

Coastal Plains Groundwater Conservation District Groundwater Management Plan



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Coastal Plains Groundwater Conservation District

Groundwater Management Plan

July 2009

I. District Mission

The Coastal Plains Groundwater Conservation District (the District) is committed to manage and protect the groundwater resources of the District. 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.

II. Purpose of Management Plan

In 1997 the 75th Texas Legislature established a statewide comprehensive regional water planning initiative with the enactment of Senate Bill 1 (SB1). Among the provisions of SB1 were amendments to Chapter 36 of the Texas Water Code requiring groundwater conservation districts to develop a groundwater management plan that shall be submitted to the Texas Water Development Board for approval as administratively complete. The groundwater management plan is specified to contain estimates on the availability of groundwater in the District, details of how the District would manage groundwater and management goals for the District. In 2001 the 77th Texas Legislature further clarified the water planning and management provisions of SB1 with the enactment of Senate Bill 2 (SB2).

In addition, the 79th Texas Legislature enacted HB 1763 in 2005 that requires joint planning among districts that are in the same Groundwater Management Area (GMA). These districts must jointly agree upon and establish the desired future conditions of the aquifers within their respective GMAs. Through this process, the districts will submit the desired future conditions (DFC) to the executive administrator of the Texas Water Development Board (TWDB) who, in turn, will provide each district within the GMA with the amount of Managed Available Groundwater (MAG) within each district. The MAG will be based on the desired future conditions jointly established for each aquifer within the GMA.

The administrative requirements of the Chapter 36 Texas Water Code provisions for groundwater management plan development are specified in 31 Texas Administrative Code Chapter 356 of the Texas Water Development Board Rules. This plan fulfills all requirements for groundwater management plans in SB1, SB2, Chapter 36 Texas Water Code and administrative rules of the Texas Water Development Board.

III. Time Period of Management Plan

This plan shall be in effect for a period of ten years from the date of approval by TWDB, unless a new or amended management plan is adopted by the District Board of Directors and approved by TWDB. This plan will be reviewed within five years as required by TWC 36.1072(e). The District will consider the necessity to amend the plan and re-adopt the plan with or without amendments as required by TWC 36.1072(e).

IV. Coastal Plains Groundwater Conservation District

The District was created in 2001 by the 77th Texas Legislature enacting HB 3640. This act is recorded in Chapter 1358 of the Acts of the 77th Texas Legislature. The District was confirmed by local election held in Matagorda County on November 6, 2001 with 68.7 percent of the voters in favor of the District.

The District is located in Matagorda County, Texas. The District boundaries are the same as the area and extent of Matagorda County. The District is bounded by Jackson, Calhoun, Brazoria and Wharton Counties. As of the plan date, groundwater conservation districts (GCDs) exist in all counties bounding the district with the exception of Calhoun County. The GCDs neighboring the District are: Brazoria County GCD (Brazoria), Coastal Bend GCD (Wharton), and Texana GCD (Jackson.) Fig.1

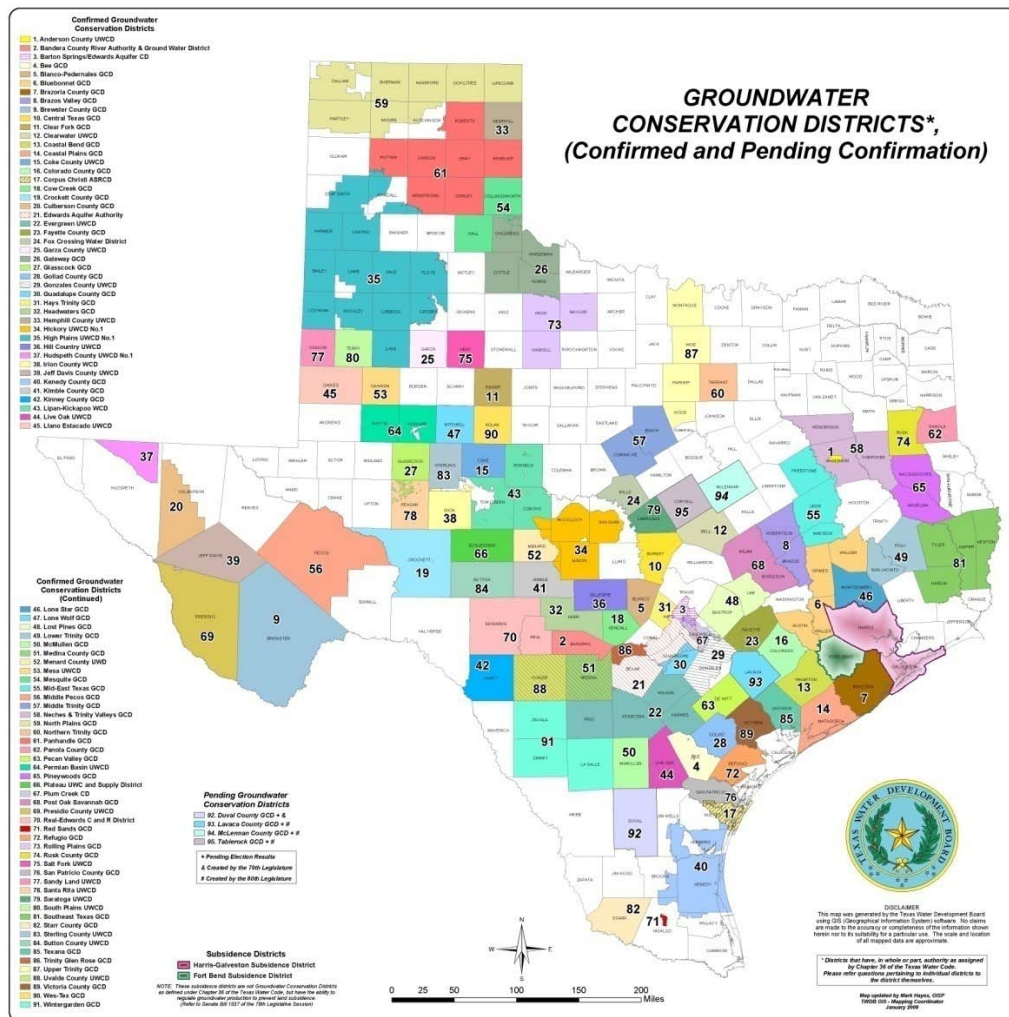


Figure 1, Neighboring Districts to Coastal Bend Groundwater Conservation District

