CCGCD

COLORADO COUNTY GROUNDWATER CONSERVATION DISTRICT

MANAGEMENT PLAN

Colorado County Groundwater Conservation District Groundwater Management Plan amended w/ new modeled available groundwater (MAG) values, April 19, 2018.

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SECTION 1.1 – District Mission Statement

The mission of the Colorado County Groundwater Conservation District (CCGCD) is to evaluate, preserve and protect the groundwater of Colorado County and to prevent waste and ensure an adequate supply for current and future residents, industry and agriculture.

SECTION 1.2 – Purpose of the Management Plan

Senate Bill 1 (SB 1), enacted by the 75th Texas Legislature in 1997, and Senate Bill 2 (SB 2), enacted by the 77th Texas Legislature in 2001, established a comprehensive statewide water resource planning process and the actions necessary for the groundwater conservation districts to manage and conserve the groundwater resources of the State of Texas. These bills required all groundwater conservation districts to develop a management plan which defines the groundwater needs and groundwater supplies within each district and the goals each district has set to achieve its mission. Additionally, the 79th Texas Legislature enacted House Bill 1763 (HB 1763) in 2005 that requires joint planning among districts that are in the same groundwater management area.

SECTION 1.3 – Jurisdiction

With one exception, the boundaries of the CCGCD are congruent with the boundaries of Colorado County (figure 1).

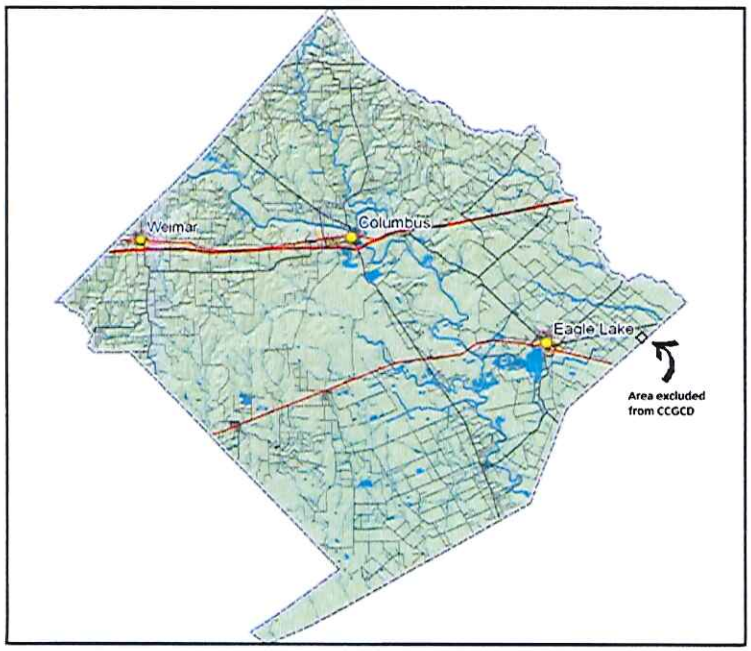

Figure 1: Shaded relief map of Colorado County (Texas Tech Center for Geospatial Technology, 2004).

The noted exception is an approximately 800-acre parcel of land located east of Eagle Lake along the Wharton County line. The landowner of this acreage elected to join the Coastal Bend Groundwater Conservation District prior to the formation of the CCGCD.

SECTION 1.4 – Creation of the CCGCD

The Colorado County Groundwater Conservation District (CCGCD) was created under authority of Section 59, Article XVI of the Texas Constitution and in accordance with Chapter 36 of the Texas Water Code by the 80th Texas Legislature with the Act of May 23, 2007, House Bill 4032, 2007 ("An act relating to the creation"), as a governmental agency and a body politic and corporate. The CCGCD was later confirmed by the votes of Colorado County in November 2007, in accordance with the Underground Water Conservation Districts Act passed by the Texas Legislature in 1949 (currently codified as Chapters 35 and 36 of the Water Code, Vernon's Texas Codes Annotated).

In January, 2007, a Colorado County citizen's group was organized to present and promote the case for forming a groundwater conservation district. This group gave numerous presentations to local organizations and also brought in speakers with expertise in groundwater conservation. In April 2007, the group received Enabling Legislation through the Colorado County Commissioner's Court and in July of that year, documentation from the State of Texas was received and seven directors were appointed to the Board of the proposed Colorado County Groundwater Conservation District.

In November of 2007, the proposal for the CCGCD was placed on the ballot for voter approval. Also at that time, elections were held for the Board of Directors for the CCGCD. The voters of Colorado County approved the creation of the District and the elected Board members were sworn in shortly after the election.

The Enabling Act was amended by the 82nd Texas Legislature with the Act of May 23, 2011 ("An act relating to the term of office and qualifications for a director in the Colorado County Groundwater Conservation District"). This amendment changed the qualifications for directors serving in at-large positions from residing in the cities of Columbus, Eagle Lake and Weimar to residing in Colorado County.

SECTION 1.5 – Roles and Responsibilities

The governing Board of Directors for the CCGCD consists of seven members and is elected under the general laws of Texas. Of the seven members, four are elected by each of the county's four precincts. As a result of the 201 amendment to the Enabling Act, the remaining three at-large members are required only to be residents of Colorado County. The first Board of Directors was elected in November 2007 at the same time the CCGCD was placed on the ballot for approval. Starting in November of 2008, elections were held for four-year terms for places 1, 3, 5 and 7. Two years later, elections were scheduled for places 2, 4 and 6.

The person employed by the Board as General Manager is the chief administrative officer of the District and shall have full authority to manage and operate the affairs of the District, subject to Board approval (Texas Water Code, §36.056).

The CCGCD office is located at 910 Milam Street, Columbus, TX. The District's mailing address is P.O. Box 667, Columbus, TX 78934. Regular office hours of the District are 8:00 am to 5:00 pm, Monday through Friday, except for District holidays or as may be set from time to time by the General Manager (Colorado County Groundwater Conservation District Bylaws, 2008).

Under the provisions of the Texas Water Code, §36.1071(f), the District adopted rules necessary to implement the management plan. The rules and regulations for the CCGCD are contained in a separate document entitled "Colorado County Groundwater Conservation District Rules and Regulations."

CHAPTER 2 – THE GULF COAST AQUIFER

SECTION 2.1 – Area Stratigraphy

The formations that comprise the Gulf Coast Aquifer range in age from Oligocene to Holocene. The lowermost formation of interest is the Oligocene age Catahoula Sandstone. In Colorado County, the Catahoula consists of alternating beds of clay, tuff and sandstone (Loskot et al., 1982). Unconformably overlying the Catahoula is the Oakville Sandstone. In the central part of the coastal plain, the formation is predominantly sand is readily distinguishable from the underlying Catahoula and overlying Fleming Formations which is composed predominantly of clay and subordinate amounts of sand. The Fleming outcrops along the northwestern part of Colorado County and the southeastern portions of Fayette County.

The Pliocene aged Goliad Formation unconformably overlies the Fleming. The Goliad consists mostly of non-marine fluvial plain deposits (Culotta et al., 1992). The upper Goliad is about seven percent higher sand-class material than the lower Goliad. The Goliad Formation outcrops in a band between five and ten miles across in Lavaca County; however, in Colorado County, it is overlain by the younger sediments and only outcrops in very small areas just east of the Colorado River (Barnes, 1974).

The delineation of the Pleistocene units – Willis Sand, Bentley Formation, Montgomery Formation and the Beaumont Clay – is exceedingly difficult due to the lithologic similarity of the sediments and lack of paleontological control (Baker, 1979). The Willis has been mapped as outcropping through the center of Colorado County and is the lowermost and hence oldest of the Quaternary sediments, unconformably lying on the Pliocene Goliad Sand. Plummer (1932) described the Willis as consisting of reddish, coarse and gravelly sands and subordinate clays attaining a maximum thickness of about 350 ft.

