERY CONSERVATION DISTRICT (CCASRCD)
SPECIAL MEETING AGENDA
Corpus Christi City Hall
ACM Conference Room – 5th Floor
1201 Leopard Street
Corpus Christi, Texas
April 18, 2019, 2:00 p.m.

POSTED
1:32pm
APR 12 2019 AB
Rebecca Huerta
City Secretary

1. Call meeting to order – Roll call
   Fred Segundo – Chairman/President*
   Dan McGinn – Vice Chairman/Vice President*
   Jeff Edmonds – Secretary
   Mark Van Vleck – Director
   Sharon Bailey Lewis– Director

2. Discussion and possible action for the Groundwater Management Plan for the Corpus Christi Aquifer Storage and Conservation District (CCASRCD) which also includes adoption of the District's five-year operating plan as a comprehensive document

3. Discussion and possible action on revising the District boundaries

4. Discussion and possible action regarding CITGO PMZ project – New monitoring well

5. Discussion and possible action regarding City Ordinance to appropriate $103,000 in the unappropriated fund balance of the Raw Water Supply Development, Fund 4041 and transfer and appropriate into the Aquifer Storage and Recovery, Fund 4021 for FY19 Budget

6. Discussion and possible action regarding approving payment of two invoices for Public Official Bonds, from McGriff, Siebels & Williams, Inc. totaling $ 476.00

7. Public Comment
8. Staff Announcements
9. Directors' Comments
10. Adjournment

This notice was posted on the official electronic bulletin board in the Atrium of Corpus Christi's City Hall, 1201 Leopard Street, Corpus Christi, Texas at 1:32 a.m./p.m., April 12, 2019
Please confirm that you will be attending by contacting Lj Francis at 361-826-1670 or email: LarijaiF@cctexas.com.

City of Corpus Christi

Water Resources

FAX Cover

Date: April 12, 2019.

TO:	**Kleberg County Clerk**	**FAX: (361) 593-1355**
	San Patricio County Clerk	**(361) 364-9450**
	Nueces County Clerk	**(361) 888-0329**

RE: **Notice of Posting**

FROM: **Itzel Ojeda, Executive Assistant – Water Utilities**

SUBJECT: **CORPUS CHRISTI AQUIFER STORAGE AND RECOVERY CONSERVATION DISTRICT- REGULAR MEETING AGENDA**

No. of pages 2 (including this page)

Please post the attached Notice on your official Bulletin Board at the County Courthouse as soon as possible.

Please return by email itzelo@cctexas.com a confirmation/file stamped copy of posting.

Thank you.

Please respond to our office (361) 826-1689 in the event of any difficulty in transmission.

P.O. Box 9277– Corpus Christi, TX 78469-9277 – (361) 826-1689/FAX (361) 826-4460

CORPUS CHRISTI AQUIFER STORAGE AND RECOVERY CONSERVATION DISTRICT (CCASRCD)
SPECIAL MEETING AGENDA
Corpus Christi City Hall
ACM Conference Room – 5th Floor
1201 Leopard Street
Corpus Christi, Texas
April 18, 2019, 2:00 p.m.

POSTED
1:32pm
APR 12 2019 AB
Rebecca Huerta
City Secretary

1. Call meeting to order – Roll call
   Fred Segundo – Chairman/President*
   Dan McGinn – Vice Chairman/Vice President*
   Jeff Edmonds – Secretary
   Mark Van Vleck – Director
   Sharon Bailey Lewis– Director

2. Discussion and possible action for the Groundwater Management Plan for the Corpus Christi Aquifer Storage and Conservation District (CCASRCD) which also includes adoption of the District's five-year operating plan as a comprehensive document

3. Discussion and possible action on revising the District boundaries

4. Discussion and possible action regarding CITGO PMZ project – New monitoring well

5. Discussion and possible action regarding City Ordinance to appropriate $103,000 in the unappropriated fund balance of the Raw Water Supply Development, Fund 4041 and transfer and appropriate into the Aquifer Storage and Recovery, Fund 4021 for FY19 Budget

6. Discussion and possible action regarding approving payment of two invoices for Public Official Bonds, from McGriff, Siebels & Williams, Inc. totaling $ 476.00

7. Public Comment
8. Staff Announcements
9. Directors' Comments
10. Adjournment

This notice was posted on the official electronic bulletin board in the Atrium of Corpus Christi's City Hall, 1201 Leopard Street, Corpus Christi, Texas at 1:32 a.m./p.m., April 12, 2019
Please confirm that you will be attending by contacting LJ Francis at 361-826-1670 or email: LarijaiF@cctexas.com.

** SENDING NOTIFICATION : FAX SENT SUCCESSFULLY **

TIME SENT	REMOTE CSID	DURATION	PAGES	STATUS
April 15, 2019 8:39:49 AM CDT		152	4	Sent

City of Corpus Christi

FROM

Name: Sarah Hickey

Phone: 826-1682 Fax: 826-4460

E-mail: SarahH@cctexas.com

TO

5931355@fax.cctexas.com

5931355

Sent: 4/15/19 at: 8:37:16 AM 4 page(s) (including cover)

Subject: Authorization

Comments:

Dear Kleberg County Clerk,

Please process all attached. Email receipt to sarahh@cctexas.com.

Thank you.

UNAPPROVED MINUTES
OF THE SPECIAL MEETING OF THE BOARD OF DIRECTORS OF
CORPUS CHRISTI AQUIFER STORAGE AND RECOVERY
CONSERVATION DISTRICT
April 18, 2019

The Board of Directors of the Corpus Christi Aquifer Storage and Recovery Conservation District met in special session on Thursday February 7, 2019, in the ACM Conference Room, 5th floor, City Hall, 1201 Leopard Street, Corpus Christi, Texas, with the following in attendance:

Members:	In Attendance: (non-members)
Jeff Edmonds	Larijai Francis, PM-Water Resources
Dan McGinn	Lisa Aguilar, Assistant City Attorney
Mark Van Vleck	Itzel Ojeda, Water Utilities Executive Assistant
Sharon Lewis	Esteban Ramos
	Kamil Taras
	Vanessa Sanchez

(1) **Call Meeting to Order**: The meeting was called to order by Board Vice Chairman Dan McGinn at 2:03 p.m. Roll was called. A quorum was present.

(2) **Discussion regarding the Groundwater Management Plan for the** Corpus Christi Aquifer Storage and Conservation District (CCASRCD) which also includes adoption of the District's five-year operating plan as a comprehensive document

ACTION: Discussion was had. Motion was made by board member Mark Van Vleck to remove 2005 on page 1 (one). Dan McGinn second.

Ayes: Board members Lewis, Edmonds, Van Vleck, and McGinn.
Nays: None

ACTION: Discussion was had. Motion was made by board member Mark Van Vleck to move to approve Groundwater Management Plan and five-year Plan. Dan McGinn second.

Ayes: Board members Lewis, Edmonds, Van Vleck, and McGinn.
Nays: None

(3) **Discussion and possible action on revising the District boundaries**

ACTION: Discussion was had. Motion was made by vice chair Dan McGinn to table this item for two months. Mark Van Vleck second.

Ayes: Board members Lewis, Edmonds, Van Vleck, and McGinn.
Nays: None No action was taken.

(4) **Discussion and possible action regarding CITGO PMZ project – New monitoring well.**

ACTION: Discussion was had. No action was taken.

DIRECTION: Board member Mark Van Vleck requested to have staff review rules in lightening of monitor wells. This item will be discussed again in next meeting.

(5) **Discussion and possible action regarding City Ordinance to appropriate $103,000 in the unappropriated fund balance of the Raw Water Supply Development, Fund 4041 and transfer and appropriate into the Aquifer Storage and Recovery, Fund 4021 for FY19 Budget**

ACTION: Discussion was had. Motion was made by Vice Chair Dan McGinn to prepare budget for Fiscal Year 2020. Mark Van Vleck second.

Ayes: Board members Lewis, Edmonds, Van Vleck, and McGinn.
Nays: None

(6) **Discussion and possible action regarding approving payment of two invoices for Public Official Bonds, from McGriff, Siebels & Williams, Inc. totaling $ 476.00**

ACTION: Discussion was had. Motion was made by Vice Chair Dan McGinn to move on and process payment for Public Bonds. Mark Van Vleck second.

Ayes: Board members Lewis, Edmonds, Van Vleck, and McGinn.
Nays: None

(7) **Public Comment**
There was no public comment.

(8) **Staff Announcements:**
Esteban Ramos pointed to the District that they may need to move forward developing a contract for the analysis and review of well applications. Mark Van Vleck recommended to included it in the budget and work with Engineering Services.

(9) **Director's Comment:**
There was no Director's comment.

(10) **Date for next meeting and identify items to be placed on Agenda:** The next meeting will be held on June 20, 2019.

(11) **Adjournment:**
Meeting was adjourned at 2:48 pm.

_____
Dan McGinn, Vice Chairman

E

Appendix E – Evidence of Coordination with Regional Surface Water Entities *(to be inserted after adoption)*

F

Appendix F – GAM Run 17-025 MAG: Modeled Available Groundwater for the Gulf Coast Aquifer System in GMA 16 (May 19, 2017)

GAM RUN 17-025 MAG:
MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 16

Rohit Raj Goswami, Ph.D., P.E.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Section
(512) 463-0495
May 19, 2017

This page is intentionally left blank.

GAM RUN 17-025 MAG: MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 16

Rohit Raj Goswami, Ph.D., P.E.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Section
(512) 463-0495
May 19, 2017

EXECUTIVE SUMMARY:

The modeled available groundwater for Groundwater Management Area 16 (Figure 1) for the Gulf Coast Aquifer System is summarized by decade for the groundwater conservation districts and counties (Table 1) and for use in the regional water planning process (Table 2). The modeled available groundwater estimates range from approximately 233,000 acre-feet per year in 2020 to 312,000 acre-feet per year in 2060 (Tables 1 and 2). The estimates were extracted from results of a model run using the alternative groundwater availability model for Groundwater Management Area 16 (version 1.01). The model run files, which meet the desired future conditions of Groundwater Management Area 16, were submitted to the Texas Water Development Board (TWDB) as part of the Desired Future Conditions Explanatory Report for Groundwater Management Area 16. The explanatory report and other materials submitted to the TWDB were determined to be administratively complete on April 19, 2017.

REQUESTOR:

Mr. David O'Rourke, consultant for Groundwater Management Area 16.