The District is located in Groundwater Management Area (GMA) 15. Chapter 36 Texas Water Code authorizes the District to co-ordinate its management of groundwater with other GCDs in GMA 15. The other confirmed GCDs that are located in GMA 15 are: Fayette County GCD (Fayette), Pecan Valley GCD (DeWitt), Texana GCD (Jackson) Coastal Bend GCD (Wharton), Colorado County GCD (Colorado), Victoria County GCD (Victoria), Evergreen UWCD (Karnes), Goliad County GCD (Goliad), Refugio County GCD (Refugio), and Bee County GCD (Bee). Fig. 2

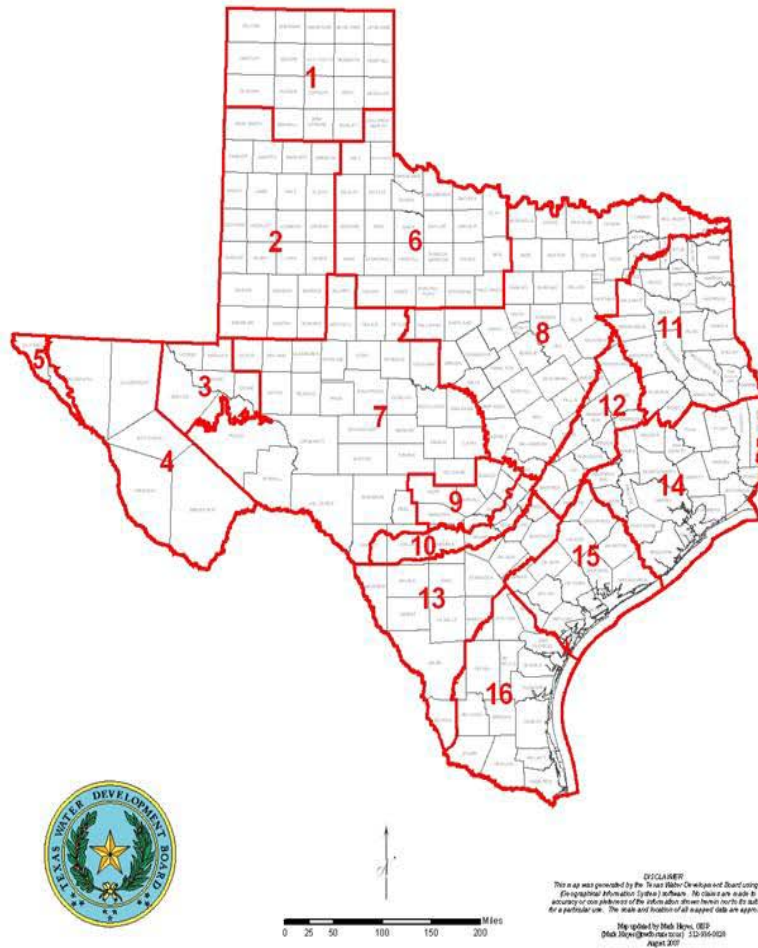


Figure 2, Groundwater Management Areas in Texas

The District Board of Directors is composed of seven members elected to staggered four-year terms. Four directors are elected from county precincts and three directors are elected at-large. The Board of Directors holds regular meetings at the District offices on the fourth floor of the County of Matagorda Office Building at 2200 Seventh Street in Bay City, Texas. Meetings of the Board of Directors are public meetings and held in accordance with public meeting requirements.

V. Authority of the District

The District derives its authority to manage groundwater within the District by virtue of the powers granted and authorized in the District's enabling act, HB 3640 of the 77th Texas Legislature. (Appendix A). The District, acting under authority of the enabling legislation, assumes all the rights and responsibilities of a groundwater conservation district specified in Chapter 36 of the Texas Water Code. Upon adoption of the District rules by the Board of Directors in a public meeting, the authority to manage the use of groundwater in the District will be governed at all times by the due process specified in the District rules. (Appendix B).

VI. Geology and Hydrologic Units of the District

The geologic units which supply fresh water in the District are (in ascending order by age): Bentley, Montgomery and Beaumont Formations and the Quaternary alluvium along the Colorado and San Bernard Rivers. The Willis Formation underlies the Bentley Formation but contains only mineralized water. The coastal deposits of beach and dune sand and coastal marshes all contain water that is mineralized and may not be capable of yielding fresh water. Only the Beaumont, the Quaternary alluvium and the coastal deposits are exposed at the land surface in the District. In the subsurface the formations dip toward the coast at a greater rate than the slope of the land surface and thicken causing the older formations to dip more steeply.

The water bearing formations of the District consists of discontinuous layers of sand and clay that are in hydrologic continuity that function as a single aquifer and are grouped together as the Gulf Coast aquifer. The Gulf Coast Aquifer is considered to be a major aquifer according to the Texas Water Development Board. The individual geologic units can be difficult to distinguish and differ mainly in the degree of coarseness of the sediments. The formations generally grade vertically from coarse to fine-grained sediments. With the exception of the Bentley Formation which contains only fresh water, the fresh-water producing zones of other formations in the District may be underlain and overlain by zones of saline water. (Hammond, 1969)

System	Series	Geologic Unit	Hydrologic Unit
Quaternary	Recent	Alluvium	Gulf Coast aquifer (Chicot aquifer)
		Coastal Deposits	
	Pleistocene	Beaumont Clay	
		Montgomery Formation	
		Bentley Formation	
		Willis Sand	

Figure 3, Geologic and Hydrologic Units of the Gulf Coast aquifer in Matagorda County, Modified from (Hammond, 1969).