In the Colorado County area, the Bentley and Montgomery formations are often referred to as the Lissie Formation. The Lissie, along with the underlying Willis, averages an abundant 65 percent sand. Lissie sediments consist of reddish, orange, and gray fine-to-coarse grained and cross bedded sands that contain intercalations of clays and sandy clays. They include abraded fossils and lentils of gravel of varied composition (Solis, 1981). The Willis and Lissie are distinctly sandier than the underlying Upper Goliad. The updip sections of the Willis and Lissie are the sandiest reflective of a fluvial setting whereas downdip they tend to consist of more bay-fill sediments.

The shallowest of the regionally deposited formations is the Beaumont Clay. Except in areas along the present-day Colorado River, the formation pinches out southeast of Colorado County in Wharton County. The formation consists of clays, silt and sand, but also include concretions of calcium carbonate, iron oxide and iron-manganese oxides common in zones of weathering.

The youngest of the zones of consideration is the Holocene alluvium section. The alluvium would mostly be associated with the floodplain of the recent Colorado River, which bisects the county, and its major tributaries. Thicknesses of alluvial deposits typically do not exceed 60 feet. The deposits consist of dark gray to dark brown clay and silt, sand with a high component of quarts, cherty gravel and, high amounts of limestone, igneous and metamorphic rock fragments, probably reworked form terrace deposits. Fluvial morphology is well preserved with point bars, oxbows and abandoned channel segments clearly visible (Barnes, 1974; Proctor et al., 1974).

SECTION 2.2 – Overview of the Aquifer

The Gulf Coast Aquifer in Texas extends along a band of roughly 100 miles in width from the Sabine River to the Rio Grande (figure 2). Colorado County is located just north of the central Gulf Coast along the Colorado River. George, et al (2011) provides cross-sections that show how the Gulf Coast Aquifer thins updip (to the northwest).

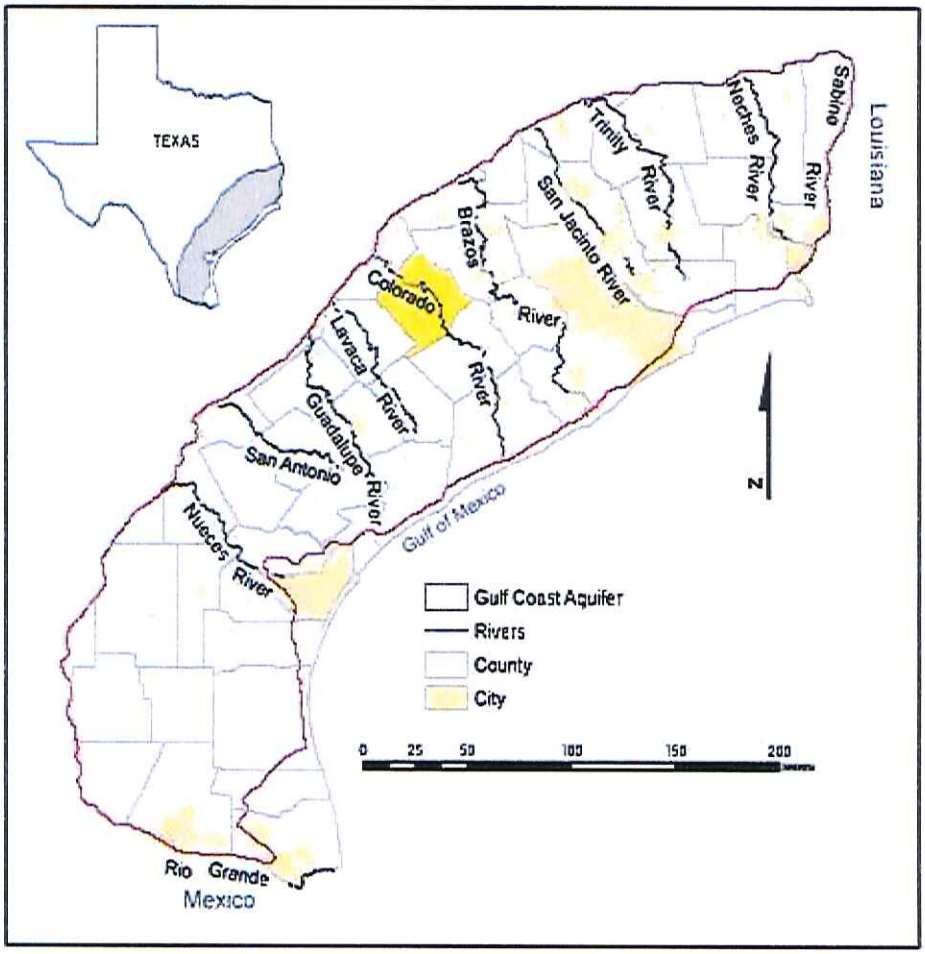

Figure 2: Regional extent of the Gulf Coast Aquifer. Colorado County designated in yellow. Modified from Chowdhury and Turco, 2006.

Figure 3 shows correlations between the geologic formations described in the previous section (stratigraphic units) and the associated aquifer zone with the Gulf Coast Aquifer (Baker, 1979). The sand units of the Catahoula may well be in hydraulic continuity with the overlying sands of the Jasper Aquifer (Loskot et al., 1982). However, the water quality is generally poorer in the Catahoula. Further downdip, the Catahoula contains a greater percentage of fine-grained material and often acts as a hydrogeological barrier and is often designated as the Catahoula Confining Unit (Loskot et al., 1982; Davidson and Mace, 2006). There is no compelling indication that the Catahoula contributes any meaningful groundwater in Colorado County.

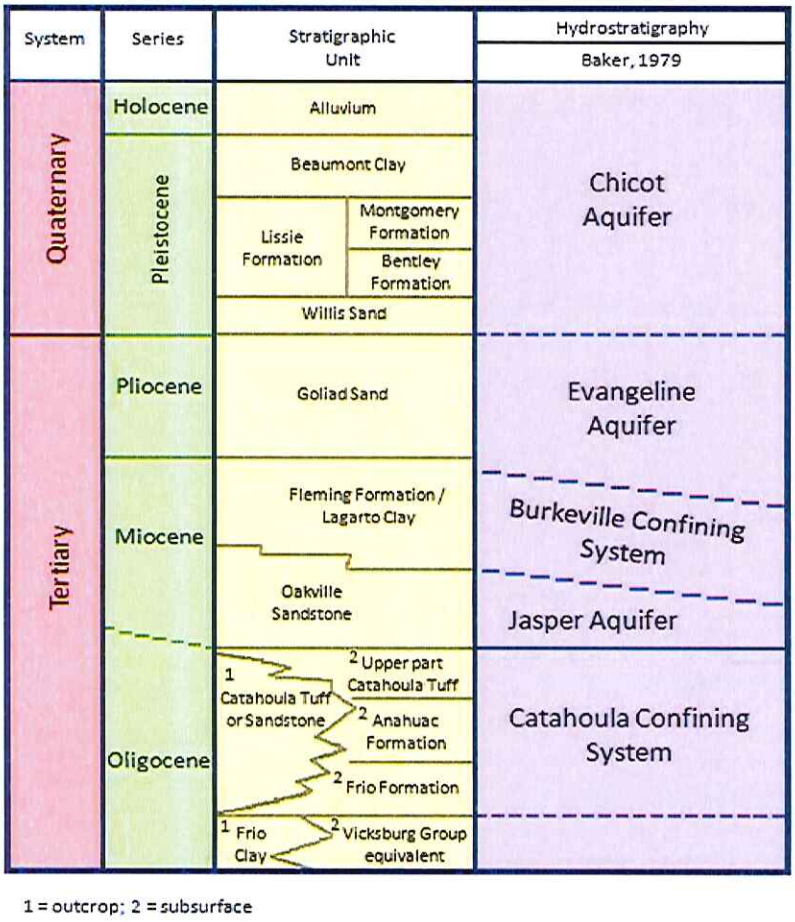

Figure 3: Hydrostratigraphy and the associated stratigraphic units that comprise the Gulf Coast Aquifer (from Baker, 1979).