DESCRIPTION OF REQUEST:

In a letter dated January 25, 2017, Mr. David O'Rourke, consultant for Groundwater Management Area 16, provided the TWDB with the desired future conditions of the Gulf Coast Aquifer System adopted by the groundwater conservation district representatives in Groundwater Management Area 16. All other aquifers in Groundwater Management Area 16 (Carrizo-Wilcox and Yegua-Jackson) were declared non-relevant for joint planning purposes. The Gulf Coast Aquifer System includes the Chicot Aquifer, Evangeline Aquifer, and the Jasper Aquifer. Clarifications to the submitted materials were received by TWDB on April 4, 2017. The desired future conditions for the Gulf Coast Aquifer System, as described

in Resolution No. 2017-01 and adopted January 17, 2017, by the groundwater conservation districts within Groundwater Management Area 16, are described below:

Groundwater Management Area 16 [all counties]

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 62 feet in December 2060 from estimated year 2010 conditions.

Bee Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 76 feet in December 2060 from estimated year 2010 conditions.

Live Oak Underground Water Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 34 feet in December 2060 from estimated year 2010 conditions.

McMullen Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 9 feet in December 2060 from estimated year 2010 conditions.

Red Sands Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 40 feet in December 2060 from estimated year 2010 conditions.

Kenedy County Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 40 feet in December 2060 from estimated year 2010 conditions.

Brush Country Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 69 feet in December 2060 from estimated year 2010 conditions.

Duval County Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 104 feet in December 2060 from estimated year 2010 conditions.

San Patricio County Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 48 feet in December 2060 from estimated year 2010 conditions.

Starr County Groundwater Conservation District

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 69 feet in December 2060 from estimated year 2010 conditions.

No District - Cameron County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 70 feet in December 2060 from estimated year 2010 conditions.

No District - Hidalgo County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 118 feet in December 2060 from estimated year 2010 conditions.

No District - Kleberg County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 28 feet in December 2060 from estimated year 2010 conditions.

No District - Nueces County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 21 feet in December 2060 from estimated year 2010 conditions.

No District - Webb County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 113 feet in December 2060 from estimated year 2010 conditions.

No District - Willacy County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 40 feet in December 2060 from estimated year 2010 conditions.

METHODS:

The alternative groundwater availability model for Groundwater Management Area 16 (Hutchison and others, 2011) was run using the model files submitted with the explanatory report (O'Rourke, 2017). Model-calculated water levels were extracted for the years 2010

and 2060, and drawdown was calculated as the difference between water levels at the beginning of 2010 and water levels at the end of 2060. Drawdown averages were calculated for the Gulf Coast Aquifer System by county, groundwater conservation districts, and the entire groundwater management area. As specified in the explanatory report (O'Rourke, 2017), drawdown for model cells that became dry during the simulation (water level dropped below the base of the cell) were excluded from the averaging. The calculated drawdown averages were compared with the desired future conditions to verify that the pumping scenario specified by the district representatives achieved the desired future conditions within a one-foot variance.

The modeled available groundwater values were determined by extracting pumping rates by decade from the model results using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Table 1 presents the annual pumping rates by county and groundwater conservation district, subtotaled by groundwater conservation district, and then summed for Groundwater Management Area 16. Table 2 presents the annual pumping rates by county, river basin, regional water planning area, and groundwater conservation district within Groundwater Management Area 16.

Modeled Available Groundwater and Permitting

As defined in Chapter 36 of the Texas Water Code, "modeled available groundwater" is the estimated average amount of water that may be produced annually to achieve a desired future condition. Groundwater conservation districts must consider modeled available groundwater when issuing permits in order to manage groundwater production to achieve the desired future condition(s). Districts must also consider annual precipitation and production patterns, the estimated amount of pumping exempt from permitting, existing permits, and a reasonable estimate of actual groundwater production under existing permits.

PARAMETERS AND ASSUMPTIONS:

The parameters and assumptions for the groundwater availability are described below:

- The analysis used version 1.01 of the alternate groundwater availability model for Groundwater Management Area 16. See Hutchison and others (2011) for assumptions and limitations of the model.

- The model has six layers that represent the Chicot Aquifer (Layer 1), the Evangeline Aquifer (Layer 2), the Burkeville Confining Unit (Layer 3), the Jasper Aquifer (Layer 4), the Yegua-Jackson Aquifer (Layer 5), and the Queen-City, Sparta and Carrizo-Wilcox Aquifer System (Layer 6).

- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).

- Groundwater Division checked the validity of the assertion that starting water levels in the model were comparable to the measured water-level conditions at the end of year 2010. Water-level values were averaged over the entire area of Groundwater Management Area 16 for the measured and modeled conditions between the years 2000 and 2010. These averaged water-level values are reported in Table 3. As presented in Table 3, the average water-levels indicate that conditions in the field did not change significantly, however, model estimated values differ significantly (by over 12 feet). Such a difference in the model estimates can be explained by the difference in values of pumping and recharge used in the model and those occurring in the field for the period between the years 2000 and 2010. It is important to note here that the groundwater availability model for Groundwater Management Area 16 was constructed using the confined aquifer assumption (and LAYCON=0 option) available within MODFLOW-96. Such an assumption leads to an almost linear response between pumping and drawdown. The Groundwater Division checked and verified the validity of the assumption by taking out the pumping input in the model from the years 2000 to 2010 and obtaining equivalent drawdown values in the year 2060. Based on the analysis, we conclude that the submitted model files are acceptable for developing estimates of modeled available groundwater. Please note that the confined aquifer assumption may also lead to physically unrealistic conditions with pumping in a model cell continuing even when water levels have dropped below the base of the model cell.

- Drawdown averages and modeled available groundwater values are based on official aquifer boundaries (Figures 1 and 2).

- Drawdown values for cells with water levels below the base elevation of the cell ("dry" cells) were excluded from the averaging. However, pumping values from those cells were included in the calculation of modeled available groundwater.

- Estimates of modeled available groundwater from the model simulation were rounded to whole numbers.

- Average drawdown per county may include some model cells that represent portions of surface water such as bays, reservoirs, and the Gulf of Mexico.

RESULTS:

The modeled available groundwater for the Gulf Coast Aquifer System that achieves the desired future conditions adopted by Groundwater Management Area 16 increases from approximately 233,000 acre-feet per year in 2020 to 312,000 acre-feet per year in 2060 (Tables 1 and 2). The modeled available groundwater is summarized by groundwater conservation district and county (Table 1) and by county, river basin, and regional water

planning area for use in the regional water planning process (Table 2). Small differences of values between table summaries are due to rounding errors.

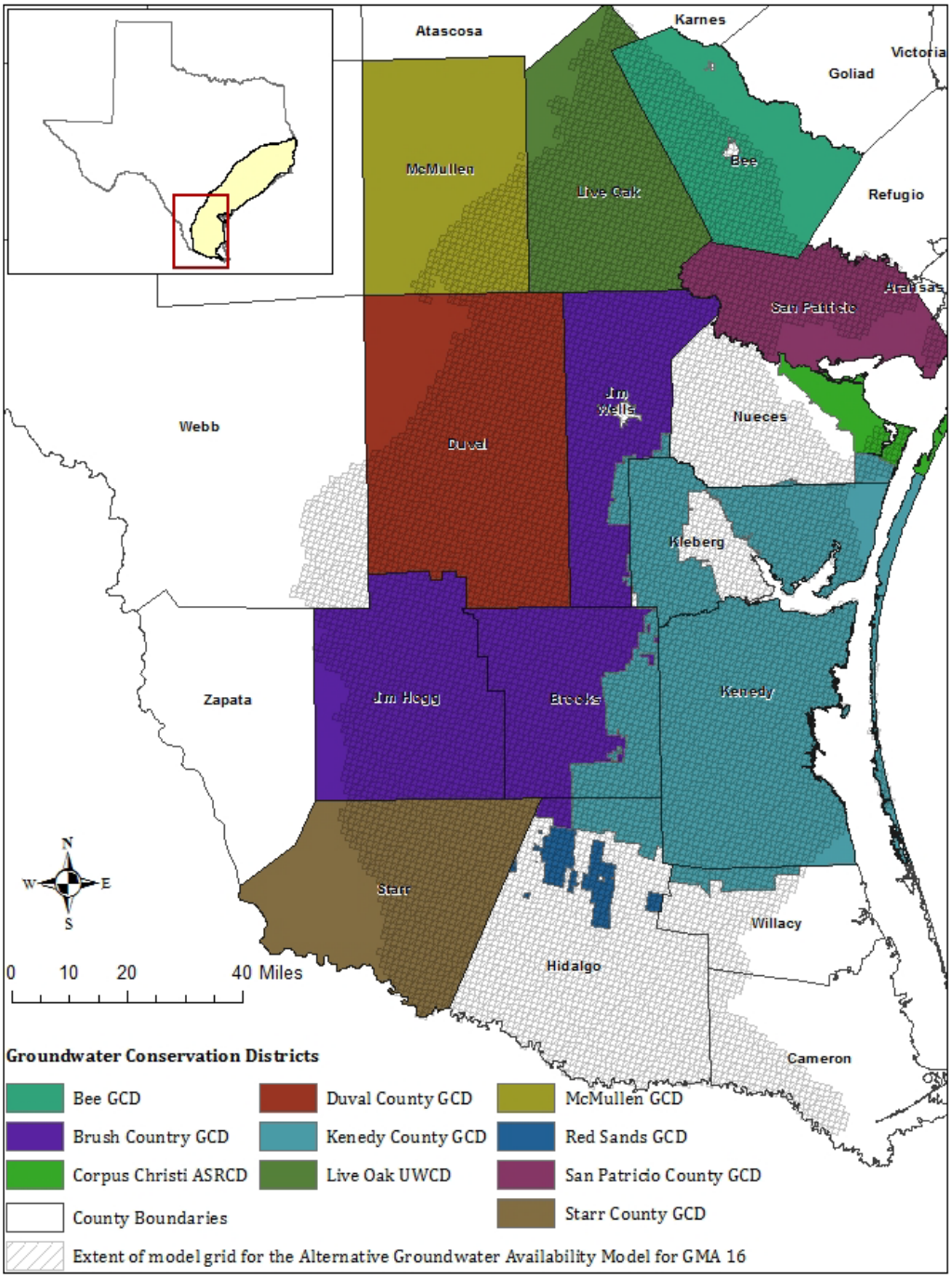


FIGURE 1. MAP SHOWING GROUNDWATER CONSERVATION DISTRICTS (GCDS), COUNTIES, AND GULF COAST AQUIFER SYSTEM EXTENT IN GROUNDWATER MANAGEMENT AREA 16 OVERLAIN ON THE EXTENT OF THE ALTERNATIVE GROUNDWATER AVAILABILITY MODEL FOR GROUNDWATER MANAGEMENT AREA 16.