VII. Geomorphology of the District

Matagorda County topography ranges from very flat coastal marshes to very gently rolling hills. There is a very gentle seaward slope of approximately 2 feet per mile. The drainage of Matagorda County streams were determined by the initial slope of the land. There are three major drainages in the county: Tres Palacios Creek in the west, the Colorado River in the center, and Caney Creek in the east. The valley of the Colorado River has steep walls and smaller streams exhibit the V-shaped cross profile of streams in the youthful stage. The very poorly drained coastal marshes have sinuous tidal channels and shallow round lakes. The Colorado River delta, meander belts in the stream valleys, coastal marshes, barrier islands, wash-over fans, and abandoned river valleys are other notable features.

Piercement type salt domes affect the topography of the county. At Old Gulf a subsurface salt dome caused a topographic high about 40 feet above the surrounding land surface. Sulfur associated with the salt dome was mined intensively and the area is now a topographic low. At Clemville the slight surface expression of another salt dome has been reduced by the removal of oil and gas. (Hammond, 1969)

VIII. Managed available groundwater in the district based on the desired future condition established under TWC 36.108 - 31TAC356.5 (a)(5)(A) (TWC 36.1071(e)(3)(A))

Managed available groundwater is defined in TWC 36.001 as “the amount of water that may be permitted by a district for beneficial use in accordance with the desired future condition of the aquifer.” The desired future condition of the aquifer may only be determined through joint planning with other groundwater conservation districts (GCDs) in the same groundwater management area (GMA) as required by the 79th Legislature with the passage of HB 1763 into law.

The District is located in GMA 15. The GCDs of GMA 15 have not completed the joint planning process to determine the desired future condition of the aquifers in the GMA. Therefore because GMA 15 has not completed the joint planning process, the District is unable to present a final value for the managed available groundwater in the aquifers of Matagorda County as of the date of this plan.

The Region K estimate for the total available groundwater within Matagorda County is 49,221 acre-feet (2007 State Water Plan). CPGCD considers this estimate to be reasonable and will use it as a guide in the management of the District’s portion of the Gulf Coast Aquifer until a MAG is delivered by the Texas Water Development Board.

IX. Estimate of the amount of groundwater used in the District on annual basis - 31TAC356.5 (a)(5)(B) (TWC 36.1071(e)(3)(B))

The data for groundwater use within the District for years 1974, 1980, 1984-2004 were obtained from the Texas Water Development Board (TWDB) Water use surveys.

Year	Groundwater (ac-ft)	Year	Groundwater (ac-ft)
1974	41,159	1994	25,644
1980	38,554	1995	36,119
1984	39,556	1996	37,557
1985	33,704	1997	14,413
1986	35,069	1998	14,324
1987	30,911	1999	15,087
1988	43,698	2000	28,488
1989	19,434	2001	27,436
1990	37,537	2002	26,803
1991	36,967	2003	55,507
1992	29,021	2004	47,279
1993	28,527		

Table 1, Matagorda County Historic Groundwater use (source: TWDB Water Use Survey.)

Source: TWDB Water Use Survey Database (<http://www.twdb.state.tx.us/wushistorical/DesktopDefault.aspx?PageID=1>)

The Coastal Plains GCD began permitting non-exempt wells in 2005. Since that time, annual water use reports were collected from each permitted user in the District at the end of each calendar year. Exempt uses (*) were calculated based on the initial well registration of a well owner. The actual reported data for groundwater use within the District for years 2005-2008 is shown below in Table 2.

Type of Use	2005	2006	2007	2008
Aquaculture	1203	808.77	2985	2261
Commercial/Industrial	1693	2744	3582	2552
1 st Crop Rice	2103	4607	952	2001
2 nd Crop Rice	138	813	129	259
Row Crop	0	0	4	94
Municipal	2908	2770	3294	3907
Nursery	0	0	130	127
Turfgrass	11669	8279	5438	11368
Waterfowl	54	0	605	357
Pasture/Hay	102	1275	181	130
Recreational	0	0	11	14
*Domestic	1278	1540	1,702	1704
*Livestock)	597	687	702	754
Total Groundwater (ac-ft)	21745	23523	19715	25528

Table 2, Coastal Plains Groundwater Conservation Total Groundwater Use

Source: CPGCD database – May 2009

X. Estimate of the Annual Recharge from Precipitation to the Groundwater Resources within the District – 31TAC356.5 (a)(5)(C) (TWC 36.1071(e)(3)(C))

The average amount of groundwater recharge from precipitation was estimated using Groundwater budget studies that employed the Central Gulf Coast Aquifer Model. The model runs were carried out by the Texas Water Development Board and the results were described in the report (GAM Run 08-76, Oliver, 2008). Water Budgets from 1981-1999 were averaged to obtain recharge estimates. The average recharge estimates are presented below in Table 3.

Aquifer or confining unit	Recharge from Precipitation
Chicot Aquifer	21,705
Evangeline Aquifer	0
Burkeville Confining Unit	0

Table 3, Estimate of the Annual Recharge from Precipitation to the Groundwater Resources within the District rounded to nearest 1 acre-foot.

As shown in Table 3, all recharge from precipitation occurs in the Chicot formation which is averaged to be 21,705 acre feet annually. It is apparent that the majority of recharge to the Chicot and Evangeline aquifers is due to lateral underflow. Lateral underflow is the amount of water annually entering the District through the underground migration of water moving down-gradient within the aquifer after being recharged in aquifer outcrops lying beyond District boundaries.