The Jasper Aquifer was not delineated west of Washington, Austin and Fort Bend counties until Baker (1979) made more detailed delineations of the Jasper and other related hydrologic units. The Jasper Aquifer ranges in thickness from about 200 feet near the outcrop, to about 2,500 feet in Wharton County. The average range in thickness within the zones of fresh to slightly saline water is about 200 to 800 feet (Loskot et al., 1982). The maximum thickness occurs in the region where the aquifer contains moderately saline water to brine.

In the northern parts of Lavaca and Colorado counties, the Jasper Aquifer contains fresh water, though the water quality varies widely. The largest user of the Jasper Aquifer in Colorado County is the City of Weimar.

The Burkeville Confining System consists wholly of the Fleming Formation (figure 3) which is composed largely of massive clays interbedded with calcareous sand and shale (Rogers, 1967) and typically ranges from 300 to 500 ft thick in the subsurface. In the Colorado County area, the low porosity and transmissivity of the clays make the Burkeville an effective confining unit hydrologically separating the underlying Jasper from the overlying Evangeline. However, parts of the unit in the outcrop area and in the shallow subsurface do contain sufficient amounts of saturated sand to supply small quantities of fresh to slightly saline water to rural-domestic and livestock wells (Loskot et al., 1982).

The Evangeline Aquifer is comprised largely of sediments from the Goliad Formation and the uppermost Fleming and ranges in thickness from near surface in Lavaca and Fayette counties to 2,300 feet below mean sea level in Wharton County. Because the Evangeline and overlying Chicot aquifers are geologically similar, the basis for separating them is primarily a noticeable but often subtle difference in hydraulic conductivity. The up-dip portion of the Evangeline Aquifer exists under water-table conditions whereas down dip, it is confined (Carr et al., 1985). Fresh water occurs in the Evangeline Aquifer throughout most of Colorado County and can occur as deep as 2,000 feet in east-central Wharton County (Loskot et al., 1982). The Evangeline is a large source of water for irrigation in the southern portion of the county and domestic and livestock use in the northern part. The City of Columbus uses water from the Evangeline Aquifer.

The Chicot Aquifer is the main source of ground water in Colorado County. This aquifer overlies the Evangeline and is composed of water-bearing units of the Willis Sand, Lissie and Beaumont Clay Formations as well as Quaternary alluvium. The base of the Chicot ranges from zero near the outcrop in north central portion of Colorado County, to 1,100 feet below mean sea level in southern Wharton County. Groundwater from the Chicot is used for irrigation and for rural domestic and livestock uses in the southern portions of the county. The City of Eagle Lake uses water from the Chicot Aquifer. Because the Chicot aquifer pinches out within the county, the aquifer is under water-table conditions in the up dip part and becomes confined down dip.

The alluvium of the Colorado River is typically modeled by TWDB together with the underlying Gulf Coast Aquifer and is not typically treated as a distinct aquifer. The Region K water planning group however, does include strategies to develop 'other aquifers' which specifically sites the alluvium of the Colorado River (Lower Colorado Regional Water Planning Group, 2010). The alluvium of the Brazos River to the east has officially been designated as a 'minor aquifer' by TWDB. Water from the Colorado River alluvium is typically found near the river and is used primarily for rural domestic and livestock uses.

CHAPTER 3 – CCGCD MAG AND WATER USE

SECTION 3.1 – Modeled Available Groundwater

Section 36.001 of the Texas Water Code defines modeled available groundwater (MAG) as "the amount of water that the Executive Administrator (of the TWDB) determines may be produced on an average annual basis to achieve a desired future condition established under §36.108." Desired future condition (DFC) is defined in §36.001 of the Texas Water Code as "a quantitative description, adopted in accordance with §36.108 of the Texas Water Code, of the desired condition of the groundwater resources in a management area at one or more specified future times."

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 (DFC) of the aquifers within their respective GMAs. Through this process, the groundwater conservation districts will submit the DFC to the executive administrator of the TWDB who, in turn, will provide each district within the GMA with the amount of modeled available groundwater (MAG) within each district. The MAG will be based on the DFCs jointly established for each aquifer within the GMA.

Colorado County Groundwater Conservation District is located wholly within GMA 15 (figure 4).

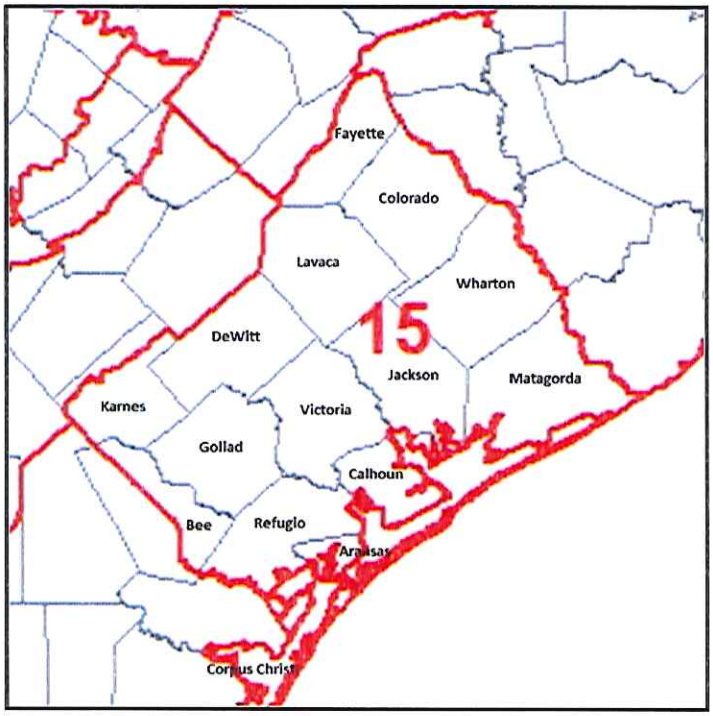

Figure 4: Map showing counties within Groundwater Management Area 15.

GMA 15 district representatives adopted, by resolution (#2016-1), DFCs for the Gulf Coast Aquifer on April 29, 2016. TWDB designated the GMA 15 Explanatory Report administratively complete on October 20, 2016. TWDB provided the Modeled Available Groundwater estimates for GMA 15 to district representatives on March 22, 2017.

The desired future condition for the entire area is stated as follows:

"Drawdown of the Gulf Coast Aquifer system shall not exceed an average of 13 feet in December 20169 from estimated January 2000 conditions."

The desired future condition for Colorado County is stated as follows:

"Drawdown of the Chicot and Evangeline Aquifers shall not exceed an average of 17 feet and drawdown of the Jasper Aquifer shall not exceed an average of 23 feet in December 2069 from estimated January 2000 conditions."