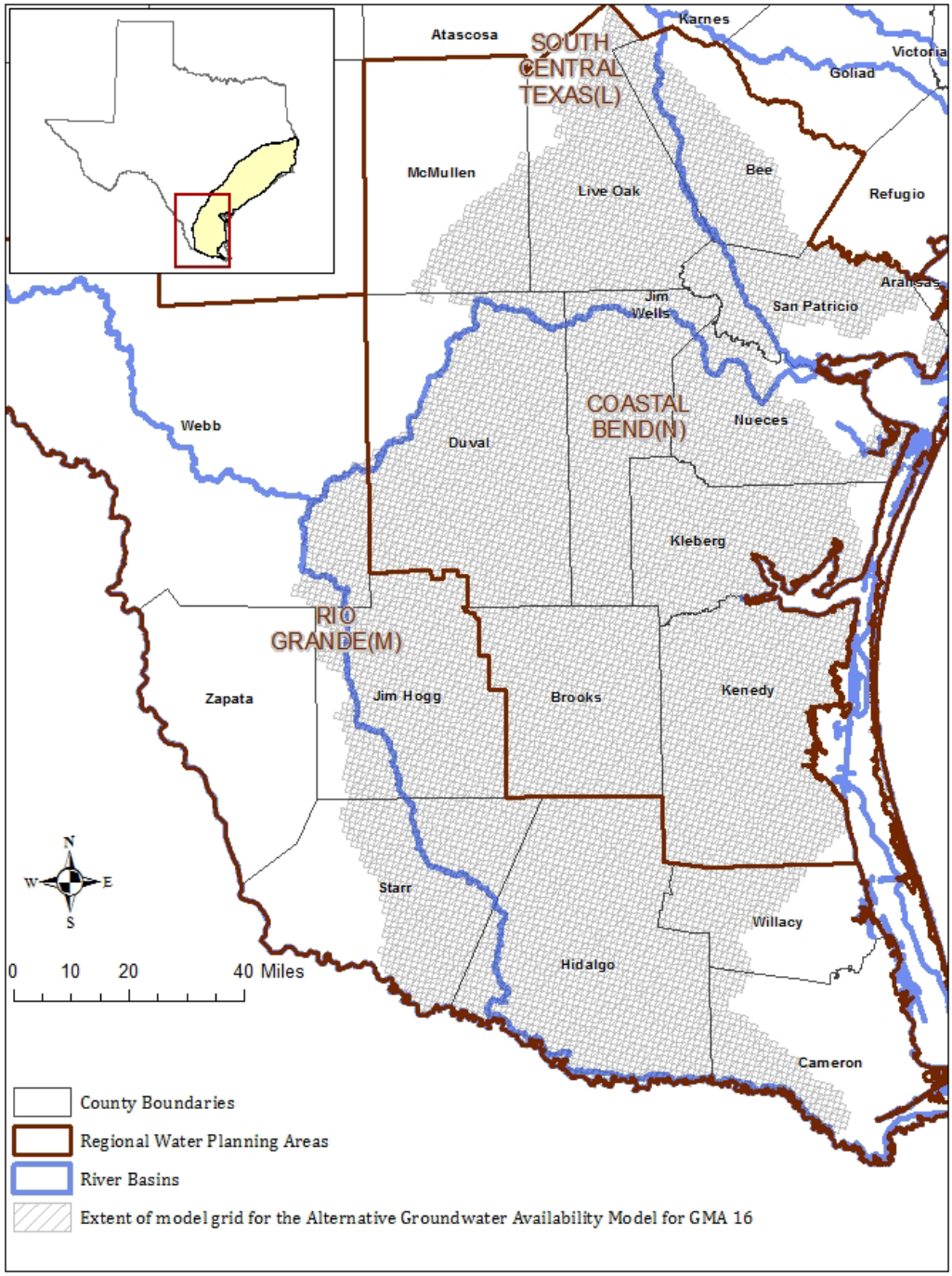


FIGURE 2. MAP SHOWING THE EXTENT OF THE GULF COAST AQUIFER SYSTEM, REGIONAL WATER PLANNING AREAS, COUNTIES, AND RIVER BASINS IN GROUNDWATER MANAGEMENT AREA 16 OVERLAIN ON THE EXTENT OF THE ALTERNATIVE GROUNDWATER AVAILABILITY MODEL FOR GROUNDWATER MANAGEMENT AREA 16.

TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 16 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2010 AND 2060. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District (GCD)	County	Aquifer	2010	2020	2030	2040	2050	2060
Bee GCD	**Bee**	**Gulf Coast Aquifer System**	**7,689**	**8,971**	**10,396**	**11,061**	**11,392**	**11,584**
Brush Country GCD	Brooks	Gulf Coast Aquifer System	3,657	3,657	3,657	3,657	3,657	3,657
Brush Country GCD	Hidalgo	Gulf Coast Aquifer System	131	131	131	131	131	131
Brush Country GCD	Jim Hogg	Gulf Coast Aquifer System	6,174	6,174	6,174	6,174	6,174	6,174
Brush Country GCD	Jim Wells	Gulf Coast Aquifer System	4,220	8,710	9,075	9,403	9,768	10,060
Brush Country GCD		**Gulf Coast Aquifer System**	**14,182**	**18,672**	**19,037**	**19,365**	**19,730**	**20,022**
Corpus Christi ASRCD	**Nueces**	**Gulf Coast Aquifer System**	**328**	**342**	**356**	**370**	**384**	**398**
Duval County GCD	**Duval**	**Gulf Coast Aquifer System**	**18,973**	**20,571**	**22,169**	**23,764**	**25,363**	**26,963**
Kenedy County GCD	Brooks	Gulf Coast Aquifer System	1,155	1,925	2,695	3,465	4,235	4,235
Kenedy County GCD	Willacy	Gulf Coast Aquifer System	289	482	674	867	1,060	1,060
Kenedy County GCD	Hidalgo	Gulf Coast Aquifer System	364	607	849	1,092	1,335	1,335
Kenedy County GCD	Jim Wells	Gulf Coast Aquifer System	261	434	608	783	957	957
Kenedy County GCD	Nueces	Gulf Coast Aquifer System	151	251	351	452	552	552
Kenedy County GCD	Kenedy	Gulf Coast Aquifer System	7,981	13,301	18,621	23,941	29,261	29,261
Kenedy County GCD	Kleberg	Gulf Coast Aquifer System	3,788	6,314	8,839	11,364	13,889	13,889
Kenedy County GCD		**Gulf Coast Aquifer System**	**13,989**	**23,314**	**32,637**	**41,964**	**51,289**	**51,289**
Live Oak UWCD	**Live Oak**	**Gulf Coast Aquifer System**	**6,556**	**8,338**	**9,343**	**8,564**	**8,441**	**8,441**
McMullen GCD	**McMullen**	**Gulf Coast Aquifer System**	**510**	**510**	**510**	**510**	**510**	**510**
Red Sands GCD	**Hidalgo**	**Gulf Coast Aquifer System**	**1,368**	**1,667**	**1,966**	**2,265**	**2,563**	**2,863**
San Patricio County GCD	**San Patricio**	**Gulf Coast Aquifer System**	**14,201**	**43,611**	**45,016**	**46,422**	**47,828**	**49,234**
Starr County GCD	**Starr**	**Gulf Coast Aquifer System**	**2,742**	**3,722**	**4,701**	**5,681**	**6,659**	**7,639**
No District-Bee	Bee	Gulf Coast Aquifer System	0	0	0	0	0	0
No District-Cameron	Cameron	Gulf Coast Aquifer System	5,378	6,688	7,999	9,311	10,620	11,932
No District-Hidalgo	Hidalgo	Gulf Coast Aquifer System	15,908	85,634	90,905	96,175	101,445	106,715

Groundwater Conservation District (GCD)	County	Aquifer	2010	2020	2030	2040	2050	2060
No District-Jim Wells	Jim Wells	Gulf Coast Aquifer System	0	0	0	0	0	0
No District-Kleberg	Kleberg	Gulf Coast Aquifer System	3,857	4,051	4,243	4,436	4,629	4,822
No District-Nueces	Nueces	Gulf Coast Aquifer System	5,753	5,996	6,240	6,487	6,731	6,974
No District-Webb	Webb	Gulf Coast Aquifer System	450	620	789	959	1,129	1,299
No District-Willacy	Willacy	Gulf Coast Aquifer System	544	664	785	905	1,024	1,145
No District-Total		**Gulf Coast Aquifer System**	**31,890**	**103,653**	**110,961**	**118,273**	**125,578**	**132,887**
GMA 16 Total		**Gulf Coast Aquifer System**	**112,428**	**233,371**	**257,092**	**278,239**	**299,737**	**311,830**

TABLE 2. MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 16. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), RIVER BASIN, AND AQUIFER.