XI. Estimate of the annual volume of water that discharges from the aquifer to springs and any surface water bodies, including lakes, streams, and rivers - 31TAC356.5 (a)(5)(D) (TWC 36.1071(e)(3)(D))

The surface water-groundwater exchanges between various components average over the 1981-1999 time-frame is present in Table 4. The values in these tables were again obtained from water budgets carried out by the Texas Water Development Board taken from the report (GAM Run 08-76, Oliver, 2008). *Negative values indicate discharge out of aquifer*

Aquifer or confining unit	Discharge
Chicot Aquifer	-34,856
Evangeline Aquifer	0
Burkeville Confining Unit	0

Table 4, Estimate of the annual volume of water that discharges from the aquifer to springs and any surface water bodies, including lakes, streams, and rivers rounded to nearest 1 acre-foot.

The results indicated that over the 1981-1999 time frame, the Chicot Aquifer, on average, discharged water to surface water bodies within the district.

XII. Estimate of annual volume of flow into and out of the district within each aquifer and between aquifers in the district, if a groundwater availability model is available - 31TAC356.5 (a)(5)(E) (TWC 36.1071(e)(3)(E))

The lateral movement of water (inflow into and out of the district) across the district boundaries is referred to as horizontal exchanges. Water budget calculations were made by TWDB for each year during the 1981-1999 time frame over the entire Coastal Plains GCD to estimate these horizontal exchanges (GAM Run 08-76, Oliver, 2008). *Negative values indicate discharge out of aquifer*

Aquifer or Confining Unit	Inflow	Outflow
Chicot Aquifer	12,805	-33,100*
Evangeline Aquifer	1,526	-5,726
Burkeville Confining Unit	9	-8

*Since the District lies on the coast, flows between the Chicot Aquifer and the Gulf of Mexico were included at lateral flows in Table 5. The interaction between the Chicot Aquifer and the Gulf of Mexico was modeled as a general head boundary in the groundwater availability model.

Table 5, Estimate of annual volume of flow into and out of District rounded to nearest 1 acre-foot.

Vertical exchanges represent the cross-formational flows within the District boundaries among various aquifer formations. Water budget calculations were made by the TWDB to estimate the net annual volume of flow between each aquifer in the District (GAM Run 08-76, Oliver, 2008).

Aquifer or Confining Unit	Net Flow
Chicot Aquifer to the Evangeline Aquifer	8,700
Burkeville Confining Unit to the Evangeline Aquifer	339

Table 6, Estimate of annual volume of flow between each aquifer in the District rounded to nearest 1 acre-foot.

XIII. Projected surface water supply in the district, according to the most recently adopted state water plan - 31TAC356.5 (a)(5)(F) (TWC 36.1071(e)(3)(F))

RWPG	Water User Group	County	River Basin	Source Name	2010	2020	2030	2040	2050	2060
K	County Other	Matagorda	Colorado	Highland Lakes Lake/Reservoir System	15	0	0	0	0	0
K	Irrigation	Matagorda	Brazos-Colorado	Brazos-Colorado River Combined Run-of-River Irrigation	4,000	4,000	4,000	4,000	4,000	4,000
K	Irrigation	Matagorda	Brazos-Colorado	Colorado River Run-of-River	34,838	34,832	34,826	34,820	34,814	34,806
K	Irrigation	Matagorda	Colorado	Colorado River Run-of-River	4,448	4,447	4,446	4,445	4,444	4,444
K	Irrigation	Matagorda	Colorado	Colorado River Run-of-River Irrigation	900	900	900	900	900	900
K	Irrigation	Matagorda	Colorado-Lavaca	Colorado River Run-of-River	34,838	34,832	34,826	34,820	34,814	34,806
K	Irrigation	Matagorda	Colorado-Lavaca	Colorado-Lavaca River Combined Run-of-River Irrigation	4,000	4,000	4,000	4,000	4,000	4,000
K	Livestock	Matagorda	Brazos-Colorado	Livestock Local Supply	206	206	206	206	206	206
K	Livestock	Matagorda	Colorado	Livestock Local Supply	25	25	25	25	25	25
K	Livestock	Matagorda	Colorado-Lavaca	Livestock Local Supply	215	215	215	215	215	215
K	Manufacturing	Matagorda	Brazos-Colorado	Highland Lakes Lake/Reservoir System	7,438	3,150	1,464	1,464	0	0
K	Manufacturing	Matagorda	Colorado	Highland Lakes Lake/Reservoir System	6,784	2,872	1,336	1,336	0	0
K	Steam Electric Power	Matagorda	Colorado	Colorado River Run-of-River	49,039	48,989	48,939	48,889	48,839	48,791
K	Steam Electric Power	Matagorda	Colorado	Highland Lakes Lake/Reservoir System	38,111	38,162	38,213	0	0	0
Total Projected Surface Water Supplies (acre-feet per year) =					184,857	176,630	173,396	135,120	132,257	132,193

Table 7, Projected Surface Water Supply – Source: Volume 3, 2007 State Water Planning Database (<http://www.twdb.state.tx.us/DATA/db07/defaultReadOnly.asp>)

XIV. Projected total demand for water in the district according to the most recent adopted state water plan - 31TAC356.5 (a)(5)(G) (TWC 36.1071(e)(3)(G))