TWDB reported the modeled available groundwater for GMA 15 based on the desired future condition in GAM Run 16-025 MAG which is incorporated into the management plan as Appendix B. The modeled available groundwater, in acre-feet per year, of the Chicot-Evangeline and jasper Aquifers within the district per Table 1 of the GAM Run 16-025 MAG is as follows:

County/Aquifer	Year					
	2020	2030	2040	2050	2060	2069
Colorado/ Chicot + Evangeline	74,964	74,964	72,765	72,765	71,618	71,618
Colorado/ Jasper	918	918	918	918	918	918
Total	75,882	75,882	73,683	73,683	72,536	72,536

Table 1: MAG values for the Gulf Coast Aquifer (Chicot+Evangeline and Jasper) as documented in TWDB GAM Run 16-1025 MAG (Rohit Raj Goswami, March 22, 2017). Units are in acre-feet per year. See Appendix B for the complete report.

SECTION 3.2 – Annual Groundwater Use

A significant portion of the economy of Colorado County can be attributed to agribusiness, most notably farming. The dominant crop type is rice which is heavily dependent upon irrigation. Colorado County and Wharton and Matagorda counties to the south are leading rice producers in the state and by far account for the most irrigation water use in Region K (Lower Colorado Regional Water Planning Group, 2010).

The Lower Colorado River Authority (LCRA) provides the bulk of the irrigation water needed to farmers in Colorado County. Specifically, the water is diverted from the rivers to LCRA owned

irrigation districts which consists of hundreds of miles of canals used to deliver the water to individual farmer's fields. In Colorado County, the LCRA owned and operated Garwood Irrigation District provides water to farmers on the west side of the Colorado River and the Lakeside Irrigation District provides farmers on the east side. Both these irrigation districts extend southward into Wharton County.

Since 2000, irrigation usage has in part been a function of precipitation. In wet years such as in 2007, farmers require less water for irrigation whereas drier years, like 2001 and 2003, tend to require more (figure 5). Another related factor is the storage volume in the Highland Lake System located along the Colorado River northwest of Austin. Two of these lakes were built to act as reservoirs and their water levels rise and drop according to need and conditions.

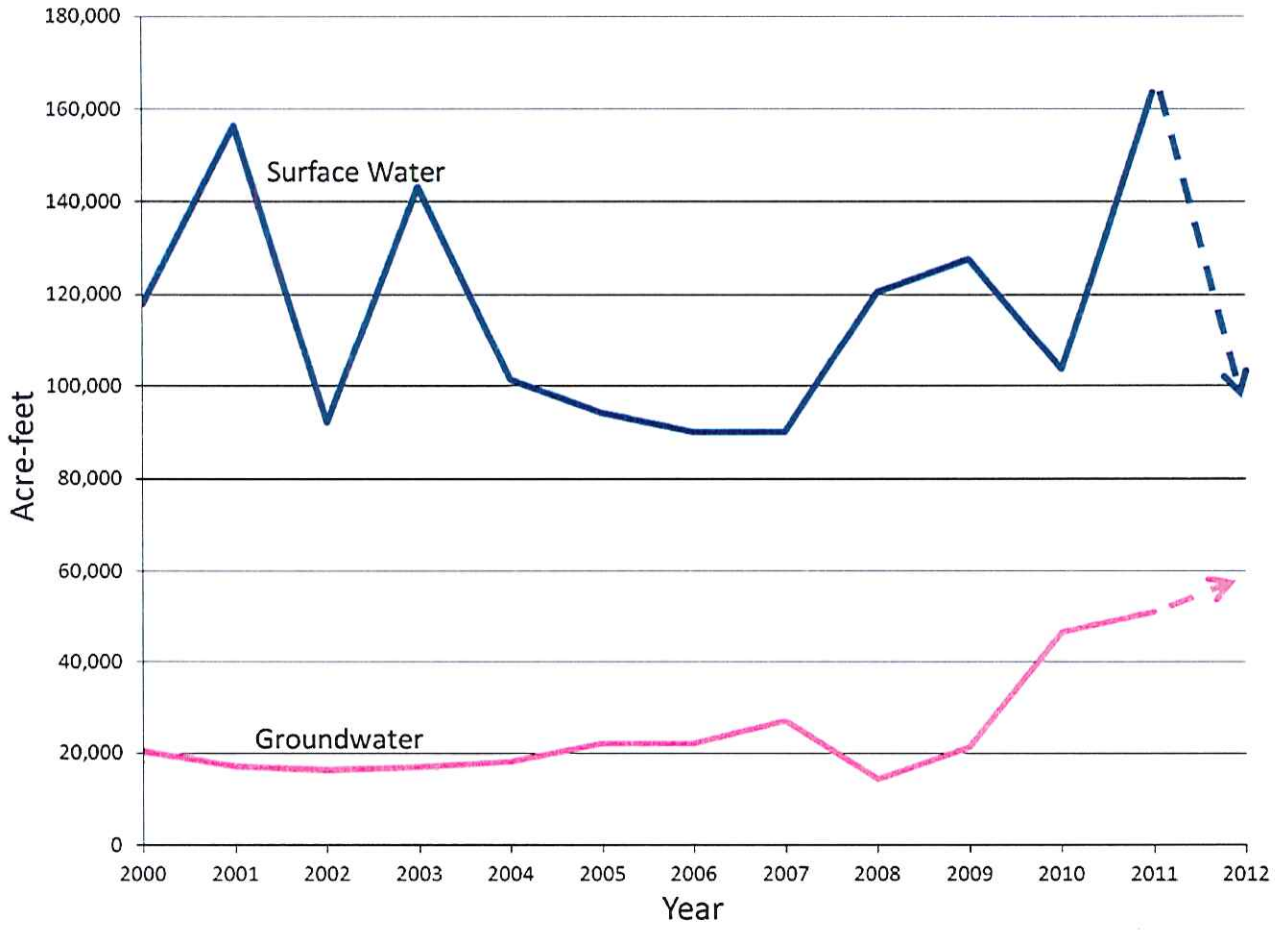

Figure 5. Usage of surface water (top line) and groundwater (bottom line) for irrigation in Colorado County from year 2000 though 2011. Dashed lines indicate projected trends beyond 2011. Modified from data provided in Appendix C1 (Allen, 2014; TWDB 2014).

In most dry years, if water was taken from the reservoir lakes, ensuing rains would replenish the lake levels. However, 2008 marked the beginning of a severe and sustained drought that has had a discernible impact on the region. As the drought persisted and inflows into the highland lakes were correspondingly reduced, the lake levels began to fall. Eventually, water storage reached a point where LCRA started restricting irrigation water to farmers downriver. In 2012, for the first time ever, farmers that used water through the irrigation districts were denied water from LCRA.

The restriction has persisted through the 2013 and 2014 seasons. Because of the senior water rights and due to the LCRA purchase contract, water has continued to be supplied to the Garwood Irrigation District during this time period.

As a result of the LCRA restrictions, surface water usage for 2012 though at least 2014 is projected to be substantially lower than in previous years (figure 5), reflecting only what was supplied to the Garwood Irrigation District. These restrictions have had an impact on groundwater usage. From 2000 through 2009, groundwater usage was relatively consistent. As the drought continued and farmers became increasingly aware that surface water was not guaranteed, more water wells were drilled and groundwater usage increased (figure 5) in order to compensate for the lack of surface water. The number of irrigation wells present in the Lakeside Irrigation District area in Colorado County has increased from seven (7) prior to 2012 to 26 as of mid 2014. This dramatic increase in high-rate wells has started to put a strain on the aquifer in the area south and east of Eagle Lake.

The amount of water use from other user groups pales in comparison to irrigation. The next largest user groups are mining and municipal. Water use from mining is due to the prolific gravel operations in the county. Owing to the relatively small population of Colorado County, municipal use is on the same scale. For a complete listing of water user group usage from year 2000 through 2011, see Appendix C1.