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Bee	N	Nueces	Gulf Coast Aquifer System	770	893	949	978	995
Bee	N	San Antonio-Nueces	Gulf Coast Aquifer System	8,201	9,503	10,112	10,414	10,589
Brooks	N	Nueces-Rio Grande	Gulf Coast Aquifer System	5,582	6,352	7,122	7,892	7,892
Cameron	M	Nueces-Rio Grande	Gulf Coast Aquifer System	6,301	7,536	8,771	10,005	11,241
Cameron	M	Rio Grande	Gulf Coast Aquifer System	387	463	540	615	691
Duval	N	Nueces	Gulf Coast Aquifer System	326	351	376	401	428
Duval	N	Nueces-Rio Grande	Gulf Coast Aquifer System	20,245	21,818	23,388	24,962	26,535
Hidalgo	M	Nueces-Rio Grande	Gulf Coast Aquifer System	86,405	91,810	97,216	102,620	107,784
Hidalgo	M	Rio Grande	Gulf Coast Aquifer System	1,634	2,041	2,447	2,854	3,260
Jim Hogg	M	Nueces-Rio Grande	Gulf Coast Aquifer System	5,236	5,236	5,236	5,236	5,236
Jim Hogg	M	Rio Grande	Gulf Coast Aquifer System	938	938	938	938	938
Jim Wells	N	Nueces	Gulf Coast Aquifer System	593	593	593	593	593
Jim Wells	N	Nueces-Rio Grande	Gulf Coast Aquifer System	8,551	9,090	9,593	10,132	10,424
Kenedy	N	Nueces-Rio Grande	Gulf Coast Aquifer System	13,301	18,621	23,941	29,261	29,261
Kleberg	N	Nueces-Rio Grande	Gulf Coast Aquifer System	10,365	13,082	15,800	18,518	18,711
Live Oak	N	Nueces	Gulf Coast Aquifer System	8,297	9,297	8,522	8,400	8,400
Live Oak	N	San Antonio-Nueces	Gulf Coast Aquifer System	41	46	42	41	41
McMullen	N	Nueces	Gulf Coast Aquifer System	510	510	510	510	510
Nueces	N	Nueces-Rio Grande	Gulf Coast Aquifer System	5,862	6,191	6,522	6,851	7,079
Nueces	N	Nueces	Gulf Coast Aquifer System	727	756	787	816	845
Nueces	N	San Antonio-Nueces	Gulf Coast Aquifer System	0	0	0	0	0
San Patricio	N	Nueces	Gulf Coast Aquifer System	4,130	4,502	4,874	5,247	5,619
San Patricio	N	San Antonio-Nueces	Gulf Coast Aquifer System	39,481	40,514	41,548	42,581	43,615
Starr	M	Nueces-Rio Grande	Gulf Coast Aquifer System	1,497	1,891	2,285	2,678	3,072

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Starr	M	Rio Grande	Gulf Coast Aquifer System	2,225	2,810	3,396	3,981	4,567
Webb	M	Rio Grande	Gulf Coast Aquifer System	98	125	152	179	206
Webb	M	Nueces	Gulf Coast Aquifer System	18	22	27	32	37
Webb	M	Nueces-Rio Grande	Gulf Coast Aquifer System	504	642	780	918	1,056
Willacy	M	Nueces-Rio Grande	Gulf Coast Aquifer System	1,146	1,459	1,772	2,084	2,205
GMA 16-Total			**Gulf Coast Aquifer System**	**233,371**	**257,092**	**278,239**	**299,737**	**311,830**

TABLE 3. COMPARISON OF MEASURED AND MODELED WATER-LEVELS AVERAGED OVER GROUNDWATER MANAGEMENT AREA 16 FROM THE DECADAL YEARS 2000 AND 2010. VALUES OF FIELD MEASURED WATER-LEVELS WERE OBTAINED FROM THE TWDB GROUNDWATER DATABASE (GWDB).

Average water levels in Groundwater Management Area 16 (in feet above mean sea level)		
	Year 2000	**Year 2010**
Field measurements (GWDB)	114.1	114.4
Model estimated	119.5	107.1

LIMITATIONS:

The groundwater model used in completing this analysis is the best available scientific tool that can be used to meet the stated objectives. To the extent that this analysis will be used for planning purposes and/or regulatory purposes related to pumping in the past and into the future, it is important to recognize the assumptions and limitations associated with the use of the results. In reviewing the use of models in environmental regulatory decision making, the National Research Council (2007) noted:

> "Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results."

A key aspect of using the groundwater model to evaluate historic groundwater flow conditions includes the assumptions about the location in the aquifer where historic pumping was placed. Understanding the amount and location of historic pumping is as important as evaluating the volume of groundwater flow into and out of the district, between aquifers within the district (as applicable), interactions with surface water (as applicable), recharge to the aquifer system (as applicable), and other metrics that describe the impacts of that pumping. In addition, assumptions regarding precipitation, recharge, and streamflow are specific to a particular historic time period.

Because the application of the groundwater model was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations relating to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor groundwater pumping and groundwater levels in the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine this analysis in the future given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future. Historic precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

REFERENCES:

Hutchison, W.R., Hill, M.E., Anaya, R., Hassan, M.M., Oliver, W., Jigmond, M., Wade, S., and Aschenbach, E. 2011. Groundwater Management Are 16 Groundwater Flow Model, Texas Water Development Board, unpublished report.

Harbaugh, A. W., 2009, Zonebudget Version 3.01, A computer program for computing subregional water budgets for MODFLOW ground-water flow models, U.S. Geological Survey Groundwater Software.

Harbaugh, A.W., Banta, E.R., Hill, M.C., and McDonald, M.G., 2000, MODFLOW-2000, The U.S. Geological Survey modular ground-water model- user guide to modularization concepts and the groundwater flow process: U.S. Geological Survey, Open-File Report 00-92.

National Research Council, 2007, Models in Environmental Regulatory Decision Making Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p., http://www.nap.edu/catalog.php?record_id=11972.

Texas Water Code, 2011, http://www.statutes.legis.state.tx.us/docs/WA/pdf/WA.36.pdf.

G

Appendix G – GAM Run Report 18-012: Corpus Christi Aquifer Storage and Recovery Conservation District Management Plan (June 27, 2018)

GAM Run 18-012: Corpus Christi Aquifer Storage and Recovery Conservation District Groundwater Management Plan

Shirley C. Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Department
512-936-0883
June 27, 2018

Shirley C. Wade
6/27/2018

This page is intentionally blank.

GAM RUN 18-012: CORPUS CHRISTI AQUIFER STORAGE AND RECOVERY CONSERVATION DISTRICT GROUNDWATER MANAGEMENT PLAN

Shirley C. Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Department
512-936-0883
June 27, 2018

EXECUTIVE SUMMARY:

Texas State Water Code, Section 36.1071, Subsection (h) (Texas Water Code, 2015), states that, in developing its groundwater management plan, a groundwater conservation district shall use groundwater availability modeling information provided by the Executive Administrator of the Texas Water Development Board (TWDB) in conjunction with any available site-specific information provided by the district for review and comment to the Executive Administrator.

The TWDB provides data and information to the Corpus Christi Aquifer Storage and Recovery Conservation District in two parts. Part 1 is the Estimated Historical Water Use/State Water Plan dataset report, which will be provided to you separately by the TWDB Groundwater Technical Assistance Department. Please direct questions about the water data report to Mr. Stephen Allen at 512-463-7317 or stephen.allen@twdb.texas.gov. Part 2 is the required groundwater availability modeling information and this information includes:

1. the annual amount of recharge from precipitation, if any, to the groundwater resources within the district;
2. for each aquifer within the district, the annual volume of water that discharges from the aquifer to springs and any surface-water bodies, including lakes, streams, and rivers; and
3. the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

The groundwater management plan for the Corpus Christi Aquifer Storage and Recovery Conservation District should be adopted by the district on or before January 12, 2019

and submitted to the Executive Administrator of the TWDB on or before February 11, 2019. The current management plan for the Corpus Christi Aquifer Storage and Recovery Conservation District expires on April 12, 2019.

This report discusses the methods, assumptions, and results from a model run using version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer System (Chowdhury and others, 2004). This report replaces the results of GAM Run 12-016 (Wade, 2012) because the approach used for analyzing model results has since been refined and GAM Run 12-016 was completed using the alternative model for Groundwater Management Area 16. Table 1 summarizes the groundwater availability model data required by statute and Figure 1 shows the area of the model from which the values in the table were extracted. If, after review of the figure, the Corpus Christi Aquifer Storage and Recovery Conservation District determines that the district boundaries used in the assessment do not reflect current conditions, please notify the TWDB at your earliest convenience.

METHODS:

In accordance with the provisions of the Texas State Water Code, Section 36.1071, Subsection (h), the groundwater availability model for the central portion of the Gulf Coast Aquifer System was used to estimate information for the Corpus Christi Aquifer Storage and Recovery Conservation District groundwater management plan. Water budgets were extracted for the historical model period (1981 through 1999) using ZONEBUDGET Version 3.01 (Harbaugh, 2009). The average annual water budget values for recharge, surface-water outflow, inflow to the district, outflow from the district, and inter-aquifer flow for the aquifers within the district are summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Gulf Coast Aquifer System

- We used version 1.01 of the groundwater availability model for the central part of the Gulf Coast Aquifer System for this analysis. See Chowdhury and others (2004) and Waterstone and others (2003) for assumptions and limitations of the groundwater availability model.
- The model has four layers which represent the Chicot Aquifer (Layer 1), the Evangeline Aquifer (Layer 2), the Burkeville Confining Unit (Layer 3), and the Jasper Aquifer and parts of the Catahoula Formation in direct hydrologic

communication with the Jasper Aquifer (Layer 4). Only the Layer 1 is active within Corpus Christi Aquifer Storage and Recovery Conservation District.

- The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).
- This model assumes a no-flow boundary condition at the base of the model.

RESULTS:

A groundwater budget summarizes the amount of water entering and leaving the aquifers according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the groundwater availability model results for the Gulf Coast Aquifer System located within Corpus Christi Aquifer Storage and Recovery Conservation District and averaged over the historical calibration period, as shown in Table 1.

1. Precipitation recharge—the areally distributed recharge sourced from precipitation falling on the outcrop areas of the aquifers (where the aquifer is exposed at land surface) within the district.

2. Surface-water outflow—the total water discharging from the aquifer (outflow) to surface-water features such as streams, reservoirs, and springs.

3. Flow into and out of district—the lateral flow within the aquifer between the district and adjacent counties.

4. Flow between aquifers—the net vertical flow between the aquifer and adjacent aquifers or confining units. This flow is controlled by the relative water levels in each aquifer and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs.

The information needed for the district's management plan is summarized in Table 1. It is important to note that sub-regional water budgets are not exact. This is due to the size of the model cells and the approach used to extract data from the model. To avoid double accounting, a model cell that straddles a political boundary, such as a district or county boundary, is assigned to one side of the boundary based on the location of the centroid of the model cell. For example, if a cell contains two counties, the cell is assigned to the county where the centroid of the cell is located.

TABLE 1. SUMMARIZED INFORMATION FOR THE GULF COAST AQUIFER SYSTEM FOR THE CORPUS CHRISTI AQUIFER STORAGE AND RECOVERY CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	7
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Gulf Coast Aquifer System	417[1]
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	202
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	89
Estimated net annual volume of flow between each aquifer in the district	Flow from brackish units into the Gulf Coast Aquifer System	396

[1] An additional net flow of 65 acre-feet per year also discharges from the aquifer system to bays.