RWPG	Water User Group	County	River Basin	2010	2020	2030	2040	2050	2060
K	Bay City	Matagorda	Brazos-Colorado	3,236	3,387	3,445	3,441	3,406	3,375
K	County Other	Matagorda	Brazos-Colorado	787	815	819	808	796	789
K	County Other	Matagorda	Colorado	158	164	164	162	160	158
K	County Other	Matagorda	Colorado-Lavaca	581	601	604	596	587	582
K	Irrigation	Matagorda	Brazos-Colorado	90,733	87,454	84,296	81,271	78,359	75,553
K	Irrigation	Matagorda	Colorado	11,583	11,164	10,761	10,375	10,003	9,645
K	Irrigation	Matagorda	Colorado-Lavaca	90,732	87,454	84,296	81,270	78,360	75,552
K	Livestock	Matagorda	Brazos-Colorado	529	529	529	529	529	529
K	Livestock	Matagorda	Colorado	136	136	136	136	136	136
K	Livestock	Matagorda	Colorado-Lavaca	486	486	486	486	486	486
K	Manufacturing	Matagorda	Brazos-Colorado	6,369	6,930	7,316	7,680	7,979	8,507
K	Manufacturing	Matagorda	Colorado	5,811	6,323	6,675	7,006	7,280	7,760
K	Mining	Matagorda	Brazos-Colorado	5	5	5	5	5	5
K	Mining	Matagorda	Colorado-Lavaca	172	167	164	162	160	158
K	Orbit Systems Inc.	Matagorda	Colorado-Lavaca	2	2	2	2	2	2
K	Palacios	Matagorda	Colorado-Lavaca	745	777	787	789	780	773
K	Southwest Utilities	Matagorda	Brazos-Colorado	81	84	85	85	84	83
K	Steam Electric Power	Matagorda	Colorado	80,000	80,000	102,000	102,000	102,000	102,000
Total Projected Water Demands (acre-feet per year) =				292,146	286,478	302,570	296,803	291,112	286,093

Table 8, Projected Total Water Demands - Source: Volume 3, 2007 State Water Planning Database
(<http://www.twdb.state.tx.us/DATA/db07/defaultReadOnly.asp>)

XV. Water Supply Needs and Water Management Strategies Included in The Adopted State Water Plan – 31TAC356.5(a)(7) (TWC 36.107(e)(4))

Projected Water Needs

Positive values reflect a water surplus; negative values reflect a water need.

RWPG	WUG	County	River Basin	2010	2020	2030	2040	2050	2060
K	Bay City	Matagorda	Brazos-Colorado	3,019	2,868	2,810	2,814	2,849	2,880
K	County Other	Matagorda	Brazos-Colorado	1,149	1,118	1,113	1,124	1,137	1,144
K	County Other	Matagorda	Colorado	896	875	875	877	879	881
K	County Other	Matagorda	Colorado-Lavaca	3,321	3,301	3,298	3,306	3,315	3,320
K	Irrigation	Matagorda	Brazos-Colorado	-47,813	-44,540	-41,388	-38,369	-35,463	-32,665
K	Irrigation	Matagorda	Colorado	-4,846	-4,428	-4,026	-3,641	-3,270	-2,912
K	Irrigation	Matagorda	Colorado-Lavaca	-44,786	-41,514	-38,362	-35,342	-32,438	-29,638
K	Livestock	Matagorda	Brazos-Colorado	552	552	552	552	552	552
K	Livestock	Matagorda	Colorado	60	60	60	60	60	60
K	Livestock	Matagorda	Colorado-Lavaca	-56	-56	-56	-56	-56	-56
K	Manufacturing	Matagorda	Brazos-Colorado	2,892	-1,957	-4,029	-4,393	-6,156	-6,684
K	Manufacturing	Matagorda	Colorado	1,902	-2,522	-4,410	-4,741	-6,351	-6,831
K	Mining	Matagorda	Brazos-Colorado	177	177	177	177	177	177
K	Mining	Matagorda	Colorado-Lavaca	492	497	500	502	504	506
K	Orbit Systems Inc.	Matagorda	Colorado-Lavaca	-2	-2	-2	-2	-2	-2
K	Palacios	Matagorda	Colorado-Lavaca	1,407	1,375	1,365	1,363	1,372	1,379
K	Southwest Utilities	Matagorda	Brazos-Colorado	59	56	55	55	56	57
K	Steam Electric Power	Matagorda	Colorado	7,593	7,594	-14,405	-52,668	-52,718	-52,766
Total Projected Water Needs (acre-feet per year) =				-97,503	-95,019	-106,678	-139,212	-136,454	-131,554

Table 9, Water Supply Needs - Source: Volume 3, 2007 State Water Planning Database
(<http://www.twdb.state.tx.us/DATA/db07/defaultReadOnly.asp>)