CHAPTER 4 – WATER BUDGET

SECTION 4.1 – Overview of Statutory Requirements

According to §36.1071(e)(3)of the Texas Water Code, the district management plan shall include estimates of the following: the amount of recharge from precipitation, if any, to the groundwater resources within the district; for each aquifer, the annual volume of water that discharge from the aquifer to the springs and any surface water bodies, including lakes, streams, and rivers; and, the 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.

Furthermore, according to §36.1071(h) of the Texas Water Code, in developing its management plan, the district shall use the groundwater availability modeling information provided by the executive administrator of the TWDB together with any available site-specific information that has been provided by the district to the TWDB executive administrator for review and comment before being sued in the plan.

SECTION 4.2 – Overview of the Model

The groundwater availability model (GAM) for the central portion of the Gulf Coast Aquifer System was run for this analysis. Assumptions and limitations of the model can be found form Chowdhury et al., (2004).

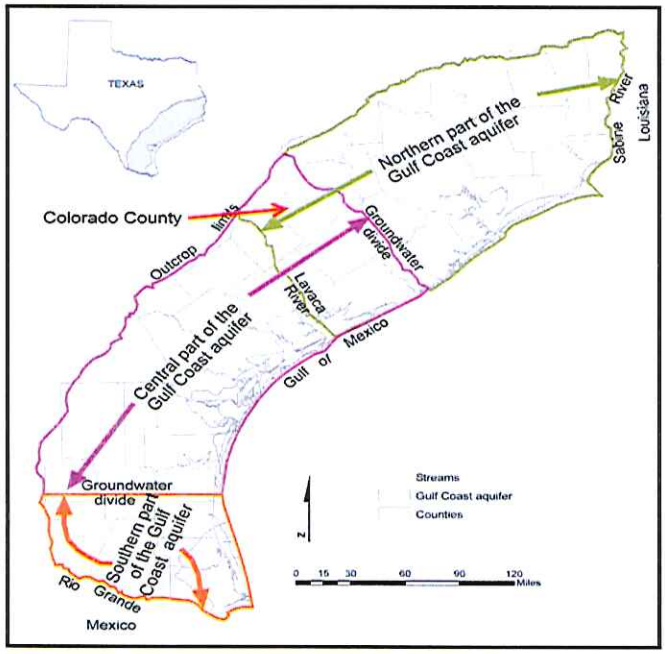

Figure 6: Map showing the groundwater model areas for the northern, central and southern parts of the Gulf Coast Aquifer (Chowdhury and Mace, 2006). Red arrow designates the location of Colorado County.

The GAM that covers the central portion of the Gulf Coast Aquifer System extends from just past the northeastern Colorado County boundary southward along the coast to the middle of Jim Hogg, Brooks and Kennedy counties (figure 6). The model comprises four layers which generally correspond as follows: Chicot Aquifer (Layer 1), Evangeline Aquifer (Layer 2), Burkeville Confining Unit (Layer 3), and the Jasper Aquifer and parts of the Catahoula Formation (Layer 4) (Goswami, 2013).

For the purposes of this report, the water budget will be concerned with the study of the Gulf Coast Aquifer in a study area that encompasses Colorado County. Figure 7 shows the model grid configuration over the subject area.

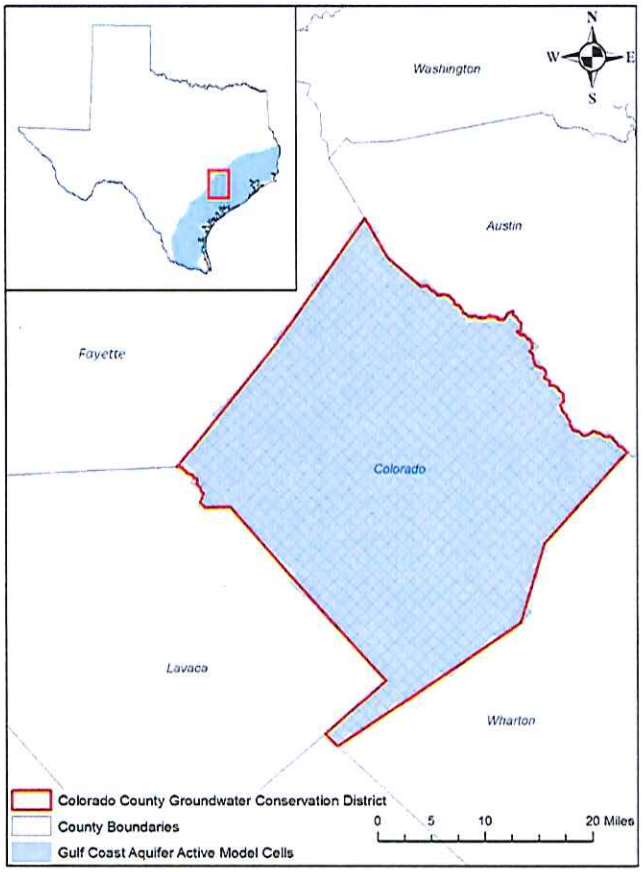

Figure 7: Map showing the grid cells used in GAM Run 13-027 to calculate results depicted in Appendix D (altered slightly from Goswami, 2013).

GAM Run 13-027 provides the most recent methods, assumptions, and results from a model run for Colorado County using the groundwater availability model for the central portion of the Gulf Coast Aquifer System. This model run replaces the results of GAM Run 09-009 (Oliver, 2009) used in the District's 2009 management plan.

SECTION 4.3 – Model Results

Copious data is incorporated into the TWDB groundwater computer simulation model in order to obtain reliable outputs. The results of the GAM runs help to understand recharge, discharge, groundwater-surface interactions, and cross-formational flow through the aquifer (Chowdhury et al., 2004). Though these models tend to be more reliable on a regional scale, the information provided on a county scale is still the best estimate available for determining important groundwater interactions.

The aquifer is impacted by movements of water into, through, and out of a particular study area – in this case, Colorado County. Prior to development (i.e. before pumping commenced), a steady-state system existed where the water that entered the aquifer, dominantly from recharge, was balanced by water that exited the aquifer. Once pumping commenced, the system entered into a transient state where, for some period of time, more water was leaving the system than was entering it. Over time, water is released from storage and another steady-state system may develop.

Table 2 below shows the model results of groundwater movement through the Gulf Coast Aquifer in and around Colorado County. Appendix D includes the entire report for GAM Run 13-027.

Management Plan Requirement	TX Water Code Requirement	Aquifer or Confining Unit	Results
Estimated annual amount of recharge from precipitation to the district	Sec. 36.1071.e.3.C	Gulf Coast Aquifer System	34,764
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Sec. 36.1071.e.3.D	Gulf Coast Aquifer System	11,412
Estimated annual volume of flow into the district within each aquifer in the district	Sec. 36.1071.e.3.E	Gulf Coast Aquifer System	18,088
Estimated annual volume of flow out of the district within each aquifer in the district	Sec. 36.1071.e.3.E	Gulf Coast Aquifer System	36,968
Estimated net annual volume of flow between each aquifer in the district	Sec. 36.1071.e.3.E	From underlying units into the Gulf Coast Aquifer System	185

Table 2: Output from GAM Run 13-027 (Goswami, 2013) and the associated Texas Water Code requirement being fulfilled. Results are in acre-feet per year.