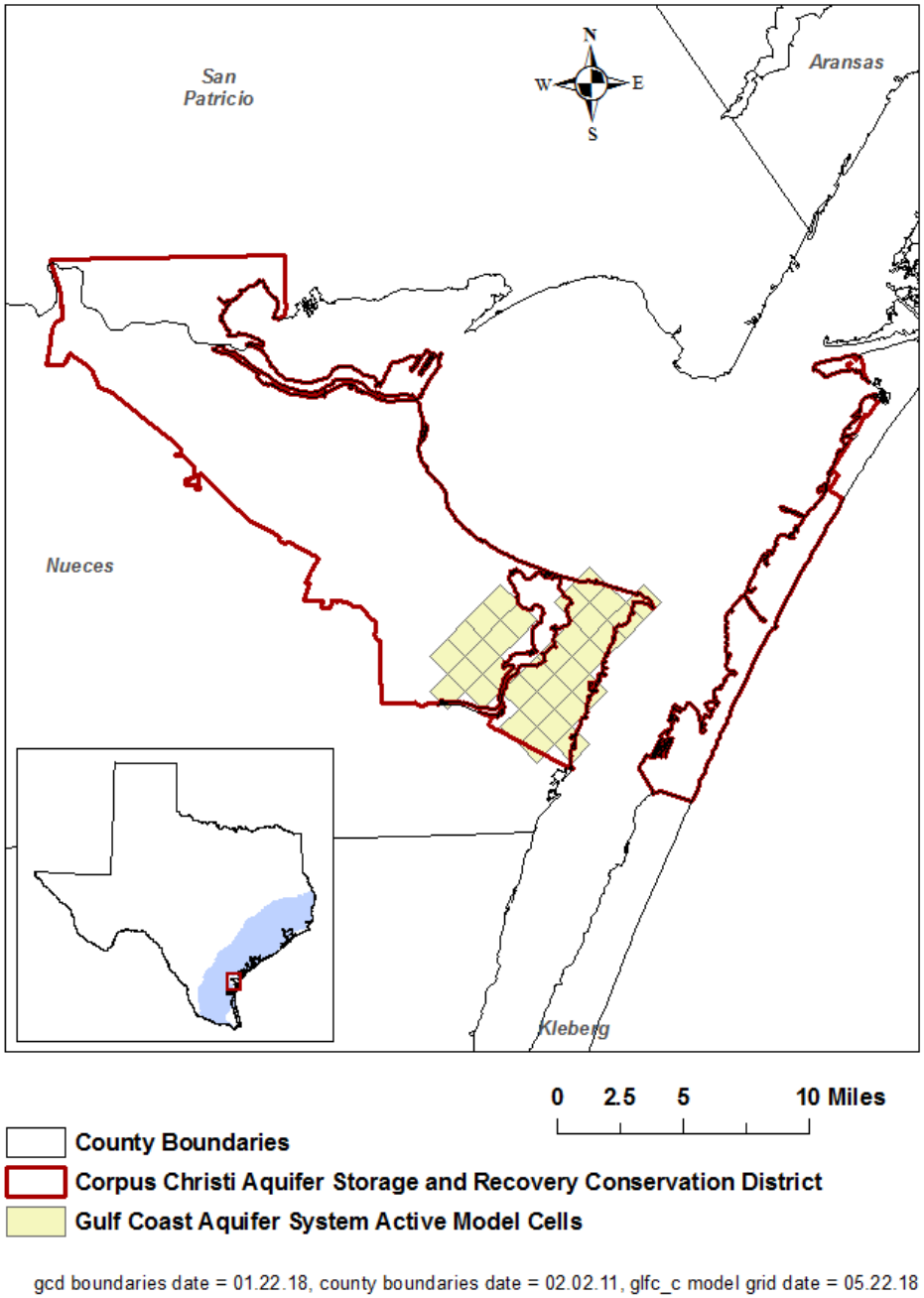


FIGURE 1. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CENTRAL PART OF THE GULF COAST AQUIFER SYSTEM FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE AQUIFER SYSTEM EXTENT WITHIN THE DISTRICT BOUNDARY).

LIMITATIONS:

The groundwater models used in completing this analysis are the best available scientific tools that can be used to meet the stated objectives. To the extent that this analysis will be used for planning purposes and/or regulatory purposes related to pumping in the past and into the future, it is important to recognize the assumptions and limitations associated with the use of the results. In reviewing the use of models in environmental regulatory decision making, the National Research Council (2007) noted:

> *"Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results."*

A key aspect of using the groundwater model to evaluate historical groundwater flow conditions includes the assumptions about the location in the aquifer where historical pumping was placed. Understanding the amount and location of historical pumping is as important as evaluating the volume of groundwater flow into and out of the district, between aquifers within the district (as applicable), interactions with surface water (as applicable), recharge to the aquifer system (as applicable), and other metrics that describe the impacts of that pumping. In addition, assumptions regarding precipitation, recharge, and interaction with streams are specific to particular historical time periods.

Because the application of the groundwater models was designed to address regional-scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations related to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor groundwater pumping and overall conditions of the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine this analysis in the future given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future. Historical precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

REFERENCES:

Chowdhury, A.H., Wade, S., Mace, R.E., and Ridgeway, C., 2004, Groundwater Availability Model of the Central Gulf Coast Aquifer System: Numerical Simulations through 1999- Model Report, 114 p., http://www.twdb.texas.gov/groundwater/models/gam/glfc_c/TWDB_Recalibration_Report.pdf.

Harbaugh, A. W., 2009, Zonebudget Version 3.01, A computer program for computing subregional water budgets for MODFLOW ground-water flow models: U.S. Geological Survey Groundwater Software.

Harbaugh, A. W., and McDonald, M. G., 1996, User's documentation for MODFLOW-96, an update to the U.S. Geological Survey modular finite-difference ground-water flow model: U.S. Geological Survey Open-File Report 96–485, 56 p.

National Research Council, 2007, Models in Environmental Regulatory Decision Making Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p., http://www.nap.edu/catalog.php?record_id=11972.

Texas Water Code, 2015, http://www.statutes.legis.state.tx.us/docs/WA/pdf/WA.36.pdf.

Wade, S., 2012, GAM Run 12-016: Corpus Christi Aquifer Storage and Recovery Conservation District Management Plan, 11 p., http://www.twdb.texas.gov/groundwater/docs/GAMruns/GR12-012.pdf

Waterstone Environmental Hydrology and Engineering Inc. and Parsons, 2003, Groundwater availability of the Central Gulf Coast Aquifer: Numerical Simulations to 2050, Central Gulf Coast, Texas Contract report to the Texas Water Development Board, 157 p.

H

Appendix H – Estimate Historical Groundwater Use and 2017 State Water Plan Datasets: Corpus Christi Aquifer Storage and Recovery Conservation District (December 11, 2018)

Estimated Historical Groundwater Use And 2017 State Water Plan Datasets:

Corpus Christi Aquifer Storage and Recovery Conservation District

by Stephen Allen
Texas Water Development Board
Groundwater Division
Groundwater Technical Assistance Section
stephen.allen@twdb.texas.gov
(512) 463-7317
December 11, 2018

GROUNDWATER MANAGEMENT PLAN DATA:

This package of water data reports (part 1 of a 2-part package of information) is being provided to groundwater conservation districts to help them meet the requirements for approval of their five-year groundwater management plan. Each report in the package addresses a specific numbered requirement in the Texas Water Development Board's groundwater management plan checklist. The checklist can be viewed and downloaded from this web address:

http://www.twdb.texas.gov/groundwater/docs/GCD/GMPChecklist0113.pdf

The five reports included in this part are:

1. Estimated Historical Groundwater Use (checklist item 2)
   from the TWDB Historical Water Use Survey (WUS)
2. Projected Surface Water Supplies (checklist item 6)
3. Projected Water Demands (checklist item 7)
4. Projected Water Supply Needs (checklist item 8)
5. Projected Water Management Strategies (checklist item 9)
   from the 2017 Texas State Water Plan (SWP)

Part 2 of the 2-part package is the groundwater availability model (GAM) report for the District (checklist items 3 through 5). The District should have received, or will receive, this report from the Groundwater Availability Modeling Section. Questions about the GAM can be directed to Dr. Shirley Wade, shirley.wade@twdb.texas.gov, (512) 936-0883.

DISCLAIMER:

The data presented in this report represents the most up-to-date WUS and 2017 SWP data available as of 12/11/2018. Although it does not happen frequently, either of these datasets are subject to change pending the availability of more accurate WUS data or an amendment to the 2017 SWP. District personnel must review these datasets and correct any discrepancies in order to ensure approval of their groundwater management plan.

The WUS dataset can be verified at this web address:

http://www.twdb.texas.gov/waterplanning/waterusesurvey/estimates/

The 2017 SWP dataset can be verified by contacting Sabrina Anderson (sabrina.anderson@twdb.texas.gov or 512-936-0886).

The values presented in the data tables of this report are county-based. In cases where groundwater conservation districts cover only a portion of one or more counties the data values are modified with an apportioning multiplier to create new values that more accurately represent conditions within district boundaries. The multiplier used in the following formula is a land area ratio: (data value * (land area of district in county / land area of county)). For two of the four SWP tables (Projected Surface Water Supplies and Projected Water Demands) only the county-wide water user group (WUG) data values (county other, manufacturing, steam electric power, irrigation, mining and livestock) are modified using the multiplier. WUG values for municipalities, water supply corporations, and utility districts are not apportioned; instead, their full values are retained when they are located within the district, and eliminated when they are located outside (we ask each district to identify these entity locations).

The remaining SWP tables (Projected Water Supply Needs and Projected Water Management Strategies) are not modified because district-specific values are not statutorily required. Each district needs only "consider" the county values in these tables.

In the WUS table every category of water use (including municipal) is apportioned. Staff determined that breaking down the annual municipal values into individual WUGs was too complex.

TWDB recognizes that the apportioning formula used is not perfect but it is the best available process with respect to time and staffing constraints. If a district believes it has data that is more accurate it can add those data to the plan with an explanation of how the data were derived. Apportioning percentages that the TWDB used are listed above each applicable table.

For additional questions regarding this data, please contact Stephen Allen (stephen.allen@twdb.texas.gov or 512-463-7317).

Estimated Historical Water Use
TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water historical use estimates are currently unavailable for calendar year 2017. TWDB staff anticipates the calculation and posting of these estimates at a later date.