Projected Water Management Strategies

RWPG	WUG	WUG County	River Basin	Water Management Strategy	Source Name	Source County	2010	2020	2030	2040	2050	2060
K	Irrigation	Matagorda	Brazos-Colorado	Amendment to Irrigation Water Rights for Municipal and Industrial Needs	Colorado River Run-of-River	Matagorda	0	0	0	-3,430	-3,430	-3,430
K	Irrigation	Matagorda	Colorado	Amendment to Irrigation Water Rights for Municipal and Industrial Needs	Colorado River Run-of-River	Matagorda	0	0	0	-350	-350	-350
K	Irrigation	Matagorda	Colorado-Lavaca	Amendment to Irrigation Water Rights for Municipal and Industrial Needs	Colorado River Run-of-River	Matagorda	0	0	0	-3,220	-3,220	-3,220
K	Irrigation	Matagorda	Brazos-Colorado	COA Return Flows	Indirect Reuse	Travis	7,608	8,524	9,440	10,357	11,273	12,189
K	Irrigation	Matagorda	Colorado	COA Return Flows	Indirect Reuse	Travis	776	870	963	1,057	1,150	1,244
K	Irrigation	Matagorda	Colorado-Lavaca	COA Return Flows	Indirect Reuse	Travis	7,142	8,002	8,862	9,723	10,583	11,443
K	Steam Electric Power	Matagorda	Colorado	COA Return Flows	Indirect Reuse	Travis	1,000	1,000	1,000	1,000	1,000	1,000
K	Irrigation	Matagorda	Brazos-Colorado	Conjunctive Use of Groundwater - Includes Overdrafts	Gulf Coast Aquifer	Matagorda	0	14,437	14,437	14,437	14,437	14,437
K	Irrigation	Matagorda	Colorado	Conjunctive Use of Groundwater - Includes Overdrafts	Gulf Coast Aquifer	Matagorda	0	1,473	1,473	1,473	1,473	1,473
K	Irrigation	Matagorda	Colorado-Lavaca	Conjunctive Use of Groundwater - Includes Overdrafts	Gulf Coast Aquifer	Matagorda	0	13,553	13,553	13,553	13,553	13,553
K	Steam Electric Power	Matagorda	Colorado	Desalination	Gulf Coast Aquifer	Matagorda	29,568	29,568	29,568	29,568	29,568	29,568
K	Irrigation	Matagorda	Brazos-Colorado	Development of New Rice Varieties	Conservation	Matagorda	0	2,661	2,661	2,661	2,661	2,661
K	Irrigation	Matagorda	Colorado	Development of New Rice Varieties	Conservation	Matagorda	0	486	486	486	486	486
K	Irrigation	Matagorda	Colorado-Lavaca	Development of New Rice Varieties	Conservation	Matagorda	0	3,468	3,468	3,468	3,468	3,468
K	Irrigation	Matagorda	Brazos-Colorado	Downstream Return Flows	Indirect Reuse	Travis	0	0	64	250	463	610
K	Irrigation	Matagorda	Colorado	Downstream Return Flows	Indirect Reuse	Travis	0	0	6	26	47	62
K	Irrigation	Matagorda	Colorado-Lavaca	Downstream Return Flows	Indirect Reuse	Travis	0	0	60	235	434	573
K	Steam Electric Power	Matagorda	Colorado	Downstream Return Flows	Indirect Reuse	Travis	0	0	9	36	68	90
K	Livestock	Matagorda	Colorado-Lavaca	Expansion of Gulf Coast Aquifer	Gulf Coast Aquifer	Matagorda	56	56	56	56	56	56
K	Irrigation	Matagorda	Brazos-Colorado	Firm Up ROR with Off-Channel Reservoir	Colorado River Run-of-River Excess Flows Permit	Matagorda	0	0	0	0	0	6,370
K	Irrigation	Matagorda	Colorado	Firm Up ROR with Off-Channel Reservoir	Colorado River Run-of-River Excess Flows Permit	Matagorda	0	0	0	0	0	650
K	Irrigation	Matagorda	Colorado-Lavaca	Firm Up ROR with Off-Channel Reservoir	Colorado River Run-of-River Excess Flows Permit	Matagorda	0	0	0	0	0	5,980
K	Irrigation	Matagorda	Brazos-Colorado	HB 1437 On-Farm Conservation	Conservation	Matagorda	0	0	0	0	10,800	12,200
K	Irrigation	Matagorda	Colorado	HB 1437 On-Farm Conservation	Conservation	Matagorda	0	0	0	0	0	200

Table 10 continued on the following page.

Table 10 Continued.....

RWPG	WUG	WUG County	River Basin	Water Management Strategy	Source Name	Source County	2010	2020	2030	2040	2050	2060
K	Irrigation	Matagorda	Colorado-Lavaca	HB 1437 On-Farm Conservation	Conservation	Matagorda	0	0	0	0	0	8,600
K	Irrigation	Matagorda	Brazos-Colorado	Irrigation District Conveyance Improvements	Conservation	Matagorda	0	3,755	3,755	3,755	3,755	3,755
K	Irrigation	Matagorda	Colorado	Irrigation District Conveyance Improvements	Conservation	Matagorda	0	631	631	631	631	631
K	Irrigation	Matagorda	Colorado-Lavaca	Irrigation District Conveyance Improvements	Conservation	Matagorda	0	3,808	3,808	3,808	3,808	3,808
K	Irrigation	Matagorda	Brazos-Colorado	Irrigation Supply Reduction Due to LSWP	Colorado River Run-of-River	Matagorda	0	0	0	0	0	-20,213
K	Irrigation	Matagorda	Colorado	Irrigation Supply Reduction Due to LSWP	Colorado River Run-of-River	Matagorda	0	0	0	0	0	-2,063
K	Irrigation	Matagorda	Colorado-Lavaca	Irrigation Supply Reduction Due to LSWP	Colorado River Run-of-River	Matagorda	0	0	0	0	0	-18,975
K	Steam Electric Power	Matagorda	Colorado	LCRA Contract Reductions	Highland Lakes Lake/Reservoir System	Reservoir	-1,000	-1,000	-1,009	-1,036	-1,068	-1,090
K	County Other	Matagorda	Colorado	LCRA Contract Renewals	Highland Lakes Lake/Reservoir System	Reservoir	0	15	15	15	15	15
K	Manufacturing	Matagorda	Brazos-Colorado	LCRA Contract Renewals	Highland Lakes Lake/Reservoir System	Reservoir	0	4,288	5,974	5,974	7,438	7,438
K	Manufacturing	Matagorda	Colorado	LCRA Contract Renewals	Highland Lakes Lake/Reservoir System	Reservoir	0	3,912	5,448	5,448	6,784	6,784
K	Steam Electric Power	Matagorda	Colorado	LCRA Contract Renewals	Highland Lakes Lake/Reservoir System	Reservoir	0	0	0	38,264	38,315	38,363
K	Irrigation	Matagorda	Brazos-Colorado	LCRA WMP Interruptible Water Supply	Colorado River Combined Run-of-River Interruptible	Travis	40,567	41,626	31,684	21,742	11,800	1,858
K	Irrigation	Matagorda	Colorado	LCRA WMP Interruptible Water Supply	Colorado River Combined Run-of-River Interruptible	Travis	4,262	4,248	3,233	2,219	1,204	190
K	Irrigation	Matagorda	Colorado-Lavaca	LCRA WMP Interruptible Water Supply	Colorado River Combined Run-of-River Interruptible	Travis	38,410	39,077	29,744	20,411	11,078	1,745
K	Irrigation	Matagorda	Brazos-Colorado	On-Farm Conservation	Conservation	Matagorda	0	2,848	2,848	2,848	2,848	2,848
K	Irrigation	Matagorda	Colorado	On-Farm Conservation	Conservation	Matagorda	0	502	502	502	502	502
K	Irrigation	Matagorda	Colorado-Lavaca	On-Farm Conservation	Conservation	Matagorda	0	3,617	3,617	3,617	3,617	3,617
K	Manufacturing	Matagorda	Colorado	Temporary Overdraft of Gulf Coast Aquifer	Gulf Coast Aquifer	Matagorda	0	0	0	0	0	47
K	County Other	Matagorda	Colorado-Lavaca	Water Allocation	Gulf Coast Aquifer	Matagorda	-2	-2	-2	-2	-2	-2
K	Orbit Systems Inc.	Matagorda	Colorado-Lavaca	Water Allocation	Gulf Coast Aquifer	Matagorda	2	2	2	2	2	2
Total Projected Water Management Strategies (acre-feet per year) =							128,389	191,425	176,356	189,584	185,247	149,173