CHAPTER 5 – AVAILABILITY, DEMAND AND ASSOCIATED STRATEGIES

SECTION 5.1 – Projected Surface Water Supply

Section 36.1071(e)(3)(F) of the Texas Water Code states that the district's management plan shall include estimates of 'the projected surface water supply in the district' according to the most recently adopted state water plan. Colorado County is within the Lower Colorado Regional Water Planning Group commonly designated as Region K (figure 8). Each regional water group supplies their specific assessments to TWDB for incorporation into the state water plan.

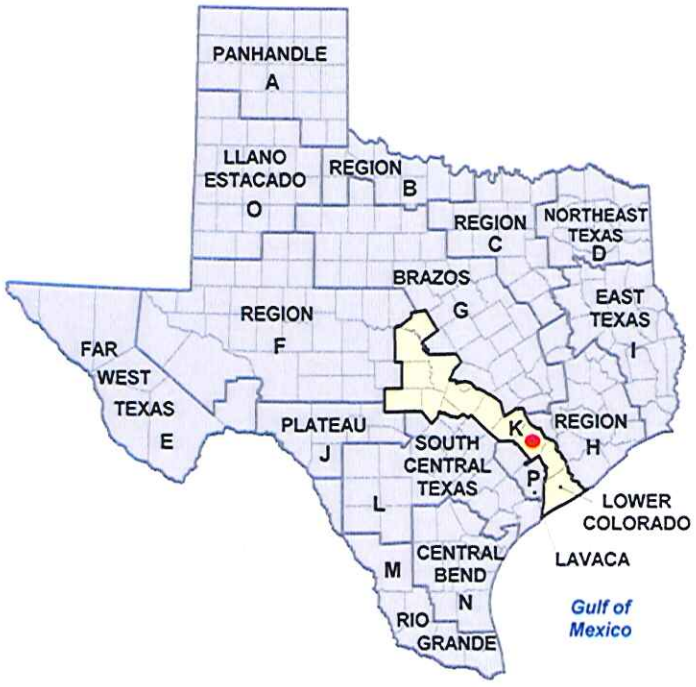

Figure 8: Map showing location of Region K relative to other regional water planning groups (Lower Colorado Regional Water Planning Group, 2010). Red dot designates the location of Colorado County.

Projected surface water supplies are the maximum amount of surface water available from existing sources for use during drought of record conditions that is physically and legally available for use. These are the existing surface water supply volumes that, without implementing any recommended water management strategies, could be used during a drought by water user groups located within the specified geographic area (Allen, 2014; TWDB, 2012).

Surface water sources include any water resources where water is obtained directly from a surface water body. This would include rivers, streams, creeks, lakes, ponds, and tanks. In the State of Texas, all waters contained in a watercourse (rivers, natural streams, and lakes, and the storm water,

flood water, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed) are waters of the State and thus belong to the State. The State grants individuals, municipalities, water suppliers, and industries the right to divert and use this water through water rights permits. Water rights are considered property rights and can be bought, sold, or transferred with state approval. These permits are issued based on the concept of prior appropriation, or "first-in-time, first-in-right". Water rights issued by the State generally fall into two major categories: run-of-river (ROR) rights and stored water rights (Lower Colorado Regional Water Planning Group, 2010).

In addition to the water rights permits issued by the State, individual landowners may use state waters without a specific permit for certain types of uses. The most common of these uses is domestic and livestock use. These types of water sources are generally referred to as "Local Supply Sources". Many individuals with land along a river or stream that still have an old riparian right can also divert a reasonable amount of water for domestic and livestock uses without a permit (Lower Colorado Regional Water Planning Group, 2010).

Three basins intersect Colorado County – Colorado; Brazos-Colorado; and Lavaca (figure 9).

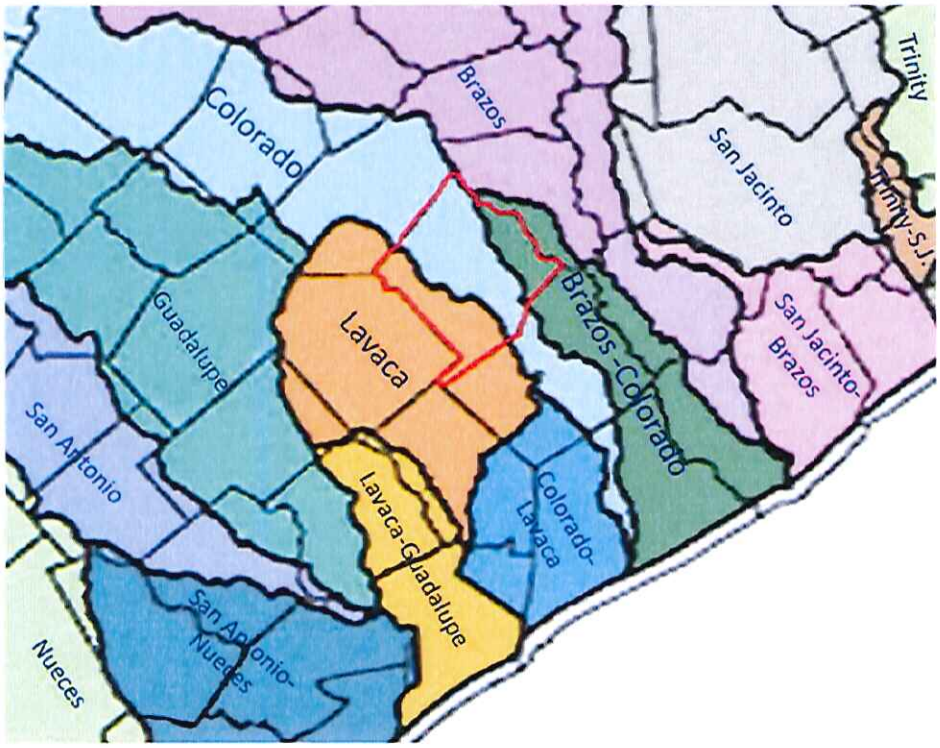

Figure 9: Map showing designated river basins in the region around Colorado County (outlined in red). Modified from Meyers/TWDB, 2002.

While the Colorado River Basin is broad and encompasses most of the Region K counties to the north, the basin starts to narrow considerably in Colorado County and southward. In Colorado

County, the basin comprises less than half the county. The primary source of water within this basin are the two water storage reservoirs in the Highland Lakes System (Lakes Travis and Buchanan) located northwest of Austin and run-of-river water from the Colorado River.

Within each of the three Colorado County basins, irrigation is the dominant water user group. The Garwood and Lakeside Irrigation Districts in Colorado County typically have access to run-of-river and supplemental interruptible supplies form the Highland Lakes. LCRA, as the major provider of surface water in the county, designates how much interruptible water supply can be made available during a repeat of a drought of record while continuing to ensure availability of water to firm customers. This is done through use of a system of curtailment triggers that are linked to actual water in storage. As firm commitments and demands for water under those commitments increase over time, interruptible supplies must be reduced more often even at higher storage levels to ensure availability of water to firm customers even in a drought of record (Lower Colorado Regional Water Planning Group, 2010). Ongoing regional drought conditions have severely impacted the reservoir lake levels at Buchanan and Travis to a storage capacity and lake level that were below the curtailment triggers designated by LCRA. As a result, stored water has not been made available to farmers in Colorado County relying on water from the irrigation districts for three consecutive years (2012-2014). Irrigation districts do have major run-of-river rights in the Colorado River Basin, but access to the water is based on a priority system where senior rights have fist call on water. Because the Garwood Irrigation District has the most senior rights of any on the river, it has had access to river water during the ongoing drought. The Lakeside Irrigation District however has had no river water access since 2011.