NUECES COUNTY

19.76% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	299	533	159	0	97	47	1,135
	SW	12,002	5,946	0	379	0	2	18,329
2015	GW	309	465	141	0	56	47	1,018
	SW	10,955	6,217	0	407	13	2	17,594
2014	GW	326	481	137	0	71	48	1,063
	SW	10,198	6,303	1	79	0	2	16,583
2013	GW	378	537	155	0	145	57	1,272
	SW	10,098	6,666	0	80	0	2	16,846
2012	GW	339	487	717	0	3	48	1,594
	SW	11,293	7,170	0	68	301	2	18,834
2011	GW	413	526	677	0	126	62	1,804
	SW	12,873	6,494	67	78	2	2	19,516
2010	GW	306	640	162	0	294	62	1,464
	SW	10,051	6,139	80	77	2	2	16,351
2009	GW	214	456	159	0	49	78	956
	SW	14,406	6,499	125	39	0	3	21,072
2008	GW	156	444	162	0	61	71	894
	SW	11,757	6,707	119	25	0	3	18,611
2007	GW	134	316	67	0	139	37	693
	SW	9,274	6,746	49	327	2	1	16,399
2006	GW	167	327	101	0	173	57	825
	SW	11,279	7,623	52	0	0	2	18,956
2005	GW	159	492	101	0	59	57	868
	SW	13,092	6,932	48	26	20	2	20,120
2004	GW	152	537	75	0	24	17	805
	SW	10,207	7,052	105	25	15	37	17,441
2003	GW	156	478	75	0	21	18	748
	SW	11,391	6,053	104	31	52	39	17,670
2002	GW	140	240	0	0	3	17	400
	SW	12,330	7,066	250	148	288	37	20,119
2001	GW	116	210	0	0	3	18	347
	SW	11,707	7,418	254	563	337	39	20,318

SAN PATRICIO COUNTY

2.88% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2016	GW	46	0	0	0	159	4	209
	SW	198	270	0	0	6	4	478
2015	GW	54	0	0	0	180	4	238
	SW	303	263	0	0	3	4	573
2014	GW	53	1	0	0	220	6	280
	SW	220	308	0	0	4	6	538
2013	GW	60	0	0	0	180	4	244
	SW	250	296	0	0	7	4	557
2012	GW	64	0	0	0	330	6	400
	SW	215	342	0	0	7	6	570
2011	GW	71	0	4	0	416	6	497
	SW	222	342	4	0	6	6	580
2010	GW	78	0	4	0	207	6	295
	SW	201	339	5	0	0	6	551
2009	GW	76	0	4	0	296	4	380
	SW	212	224	5	0	0	4	445
2008	GW	71	0	3	0	401	7	482
	SW	339	138	4	0	0	7	488
2007	GW	65	0	0	0	168	4	237
	SW	182	227	0	0	16	4	429
2006	GW	71	0	0	0	287	8	366
	SW	211	230	0	0	0	8	449
2005	GW	69	0	0	0	271	6	346
	SW	297	220	0	0	6	6	529
2004	GW	61	0	0	0	258	1	320
	SW	218	220	0	0	6	12	456
2003	GW	62	0	0	0	227	0	289
	SW	205	220	0	0	4	9	438
2002	GW	68	0	0	0	129	1	198
	SW	222	233	0	0	0	12	467
2001	GW	69	0	0	0	127	1	197
	SW	351	166	0	0	0	13	530

Projected Surface Water Supplies
TWDB 2017 State Water Plan Data

NUECES COUNTY

19.76% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
N	AGUA DULCE	NUECES-RIO GRANDE	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	66	69	71	72	74	75
N	AGUA DULCE	NUECES-RIO GRANDE	TEXANA LAKE/RESERVOIR	66	70	72	73	74	75
N	ARANSAS PASS	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	1	1	1	1	1	1
N	ARANSAS PASS	SAN ANTONIO-NUECES	TEXANA LAKE/RESERVOIR	2	2	2	2	2	2
N	BISHOP	NUECES-RIO GRANDE	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	176	193	202	209	215	220
N	BISHOP	NUECES-RIO GRANDE	TEXANA LAKE/RESERVOIR	176	193	202	209	216	220
N	CORPUS CHRISTI	NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	5,174	5,502	5,546	5,547	5,546	5,529
N	CORPUS CHRISTI	NUECES	TEXANA LAKE/RESERVOIR	12	13	156	268	380	476
N	CORPUS CHRISTI	NUECES-RIO GRANDE	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	59,487	63,263	63,775	63,778	63,766	63,576
N	CORPUS CHRISTI	NUECES-RIO GRANDE	TEXANA LAKE/RESERVOIR	143	153	1,793	3,087	4,372	5,477
N	COUNTY-OTHER, NUECES	NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	16	17	17	17	17	17
N	COUNTY-OTHER, NUECES	NUECES	NUECES RUN-OF-RIVER	6	6	5	5	5	5
N	COUNTY-OTHER, NUECES	NUECES	TEXANA LAKE/RESERVOIR	14	14	15	15	15	15
N	COUNTY-OTHER, NUECES	NUECES-RIO GRANDE	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	16	18	19	20	20	20
N	COUNTY-OTHER, NUECES	NUECES-RIO GRANDE	NUECES RUN-OF-RIVER	25	25	25	25	25	25
N	COUNTY-OTHER, NUECES	NUECES-RIO GRANDE	TEXANA LAKE/RESERVOIR	17	19	20	21	22	22
N	DRISCOLL	NUECES-RIO GRANDE	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	52	55	56	57	58	59

N	DRISCOLL	NUECES-RIO GRANDE	TEXANA LAKE/RESERVOIR	53	55	57	57	58	59
N	IRRIGATION, NUECES	NUECES-RIO GRANDE	NUECES-RIO GRANDE RUN-OF-RIVER	0	0	0	0	0	0
N	IRRIGATION, NUECES	SAN ANTONIO-NUECES	NUECES-RIO GRANDE RUN-OF-RIVER	0	0	0	0	0	0
N	LIVESTOCK, NUECES	NUECES	NUECES LIVESTOCK LOCAL SUPPLY	7	7	7	7	7	7
N	LIVESTOCK, NUECES	NUECES-RIO GRANDE	NUECES-RIO GRANDE LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
N	MANUFACTURING, NUECES	NUECES	COLORADO RUN-OF-RIVER	240	244	247	258	254	258
N	MANUFACTURING, NUECES	NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	37	79	141	174	148	120
N	MANUFACTURING, NUECES	NUECES	TEXANA LAKE/RESERVOIR	239	231	202	175	147	122
N	MANUFACTURING, NUECES	NUECES-RIO GRANDE	COLORADO RUN-OF-RIVER	3,761	3,817	3,873	4,040	3,984	4,040
N	MANUFACTURING, NUECES	NUECES-RIO GRANDE	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	718	1,373	2,347	2,732	2,312	1,885
N	MANUFACTURING, NUECES	NUECES-RIO GRANDE	TEXANA LAKE/RESERVOIR	3,751	3,626	3,167	2,745	2,309	1,905
N	MINING, NUECES	NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	43	69	88	102	124	149
N	NUECES WSC	NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	8	9	9	9	9	10
N	NUECES WSC	NUECES	TEXANA LAKE/RESERVOIR	9	9	9	10	10	10
N	NUECES WSC	NUECES-RIO GRANDE	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	158	168	175	179	182	184
N	NUECES WSC	NUECES-RIO GRANDE	TEXANA LAKE/RESERVOIR	158	169	175	178	182	184
N	PORT ARANSAS	NUECES-RIO GRANDE	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	1,125	1,216	1,274	1,307	1,333	1,351
N	PORT ARANSAS	NUECES-RIO GRANDE	TEXANA LAKE/RESERVOIR	1,126	1,218	1,274	1,307	1,334	1,352
N	RIVER ACRES WSC	NUECES	NUECES RUN-OF-RIVER	426	450	463	470	479	486
N	ROBSTOWN	NUECES	NUECES RUN-OF-RIVER	1	1	1	1	1	1
N	ROBSTOWN	NUECES-RIO GRANDE	NUECES RUN-OF-RIVER	1,373	1,349	1,336	1,329	1,320	1,313
N	STEAM ELECTRIC POWER, NUECES	NUECES	COLORADO RUN-OF-RIVER	1,023	1,038	1,053	1,099	1,084	1,099
N	STEAM ELECTRIC POWER, NUECES	NUECES	CORPUS CHRISTI-CHOKE CANYON	117	427	812	1,257	1,445	1,546

			LAKE/RESERVOIR SYSTEM						
N	STEAM ELECTRIC POWER, NUECES	NUECES	TEXANA LAKE/RESERVOIR	1,140	1,199	1,269	1,351	1,445	1,546
N	STEAM ELECTRIC POWER, NUECES	NUECES-RIO GRANDE	COLORADO RUN-OF-RIVER	311	315	320	334	329	334
N	STEAM ELECTRIC POWER, NUECES	NUECES-RIO GRANDE	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	35	130	247	382	439	469
N	STEAM ELECTRIC POWER, NUECES	NUECES-RIO GRANDE	TEXANA LAKE/RESERVOIR	346	364	386	411	439	469
	Sum of Projected Surface Water Supplies (acre-feet)			**81,654**	**87,176**	**90,909**	**93,320**	**94,182**	**94,713**

SAN PATRICIO COUNTY

2.88% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
N	ARANSAS PASS	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	565	574	574	577	583	588
N	ARANSAS PASS	SAN ANTONIO-NUECES	TEXANA LAKE/RESERVOIR	566	574	575	578	584	588
N	COUNTY-OTHER, SAN PATRICIO	NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	3	3	4	4	5	5
N	COUNTY-OTHER, SAN PATRICIO	NUECES	TEXANA LAKE/RESERVOIR	1	2	2	3	3	3
N	GREGORY	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	169	172	174	177	179	180
N	GREGORY	SAN ANTONIO-NUECES	TEXANA LAKE/RESERVOIR	170	172	174	177	179	181
N	INGLESIDE	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	526	531	530	532	537	542
N	INGLESIDE	SAN ANTONIO-NUECES	TEXANA LAKE/RESERVOIR	525	531	530	532	537	541
N	INGLESIDE ON THE BAY	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	38	39	39	39	39	39
N	INGLESIDE ON THE BAY	SAN ANTONIO-NUECES	TEXANA LAKE/RESERVOIR	39	39	39	39	40	40
N	IRRIGATION, SAN PATRICIO	SAN ANTONIO-NUECES	SAN ANTONIO-NUECES RUN-OF-RIVER	0	0	0	0	0	0
N	LIVESTOCK, SAN PATRICIO	NUECES	NUECES LIVESTOCK LOCAL SUPPLY	3	3	3	3	3	3
N	LIVESTOCK, SAN PATRICIO	SAN ANTONIO-NUECES	SAN ANTONIO-NUECES LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
N	MANUFACTURING, SAN PATRICIO	NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	374	389	402	414	430	446