Table 10, Water Management Strategies
 Source: Volume 3, 2007 State Water Planning Database
 (<http://www.twdb.state.tx.us/DATA/db07/defaultReadOnly.asp>)

XVII. Details on How the District Will Manage Groundwater within the District

The District will manage the supply of groundwater within the District in order to conserve the resource while seeking to maintain the economic viability of all resource user groups, public and private. In consideration of the economic and cultural activities occurring within the District, the District will identify and engage in such activities and practices, that if implemented would result in more efficient use of groundwater. An observation network shall be established and maintained in order to monitor changing storage conditions of groundwater supplies within the District. The District will make a regular assessment of water supply and groundwater storage conditions and will report those conditions to the Board and to the public. The District will undertake, as necessary and co-operate with investigations of the groundwater resources within the District and will make the results of investigations available to the public upon adoption by the Board. Notwithstanding, all actions and rules of the District will adhere to the Texas Water Code.

The District may adopt rules to regulate groundwater withdrawals by means of spacing and production limits. The District may deny a well construction permit or limit groundwater withdrawals in accordance with the guidelines stated in the rules of the District. In making a determination to deny a permit or limit groundwater withdrawals, the District will consider the public benefit against individual hardship after considering all appropriate testimony.

The relevant factors to be considered in making a determination to deny a permit or limit groundwater withdrawals will include:

- 1) The purpose of the rules of the District
- 2) The distribution of groundwater resources
- 3) The economic hardship resulting from grant or denial of a permit or the terms prescribed by the permit

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. In pursuit of the District's mission of protecting the resource, the District may require reduction of groundwater withdrawals to amounts, which will not cause harm to the aquifer. To achieve this purpose, the District may, at the Board's discretion amend or revoke any permits after notice and hearing. The determination to seek the amendment or revocation of a permit by the District will be based on aquifer conditions observed by the District.

The District will enforce the terms and conditions of permits and the rules of the District by enjoining the permit holder in a court of competent jurisdiction as provided for in Texas Water Code Chapter 36.102.

The District will employ technical resources at its disposal to evaluate the resources available within the District and to determine the effectiveness of regulatory or conservation measures. A public or private user may appeal to the Board for discretion in enforcement of the provisions of the water supply deficit contingency plan on grounds of adverse economic hardship or unique local conditions. The exercise of said discretion by the Board shall not be construed as limiting the power of the Board.

XVIII. Actions, Procedures, Performance and Avoidance Necessary to Effectuate the Plan

The District will implement the provisions of this management plan and will utilize the objectives of the plan as a guide for District actions, operations and decision-making. The District will ensure that its planning efforts, activities and operations are consistent with the provisions of this plan.

The District will adopt rules in accordance with Chapter 36 of the Texas Water Code and all rules will be followed and enforced. The development of rules will be based on the best scientific information and technical evidence available to the District.

The District will encourage cooperation and coordination in the implementation of this plan. All operations and activities will be performed in a manner that encourages the cooperation of the citizens of the District and with the appropriate water management entities at the state, regional and local level.

XIX. Methodology for Tracking the District's Progress in Achieving Management Goals

The general manager of the District will prepare and submit an annual report (Annual Report) to the District Board of Directors. The Annual Report will include an update on the District's performance in achieving the management goals contained in this plan. The general manager will present the Annual Report to the Board of Directors Within ninety (90) days following the completion of the District's Fiscal Year, beginning in the fiscal year starting on October 1, 2009. The District will maintain a copy of the Annual Report on file for public inspection at the District offices, upon adoption by the Board of Directors.

XX. Management Goals

1) Providing for the Most Efficient Use of Groundwater in the District.

1.1 Objective – Each year, the District will require 100 percent of 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.

1.1 Performance Standard – The number of exempt and permitted wells registered by the District for the year will be incorporated into the Annual Report submitted to the Board of Directors of the District.

1.2 Objective – Each year, the District will regulate the production of groundwater by maintaining a system of permitting the use of groundwater within the boundaries of the District in accordance with the District Rules.

1.2 Performance Standard – Each year the District will accept and process applications for the permitted use of groundwater in the District in accordance with the permitting process established by District rules. The number and type of applications made for the permitted use of groundwater in the District and, the number and type of permits issued by the District will be included in the Annual Report given to the Board of Directors.

1.3 Objective – The District will conduct an investigation to evaluate the aquifers of the district and the production of groundwater within the district in preparation of establishing a monitor well network within the boundaries of the District.

1.3 Performance Standard – Each year the District will utilize the monitor well network to take samples of water quality and to conduct regular measurements of the changing water-levels in the aquifers of the District. The District will monitor the water levels in at least 5 wells monthly throughout the District. The District will also annual test the water quality in at least one well for each county precinct in Matagorda County. A progress report on the work of the District regarding monitoring the water quality and water-levels of aquifers within the District will be included in the Annual Report of the District each year.