Within Region K, the Lavaca River Basin is the most extensive in Colorado County encompassing more than a third of the county (figure 9), primarily to the west and southwest. Surface water sources are limited to local sources since there are no major reservoirs in this portion of the Lavaca River Basin and no water user groups that have rights to water from reservoirs in the Lavaca River Basin. However, many farmers (primarily rice) that are located with the Lavaca River Basin are part of the Garwood Irrigation District and as such access run-of-river rights from the Colorado River through purchases from LCRA. Because of this, the largest single water user group in Colorado County is irrigation from users located in the Lavaca River Basin (Appendix C2).

The third basin within Colorado County is the Brazos-Colorado Coastal Basin which comprises less than 20% of the county (figure 9), primarily to the east. As with the Lavaca River Basin, surface water sources are limited to local sources since there are no major reservoirs within the Colorado County portion of the Brazos-Colorado Coastal Basin. A significant number of farmers in the Lakeside Irrigation District are located within the Brazos-Colorado Coastal Basin and therefore to have access to run-of-river rights from the Colorado River through purchases from LCRA. The second largest water user group in Colorado County is irrigation from users located in the Brazos-Colorado Coastal Basin (Appendix C2).

Irrigation, livestock, manufacturing and mining comprise the water user groups that are supplied surface water. No municipal usage in the county is supplied from surface water. Appendix C2 contains the projected surface water supplies for Colorado County as recorded in the 2012 State Water Plan.

SECTION 5.2 – Projected Total Water Demand

Section 36.1071(e)(3)(G) of the Texas Water Code states that the district's management plan shall include an estimate of 'the projected total demand for water in the district according to the most recently adopted state water plan.'

Projected surface water demands are the quantity of water projected to meet the overall necessities of a water user group in a specific future year. These are not water demand volumes as projected for specific water user groups in the 2011 Regional Water Plans. Also, this is not groundwater pumpage or demand based on any existing water source. This demand is how much water each water user group is projected to require in each decade over the planning horizon (Lower Colorado Regional Water Planning Group, 2010).

During assessments of water demand for Region K, the planning group was understandably focused heavily on population projections since urban areas in and around Austin are projected to more than double over the next 60 years. However, owing to the relatively small population of Colorado County and projected modest growth rate, the associated water demand was overshadowed by water demands for irrigation (Appendix C3).

As discussed in previous sections, farming is a key economic driver for Colorado County. The southern portion of Colorado County by far has the bulk of the agricultural water use and is similar to Wharton County to the south. By contrast, northern Colorado County has minimal agricultural water use that is on par with Fayette County to the north. Table 3 shows a comparison of Colorado with the adjacent counties.

County	2010 (ac-ft/yr)	2020 (ac-ft/yr)	2030 (ac-ft/yr)	2040 (ac-ft/yr)	2050 (ac-ft/yr)	2060 (ac-ft/yr)
Fayette	739	692	648	606	568	533
Colorado	200,822	192,465	184,380	176,555	168,946	161,663
Wharton (p)	182,985	176,441	170,127	164,044	158,177	135,911

Table 3: Projected irrigation demand based on 2012 State Water Plan for Colorado and adjacent counties to the north and south. (p) - only the portion of Wharton County within Region K reported in table. From the 2012 State Water Plan (TWDB, 2012).

The most common crop type in Colorado County is rice which requires significant water for growth. Though irrigation demand over the next 60 years will continue to far exceed other projected water

user groups, demand is expected to decrease over that span. This decrease is expected due to improvements in irrigation efficiency and reductions in irrigation acreage due to forecasted unfavorable farming economics. However, since irrigation demand is still an order of magnitude greater than the next largest water user group, mining, the overall water demand trend for the county, largely mirrors the trend for irrigation demand (table 3).

Water-User Group	2010 (ac-ft/yr)	2020 (ac-ft/yr)	2030 (ac-ft/yr)	2040 (ac-ft/yr)	2050 (ac-ft/yr)	2060 (ac-ft/yr)
Irrigation	200,822	192,465	184,380	176,555	168,946	161,663
Municipal	3,155	3,292	3,328	3,259	3,320	3,409
Mining	20,804	21,197	21,416	21,623	21,821	21,996
Manufacturing	176	192	205	217	227	245
Steam Electric	0	0	0	0	0	0
Livestock	1,473	1,473	1,473	1,473	1,473	1,473
Total Demand	*226,430*	*218,619*	*210,802*	*203,127*	*195,787*	*188,786*

Table 3: Projected WUG demand for Colorado County based on 2012 State Water Plan. Note that County-Other is included in the Municipal numbers. See Appendix C3 (Allen, 2014; TWDB, 2012).

SECTION 5.3 – Projected Total Water Supply Needs

Section 36.1071(e)(4) of the Texas Water Code states that the district's management plan shall 'consider the water supply needs...included in the adopted state water plan.'

Water supply needs are the projected water demands in excess of existing water supplies for a water user group or a wholesale water provider. These are the volumes of water that results from comparing each Water User Group's projected existing water supplies to its projected water demands. If the volume listed is a negative number, then the Water User Group shows a projected need during a drought if they do not implement any water management strategies. If the volume listed is a positive number, then the Water User Group shows a projected surplus. Note that if a Water User Group shows a need in any decade, then they are considered to have a potential need during the planning horizon, even if they show a surplus elsewhere (Allen, 2014; TWDB, 2012).

Appendix C4 shows a listing of the projected water supply needs for Colorado County for each water user group. Of the 18 water user groups designated, ten show a projected surplus. The remaining eight show a negative number which indicates a projected need during a drought. Of the eight showing a water need, five show relatively minor deficits while the remaining three indicate sizable deficits.

As might be expected, the two largest deficits are related to irrigation. The third largest deficit is related to mining use. Of the eight municipal users, which include the cities of Columbus, Eagle

Lake and Weimar and the rural areas in each of the basins, seven show a surplus. Only the rural area in the Lavaca River Basin (designated as county-other in Appendix C4) shows a small deficit. Livestock usage also shows a tiny deficit in the Colorado and Lavaca River Basins.

WUG Group Need	2010 Needs	2020 Needs	2030 Needs	2040 Needs	2050 Needs	2060 Needs
County-Other	(105)	(109)	(106)	(97)	(93)	(90)
Irrigation	(49,300)	(42,090)	(35,089)	(28,312)	(21,723)	(15,416)
Livestock	(25)	(25)	(25)	(25)	(25)	(25)
Mining	(8,569)	(8,079)	(7,246)	(6,111)	(4,692)	(4,867)
Total Needs	(57,999)	(50,303)	(42,466)	(34,545)	(26,533)	(20,398)

Table 4: Water needs designated by water user group for Colorado County. Units in ac-ft/yr. Data from Appendix C4 (Allen, 2014; TWDB, 2012).

SECTION 5.4 – Water Management Strategies

Section 36.1071(e)(4) of the Texas Water Code states that the district's management plan shall 'consider the...water management strategies included in the adopted state water plan.'

A projected water management strategy is a specific project or action to increase water supply or maximize existing supply to meet a specific need. Each water need identified in the previous section, regardless of how large or small and regardless of when during the planning horizon, is required to have at least one identified water management strategy that will provide the additional water to fully serve the projected need.

Many water management strategies are straightforward. For Colorado County, the water management strategies basically fall into one of four categories: conservation; groundwater development; return flows; and, run-of-river rights.