N	MANUFACTURING, SAN PATRICIO	NUECES	TEXANA LAKE/RESERVOIR	61	60	59	59	58	58
N	MANUFACTURING, SAN PATRICIO	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	439	456	472	486	504	523
N	MANUFACTURING, SAN PATRICIO	SAN ANTONIO-NUECES	TEXANA LAKE/RESERVOIR	72	70	70	69	68	68
N	MATHIS	NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	335	338	336	339	342	345
N	MATHIS	NUECES	TEXANA LAKE/RESERVOIR	335	338	336	340	343	346
N	ODEM	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	189	192	192	193	195	198
N	ODEM	SAN ANTONIO-NUECES	TEXANA LAKE/RESERVOIR	190	192	192	194	196	196
N	PORTLAND	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	1,315	1,342	1,349	1,359	1,373	1,385
N	PORTLAND	SAN ANTONIO-NUECES	TEXANA LAKE/RESERVOIR	1,316	1,342	1,349	1,359	1,374	1,385
N	RINCON WSC	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	173	177	179	181	183	184
N	RINCON WSC	SAN ANTONIO-NUECES	TEXANA LAKE/RESERVOIR	173	178	180	182	183	185
N	TAFT	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	232	235	235	238	240	242
N	TAFT	SAN ANTONIO-NUECES	TEXANA LAKE/RESERVOIR	232	235	234	237	240	242
	Sum of Projected Surface Water Supplies (acre-feet)			**8,041**	**8,184**	**8,229**	**8,311**	**8,418**	**8,513**

Projected Water Demands
TWDB 2017 State Water Plan Data

Please note that the demand numbers presented here include the plumbing code savings found in the Regional and State Water Plans.

NUECES COUNTY

19.76% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
N	AGUA DULCE	NUECES-RIO GRANDE	132	139	143	145	148	150
N	ARANSAS PASS	SAN ANTONIO-NUECES	3	3	3	3	3	3
N	BISHOP	NUECES-RIO GRANDE	594	628	646	660	673	682
N	CORPUS CHRISTI	NUECES	5,186	5,515	5,702	5,815	5,926	6,005
N	CORPUS CHRISTI	NUECES-RIO GRANDE	59,630	63,416	65,568	66,865	68,138	69,053
N	COUNTY-OTHER, NUECES	NUECES	61	64	66	67	68	69
N	COUNTY-OTHER, NUECES	NUECES-RIO GRANDE	246	286	310	323	336	344
N	DRISCOLL	NUECES-RIO GRANDE	105	110	113	114	116	118
N	IRRIGATION, NUECES	NUECES	11	12	12	13	14	14
N	IRRIGATION, NUECES	NUECES-RIO GRANDE	75	79	83	87	92	96
N	IRRIGATION, NUECES	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	LIVESTOCK, NUECES	NUECES	11	11	11	11	11	11
N	LIVESTOCK, NUECES	NUECES-RIO GRANDE	52	52	52	52	52	52
N	MANUFACTURING, NUECES	NUECES	596	634	670	701	751	803
N	MANUFACTURING, NUECES	NUECES-RIO GRANDE	9,338	9,923	10,495	10,987	11,760	12,588
N	MINING, NUECES	NUECES	127	150	167	180	199	222
N	MINING, NUECES	NUECES-RIO GRANDE	10	12	13	14	16	17
N	MINING, NUECES	SAN ANTONIO-NUECES	6	7	8	8	9	10
N	NUECES WSC	NUECES	17	18	18	19	19	20
N	NUECES WSC	NUECES-RIO GRANDE	316	337	350	357	364	368
N	PORT ARANSAS	NUECES-RIO GRANDE	2,251	2,434	2,548	2,614	2,667	2,703
N	RIVER ACRES WSC	NUECES	426	450	463	470	479	486
N	ROBSTOWN	NUECES	3	3	3	3	3	3
N	ROBSTOWN	NUECES-RIO GRANDE	2,954	2,894	2,845	2,840	2,836	2,836
N	STEAM ELECTRIC POWER, NUECES	NUECES	2,279	2,665	3,134	3,707	4,405	5,235
N	STEAM ELECTRIC POWER, NUECES	NUECES-RIO GRANDE	692	810	952	1,126	1,338	1,590
	Sum of Projected Water Demands (acre-feet)		**85,121**	**90,652**	**94,375**	**97,181**	**100,423**	**103,478**

SAN PATRICIO COUNTY

2.88% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
N	ARANSAS PASS	SAN ANTONIO-NUECES	1,131	1,148	1,149	1,155	1,167	1,176

N	COUNTY-OTHER, SAN PATRICIO	NUECES	14	14	14	14	15	15
N	COUNTY-OTHER, SAN PATRICIO	SAN ANTONIO-NUECES	32	33	33	34	34	34
N	GREGORY	SAN ANTONIO-NUECES	339	344	348	354	358	361
N	INGLESIDE	SAN ANTONIO-NUECES	1,051	1,062	1,060	1,064	1,074	1,083
N	INGLESIDE ON THE BAY	SAN ANTONIO-NUECES	77	78	78	78	79	79
N	IRRIGATION, SAN PATRICIO	NUECES	32	35	39	43	48	54
N	IRRIGATION, SAN PATRICIO	SAN ANTONIO-NUECES	287	317	351	387	428	483
N	LAKE CITY	NUECES	64	65	64	64	65	66
N	LIVESTOCK, SAN PATRICIO	NUECES	6	6	6	6	6	6
N	LIVESTOCK, SAN PATRICIO	SAN ANTONIO-NUECES	6	6	6	6	6	6
N	MANUFACTURING, SAN PATRICIO	NUECES	526	571	615	654	702	755
N	MANUFACTURING, SAN PATRICIO	SAN ANTONIO-NUECES	618	670	722	767	825	886
N	MATHIS	NUECES	670	676	672	679	685	691
N	MINING, SAN PATRICIO	NUECES	2	3	3	3	3	3
N	MINING, SAN PATRICIO	SAN ANTONIO-NUECES	8	10	10	10	11	12
N	ODEM	SAN ANTONIO-NUECES	379	384	384	387	391	394
N	PORTLAND	SAN ANTONIO-NUECES	2,631	2,684	2,698	2,718	2,747	2,770
N	RINCON WSC	SAN ANTONIO-NUECES	346	355	359	363	366	369
N	SINTON	SAN ANTONIO-NUECES	1,409	1,448	1,463	1,478	1,495	1,507
N	TAFT	SAN ANTONIO-NUECES	464	470	469	475	480	484
	Sum of Projected Water Demands (acre-feet)		**10,092**	**10,379**	**10,543**	**10,739**	**10,985**	**11,234**

Projected Water Supply Needs
TWDB 2017 State Water Plan Data

Negative values (in red) reflect a projected water supply need, positive values a surplus.

NUECES COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
N	AGUA DULCE	NUECES-RIO GRANDE	0	0	0	0	0	0
N	ARANSAS PASS	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	BISHOP	NUECES-RIO GRANDE	0	0	0	0	0	0
N	CORPUS CHRISTI	NUECES	0	0	0	0	0	0
N	CORPUS CHRISTI	NUECES-RIO GRANDE	0	0	0	0	0	0
N	COUNTY-OTHER, NUECES	NUECES	43	26	17	11	6	0
N	COUNTY-OTHER, NUECES	NUECES-RIO GRANDE	445	266	159	97	41	3
N	DRISCOLL	NUECES-RIO GRANDE	0	0	0	0	0	0
N	IRRIGATION, NUECES	NUECES	152	149	146	143	140	137
N	IRRIGATION, NUECES	NUECES-RIO GRANDE	110	91	71	50	27	4
N	IRRIGATION, NUECES	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	LIVESTOCK, NUECES	NUECES	0	0	0	0	0	0
N	LIVESTOCK, NUECES	NUECES-RIO GRANDE	0	0	0	0	0	0
N	MANUFACTURING, NUECES	NUECES	0	0	0	-73	-618	-1,135
N	MANUFACTURING, NUECES	NUECES-RIO GRANDE	0	0	0	-1,832	-10,363	-18,468
N	MINING, NUECES	NUECES	0	0	0	0	0	0
N	MINING, NUECES	NUECES-RIO GRANDE	0	0	0	0	0	0
N	MINING, NUECES	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	NUECES WSC	NUECES	0	0	0	0	0	0
N	NUECES WSC	NUECES-RIO GRANDE	0	0	0	0	0	0
N	PORT ARANSAS	NUECES-RIO GRANDE	0	0	0	0	0	0
N	RIVER ACRES WSC	NUECES	0	0	0	0	0	0
N	ROBSTOWN	NUECES	-2	-2	-2	-2	-2	-2
N	ROBSTOWN	NUECES-RIO GRANDE	-1,581	-1,545	-1,509	-1,511	-1,516	-1,523
N	STEAM ELECTRIC POWER, NUECES	NUECES	0	0	0	0	-2,183	-5,286
N	STEAM ELECTRIC POWER, NUECES	NUECES-RIO GRANDE	0	0	0	0	-663	-1,607
	Sum of Projected Water Supply Needs (acre-feet)		**-1,583**	**-1,547**	**-1,511**	**-3,418**	**-15,345**	**-28,021**

SAN PATRICIO COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
N	ARANSAS PASS	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	COUNTY-OTHER, SAN PATRICIO	NUECES	0	0	0	0	0	0