2) Controlling and Preventing the Waste of Groundwater in the District.

2.1 Objective – Each year, the District will make an evaluation of the District Rules to determine whether any amendments are recommended to decrease the amount of waste of groundwater within the District.

2.1 Performance Standard – The District will include a discussion of the annual evaluation of the District Rules and the determination of whether any amendments to the rules are recommended to prevent the waste of groundwater in the Annual Report of the District provided to the Board of Directors.

2.2 Objective – Each year, the District will provide one article to the public on eliminating and reducing wasteful practices in the use of groundwater on the District's website.

2.2 Performance Standard – Each year, a copy of the information provided on the District’s website regarding groundwater waste reduction will be included in the District’s Annual Report to be given to the District Board of Directors.

3) Controlling and Preventing Subsidence.

3.1 Objective – Each year, the District will hold a joint meeting with neighboring Groundwater Conservation Districts focused on sharing information regarding subsidence and the control and prevention of subsidence through the regulation of groundwater use.

3.1 Performance Standard – Each year, a summary of the joint meeting on subsidence issues will be included in the Annual Report submitted to the Board of Directors of the District.

3.2 Objective – Each year, the District will provide one article annually on the District’s website to educate the public on the subject of subsidence.

3.2 Performance Standard – The Annual Report submitted to the Board of Directors will include a copy of the article posted on the District’s website.

4) Natural Resource Issues That Affect the Use and Availability of Groundwater or are affected by the Use of Groundwater.

4.1 Objective – Each year the District will inquire to the Texas Railroad Commission asking whether any new salt water or waste disposal injection wells have been permitted by the Texas Railroad Commission to operate within the District.

4.1 Performance Standard – Each year a copy of the letter to the Texas Railroad Commission asking for the location of any new salt water or waste disposal wells permitted to operate within the District will be included in the Annual Report submitted to the Board of Directors of the District along with any information received from the TRC.

4.2 Objective – Each year the District will request the Texas Railroad Commission to provide a copy of the results of integrity tests performed on salt water or waste disposal injection wells permitted by the Texas Railroad Commission to operate within the District

4.2 Performance Standard – Each year a copy of the letter to the Texas Railroad Commission requesting the results of the integrity testing performed on salt water or waste disposal injection wells permitted by the Texas Railroad Commission to operate within the District will be included in the Annual Report submitted to the Board of Directors of the District along with any information received from the TRC.

5) Conjunctive Surface Water Management Issues.

5.1 Objective – Each year, the District will participate in the regional planning process by attending 50 percent of the Region K Regional Water Planning Group meetings to encourage the development of surface water supplies to meet the needs of water user groups in the District.

5.1 Performance Standard – The percentage of meetings attended by a District representative at the Region K and Region P Regional Water Planning Group meetings will be noted in the Annual Report presented to the District Board of Directors.

6) Addressing Drought Conditions.

6.1 Objective – Each month, the District will download the updated Palmer Drought Severity Index (PDSI) map and other drought related information from the National Weather Service – Climate Prediction Center website.

6.1 Performance Standard – Quarterly, the District will make an assessment of the status of drought in the District and prepare a quarterly briefing to the Board of Directors. The downloaded PDSI maps and other related information will be included with copies of the quarterly briefing in the District Annual Report to the Board of Directors.

7) Addressing Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, or Brush Control, where appropriate and cost-effective.

Conservation

7.1a Objective – The District will annually submit an article regarding water conservation for publication to at least one newspaper of general circulation in the District.

7.1a Performance Standard – A copy of the article submitted by the District for publication to a newspaper of general circulation in the District regarding water conservation will be included in the Annual Report to the Board of Directors.

7.1b Objective – The District will develop or implement a pre-existing educational program for use in public or private schools located in the District to educate students on the importance of water conservation.

7.1b Performance Standard – A summary of the educational program developed or implemented by the District for use in public or private schools located in the District will be included in the Annual Report to the Board of Directors for every year this plan is active.

Brush Control

7.2 Objective – Each year, the District will provide one article relating to brush control on the District web site.

7.2 Performance Standard – Each year, the District annual report will include a copy of the information that has been provided on the District web site relating to brush control.

Recharge Enhancement

7.3 Objective – Each year, the District will provide one article relating to recharge enhancement on the District web site.

7.3 Performance Standard – Each year, the District annual report will include a copy of the information that has been provided on the District web site relating to recharge enhancement.

Rainwater Harvesting

7.4 Objective – Each year, the District will provide one article on rainwater harvesting on the District web site.

7.4 Performance Standard – Each year, the District annual report will include a copy of the information on rainwater harvesting that is provided on the District web site.

Precipitation Enhancement

Precipitation enhancement is not an appropriate or cost-effective program for the District at this time because there is not an existing precipitation enhancement program operating in nearby counties in which the District could participate and share costs. The cost of operating a single-county precipitation enhancement program is prohibitive and would require the District to increase taxes. Therefore, this goal is not applicable to the District at this time.

8) Addressing in a Quantitative Manner the Desired Future Conditions of the Groundwater Resources

This category of management goal is not now applicable to the District because GMA 15 is currently in the process of developing the desired future condition of the groundwater resources in GMA 15 and the desired future conditions of the groundwater resources have not been defined. The District is coordinating with other groundwater conservations districts in GMA 15 to define the desired future conditions of the aquifer, as required by TWC 36.108. The District will review and evaluate the GAM simulation results from the Gulf Coast aquifer GAM and other available data as a participant in the GMA 15 process. GMA 15 anticipates developing the desired future conditions of the aquifers in the GMA on or before the statutory deadline of September 1, 2010.

Appendix A

Evidence of the Administrative Processes Required For the Certification of the Groundwater Management Plan as Administratively Complete