N	COUNTY-OTHER, SAN PATRICIO	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	GREGORY	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	INGLESIDE	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	INGLESIDE ON THE BAY	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	IRRIGATION, SAN PATRICIO	NUECES	1,160	1,045	916	0	0	0
N	IRRIGATION, SAN PATRICIO	SAN ANTONIO-NUECES	2,196	1,152	0	-499	-2,063	-4,191
N	LAKE CITY	NUECES	6	5	6	6	5	4
N	LIVESTOCK, SAN PATRICIO	NUECES	0	0	0	0	0	0
N	LIVESTOCK, SAN PATRICIO	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	MANUFACTURING, SAN PATRICIO	NUECES	-3,177	-4,259	-5,327	-6,269	-7,456	-8,733
N	MANUFACTURING, SAN PATRICIO	SAN ANTONIO-NUECES	-3,274	-4,545	-5,799	-6,903	-8,298	-9,796
N	MATHIS	NUECES	0	0	0	0	0	0
N	MINING, SAN PATRICIO	NUECES	37	27	23	18	12	3
N	MINING, SAN PATRICIO	SAN ANTONIO-NUECES	156	117	102	87	61	29
N	ODEM	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	PORTLAND	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	RINCON WSC	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	SINTON	SAN ANTONIO-NUECES	560	521	506	491	474	462
N	TAFT	SAN ANTONIO-NUECES	0	0	0	0	0	0
	Sum of Projected Water Supply Needs (acre-feet)		**-6,451**	**-8,804**	**-11,126**	**-13,671**	**-17,817**	**-22,720**

Projected Water Management Strategies
TWDB 2017 State Water Plan Data

NUECES COUNTY

WUG, Basin (RWPG) All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
BISHOP, NUECES-RIO GRANDE (N)							
MUNICIPAL WATER CONSERVATION (SUBURBAN)	DEMAND REDUCTION [NUECES]	16	39	27	23	23	23
		16	**39**	**27**	**23**	**23**	**23**
CORPUS CHRISTI, NUECES (N)							
MUNICIPAL WATER CONSERVATION (URBAN)	DEMAND REDUCTION [NUECES]	184	588	879	853	861	872
		184	**588**	**879**	**853**	**861**	**872**
CORPUS CHRISTI, NUECES-RIO GRANDE (N)							
MUNICIPAL WATER CONSERVATION (URBAN)	DEMAND REDUCTION [NUECES]	2,121	6,766	10,106	9,814	9,904	10,026
		2,121	**6,766**	**10,106**	**9,814**	**9,904**	**10,026**
MANUFACTURING, NUECES, NUECES (N)							
ADDITIONAL REUSE - CORPUS CHRISTI	DIRECT REUSE [NUECES]	0	1,211	1,211	1,211	1,211	1,211
GBRA LOWER BASIN OFF-CHANNEL RESERVOIR	GBRA LOWER BASIN OFF-CHANNEL LAKE/ RESERVOIR [RESERVOIR]	0	312	312	312	312	312
MANUFACTURING WATER CONSERVATION	DEMAND REDUCTION [NUECES]	30	33	35	38	40	43
O.N. STEVENS WTP IMPROVEMENTS	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM [RESERVOIR]	1,245	786	339	0	0	0
SEAWATER DESALINATION	GULF OF MEXICO [GULF OF MEXICO]	0	540	540	540	540	540
		1,275	**2,882**	**2,437**	**2,101**	**2,103**	**2,106**
MANUFACTURING, NUECES, NUECES-RIO GRANDE (N)							
ADDITIONAL REUSE - CORPUS CHRISTI	DIRECT REUSE [NUECES]	0	18,967	18,967	18,967	18,967	18,967
GBRA LOWER BASIN OFF-CHANNEL RESERVOIR	GBRA LOWER BASIN OFF-CHANNEL LAKE/ RESERVOIR [RESERVOIR]	0	4,888	4,888	4,888	4,888	4,888
MANUFACTURING WATER CONSERVATION	DEMAND REDUCTION [NUECES]	471	509	548	588	628	666
O.N. STEVENS WTP IMPROVEMENTS	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM [RESERVOIR]	19,494	12,309	5,317	0	0	0
SEAWATER DESALINATION	GULF OF MEXICO [GULF OF MEXICO]	0	8,460	8,460	8,460	8,460	8,460
		19,965	**45,133**	**38,180**	**32,903**	**32,943**	**32,981**

PORT ARANSAS, NUECES-RIO GRANDE (N)							
MUNICIPAL WATER CONSERVATION (SUBURBAN)	DEMAND REDUCTION [NUECES]	160	374	589	792	985	1,161
		160	**374**	**589**	**792**	**985**	**1,161**
RIVER ACRES WSC, NUECES (N)							
MUNICIPAL WATER CONSERVATION (SUBURBAN)	DEMAND REDUCTION [NUECES]	9	0	0	0	0	0
		9	**0**	**0**	**0**	**0**	**0**
ROBSTOWN, NUECES (N)							
LOCAL BALANCING RESERVOIR - ROBSTOWN	NUECES RUN-OF-RIVER [NUECES]	2	2	2	2	2	2
MUNICIPAL WATER CONSERVATION (SUBURBAN)	DEMAND REDUCTION [NUECES]	0	0	1	1	1	1
		2	**2**	**3**	**3**	**3**	**3**
ROBSTOWN, NUECES-RIO GRANDE (N)							
LOCAL BALANCING RESERVOIR - ROBSTOWN	NUECES RUN-OF-RIVER [NUECES]	1,581	1,581	1,581	1,581	1,581	1,581
MUNICIPAL WATER CONSERVATION (SUBURBAN)	DEMAND REDUCTION [NUECES]	125	336	531	747	883	883
		1,706	**1,917**	**2,112**	**2,328**	**2,464**	**2,464**
STEAM ELECTRIC POWER, NUECES, NUECES (N)							
GBRA LOWER BASIN OFF-CHANNEL RESERVOIR	GBRA LOWER BASIN OFF-CHANNEL LAKE/ RESERVOIR [RESERVOIR]	0	3,068	3,068	3,068	3,068	3,068
MANUFACTURING WATER CONSERVATION	DEMAND REDUCTION [NUECES]	31	31	31	31	31	31
O.N. STEVENS WTP IMPROVEMENTS	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM [RESERVOIR]	5,588	3,529	1,524	0	0	0
SEAWATER DESALINATION	GULF OF MEXICO [GULF OF MEXICO]	0	3,390	3,390	3,390	3,390	3,390
		5,619	**10,018**	**8,013**	**6,489**	**6,489**	**6,489**
STEAM ELECTRIC POWER, NUECES, NUECES-RIO GRANDE (N)							
GBRA LOWER BASIN OFF-CHANNEL RESERVOIR	GBRA LOWER BASIN OFF-CHANNEL LAKE/ RESERVOIR [RESERVOIR]	0	932	932	932	932	932
MANUFACTURING WATER CONSERVATION	DEMAND REDUCTION [NUECES]	9	9	9	9	9	9
O.N. STEVENS WTP IMPROVEMENTS	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM [RESERVOIR]	1,698	1,072	463	0	0	0
SEAWATER DESALINATION	GULF OF MEXICO [GULF OF MEXICO]	0	1,030	1,030	1,030	1,030	1,030
		1,707	**3,043**	**2,434**	**1,971**	**1,971**	**1,971**
Sum of Projected Water Management Strategies (acre-feet)		**32,764**	**70,762**	**64,780**	**57,277**	**57,746**	**58,096**

SAN PATRICIO COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
GREGORY, SAN ANTONIO-NUECES (N)							
MUNICIPAL WATER CONSERVATION (SUBURBAN)	DEMAND REDUCTION [SAN PATRICIO]	8	11	6	6	5	5
		8	**11**	**6**	**6**	**5**	**5**
IRRIGATION, SAN PATRICIO, NUECES (N)							
IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [SAN PATRICIO]	0	0	0	149	206	279
		0	**0**	**0**	**149**	**206**	**279**
IRRIGATION, SAN PATRICIO, SAN ANTONIO-NUECES (N)							
GULF COAST AQUIFER - SAN PATRICIO IRRIGATION	GULF COAST AQUIFER [SAN PATRICIO]	0	0	0	237	237	237
IRRIGATION WATER CONSERVATION	DEMAND REDUCTION [SAN PATRICIO]	0	0	0	1,345	1,857	2,516
SUPPLY REDUCTION FOR SAN PATRICIO IRRIGATION	GULF COAST AQUIFER [SAN PATRICIO]	0	0	0	466	466	466
		0	**0**	**0**	**2,048**	**2,560**	**3,219**
MANUFACTURING, SAN PATRICIO, NUECES (N)							
GBRA LOWER BASIN OFF-CHANNEL RESERVOIR	GBRA LOWER BASIN OFF-CHANNEL LAKE/ RESERVOIR [RESERVOIR]	0	3,680	3,680	3,680	3,680	3,680
MANUFACTURING WATER CONSERVATION	DEMAND REDUCTION [SAN PATRICIO]	248	268	287	306	325	344
SEAWATER DESALINATION	GULF OF MEXICO [GULF OF MEXICO]	0	4,140	4,140	4,140	4,140	4,140
SPMWD INDUSTRIAL WTP IMPROVEMENTS	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM [RESERVOIR]	3,432	2,875	2,402	1,956	1,399	812
		3,680	**10,963**	**10,509**	**10,082**	**9,544**	**8,976**
MANUFACTURING, SAN PATRICIO, SAN ANTONIO-NUECES (N)							
GBRA LOWER BASIN OFF-CHANNEL RESERVOIR	GBRA LOWER BASIN OFF-CHANNEL LAKE/ RESERVOIR [RESERVOIR]	0	4,320	4,320	4,320	4,320	4,320
MANUFACTURING WATER CONSERVATION	DEMAND REDUCTION [SAN PATRICIO]	292	314	337	359	381	404
PORTLAND REUSE PIPELINE	DIRECT REUSE [SAN PATRICIO]	2,240	2,240	2,240	2,240	2,240	2,240
SEAWATER DESALINATION	GULF OF MEXICO [GULF OF MEXICO]	0	4,860	4,860	4,860	4,860	4,860
SPMWD INDUSTRIAL WTP IMPROVEMENTS	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM [RESERVOIR]	4,028	3,375	2,820	2,297	1,642	953
		6,560	**15,109**	**14,577**	**14,076**	**13,443**	**12,777**
PORTLAND, SAN ANTONIO-NUECES (N)							
MUNICIPAL WATER CONSERVATION (SUBURBAN)	DEMAND REDUCTION [SAN PATRICIO]	74	49	0	0	0	0
		74	**49**	**0**	**0**	**0**	**0**
SINTON, SAN ANTONIO-NUECES (N)							
MUNICIPAL WATER CONSERVATION (SUBURBAN)	DEMAND REDUCTION [SAN PATRICIO]	62	170	277	385	447	451

	62	**170**	**277**	**385**	**447**	**451**
Sum of Projected Water Management Strategies (acre-feet)	**10,384**	**26,302**	**25,369**	**26,746**	**26,205**	**25,707**