One of the most common means of conservation for irrigation water usage is through on-farm conservation. Rice is the dominant crop type in Colorado County and because it is grown in standing water, it utilizes significantly more water than other Texas crops because of the growing environment. For rice, significant water savings can be achieved through the use of precision land leveling, multiple field inlets, and reduced levee intervals (Lower Colorado Regional Water Planning Group, 2010). The development of high yielding/water efficient rice varieties is another conservation strategy to be employed for Colorado County. A third conservation means for irrigation is improvements of the conveyance operations. As water is conveyed from the river through the irrigation district canal systems, water is typically lost through evaporation and transpiration. Water losses may be lessened by removing brush, grass and weeds along the canal system, lining canals to prevent growth of unwanted plants and automating the system to more readily feed water into the

desired location.

A second key water management strategy is further utilization of groundwater. These strategies are geared not only toward needs in irrigation, but also for mining, livestock, and municipal uses. Increased utilization of groundwater is expressed as either expansion of the Gulf Coast Aquifer, conjunctive use of groundwater with surface water, or development of another aquifer. Expansion of the Gulf Coast Aquifer would mean pumping more groundwater from the aquifer, either using existing wells or by drilling additional wells. Development of 'other aquifer' would refer to targeting the shallow alluvium and related terrace deposits of the Colorado River as a source of groundwater. Another strategy would be conjunctive use of groundwater. During times of drought or unusually high need, groundwater would be used to supplement surface water sources (Lower Colorado Regional Water Planning Group, 2010).

The third key overarching water management strategy that applies to Colorado County is utilization of return flows. These water management strategies typically address needs for irrigation in Colorado County. Approximately 60% of all municipal diversions by the City of Austin (COA) and others are currently returned to the Colorado River as effluent discharges and unless are subject to diversion under existing water rights' permits. After meeting environmental flow requirements, the remaining COA return flows were made available to meet all downstream demands, including irrigation demands in Colorado County (Lower Colorado Regional Water Planning Group, 2010). In addition to COA, return flows for the City of Pflugerville and the Aqua Water Supply Corporation (Bastrop area) were taken into consideration. This return is represented in the water management strategies as 'downstream return flows'.

The most convoluted impact water management strategies involve run-of-river rights and their impact on irrigation. There are references in the 2012 State Water Plan to the now defunct LCRA/SAWS water project (LSWP). Though the project is no longer under consideration, there are components of it that can be utilized as a water management strategy. One of these is diverting run-of-river water into an off-channel reservoir. The plan also assumes that there will be a negative impact from LSWP in 2060 (Appendix C5).

Due to growth in municipal, manufacturing and steam electric water use, LCRA has had to amend their water management plan to provide for these additional firm customers. While this may be a positive water management strategy that addresses those firm water needs, there is an associated negative impact on interruptible surface water supplies to the lower counties (including Colorado County) for irrigation purposes. This scenario has occurred in the lower Colorado River Basin as farmers in most irrigation districts have had access to LCRA-supplied surface water cutoff to them in 2012, 2013 and 2014. Additional water management strategies must therefore be formulated to overcome the additional anticipated deficit due to the projected reduction in interruptible water supplies to farmers in Colorado County and counties south (Appendix C5).

CHAPTER 6 – MANAGEMENT OF GROUNDWATER SUPPLIES

SECTION 6.1 – Implementation of District Rules & Policies

The Texas Legislature has determined that groundwater conservation districts are the state's preferred method of groundwater management (Texas Water Code, §36.0015). The Colorado County Groundwater Conservation District (CCGCD) shall manage the use of groundwater in order to protect, preserve, conserve, and prevent waste of the resource while seeking to maintain the economic viability of all resource user groups, public and private, through the rules developed and implanted in accordance to the statutory authority granted in Chapter 36 of the TWC and within the guidelines set forth in the District's enabling legislation.

The rules of the CCGCD were written with the intent to give all landowners a fair and equal opportunity to use the groundwater resource underlying their property for beneficial purposes. It will be the policy of the District to educate constituents of their responsibility for groundwater conservation and to employ regulation only as required to fulfill the District's mission statement and guiding principles. The District will manage the groundwater resources of Colorado County as practically as possible and will give strong consideration to the economic and cultural activities which occur within the District and which rely upon the continued use of groundwater.

This document is intended to be used as a tool to provide continuity in the management of the District. It will be used by CCGCD staff as a guide to insure that all aspects of the goals of the District are carried out. The management plan will also be referenced by the Board for future planning for the District. The Board may modify this document and re-submit it to the Texas Water Development Board (TWDB), should conditions warrant it.

The goals, objectives and performance standards put forth in this planning document have been set at a reasonable level in consideration of existing and future fiscal and technical resources. Conditions may change which could cause a change in the management objectives defined to reach the stated goals. The following guidelines will be used to insure that the management objectives are set at a sufficient level to be realistic and effective:

- The constituency of Colorado County will appraise the District's overall performance in the process of electing or re-electing Board members;
- The interests and needs of the District's constituency shall control the direction of the management of the CCGCD;
- The CCGCD will endeavor to maintain local governmental control of the privately owned resources over which the District has jurisdictional authority;
- The General Manger of the CCGCD will have day-to-day authority over the District's operations and will be wholly accountable to the Board of Directors;

- The Board will evaluate District activities on a fiscal year basis (January 1 through December 31). Any reference to the terms annual, annually or yearly will refer to the fiscal year of the District.

SECTION 6.2 – Guiding Principles

The CCGCD was formed with the belief that the ownership and pumpage of groundwater is a private property right. It is understood however, that through the confirmation election of the District, the landowners relinquish some of their control over that right for the collective benefit of the community which the District serves.

The CCGCD will monitor water levels in wells, meter high-capacity wells and require annual water usage data from non-exempt wells in order to more accurately assess ongoing demands and remaining supplies. The monitor and usage data will allow the District to take preventive action to avoid drastic changes in water level that could severely impact local municipalities, business, farmers and rancher. The District has adopted rules to regulate groundwater withdrawals by means of spacing and/or production limits. In the event there is evidence of a significant drawdown of the water table, the District may declare a Critical Groundwater Depletion Area and adopt different rules for those areas.

The District shall have responsibility to monitor water quality and ensure that groundwater resources are not contaminated or polluted. To help accomplish this, the District may establish a water quality monitoring network. The CCGCD will formulate and enforce rules that require suspended wells to be properly capped and may further incentivize owners to plug wells that are abandoned or deteriorated.

Using the regulatory tools granted by Chapter 36 to preserve and protect the existing and historic users of groundwater within the District,

The CCGCD may adopt rules that protect historic use of groundwater in Colorado County to the maximum extent practical and consistent with this plan. Under the regulatory tools granted by Chapter 36 to preserve and protect the existing and historic users of groundwater within the District, CCGCD may impose more restrictive conditions on non-historic use permits.

CHAPTER 7 – IMPLEMENTATION OF THE MANAGEMENT PLAN

SECTION 7.1 – Actions, Procedures, Performance and Avoidance for Plan Implementation

The District will use the Management Plan to guide the District in its efforts to preserve and protect the groundwater resources of Colorado County and for determining the direction and priority of district activities. Operations of the District, agreements entered into by the District and planning efforts in which the District may participate will be consistent with the provisions of this plan.

The CCGCD will implement the provisions of this management plan through the application of rules consistent with the management plan, using it as a guide to its principles and policies. Rules adopted by the District shall comply with Chapter 36 of the Texas Water Code and the provisions of this management plan. Promulgation and enforcement of the rules will be based on the best technical evidence available to the District. The District may amend the rules as necessary to insure the best management practices of the groundwater in the District and/or to comply with changes to Chapter 36 of the Texas Water Code. A copy of the District rules are available at the following website address: http://www.ccgcd.net/1392.html.

The District will seek cooperation from municipalities, water supply companies, irrigators, and all other users of groundwater pumped in Colorado County in the implementation of this plan and the management of groundwater supplies within the District. The CCGCD also will seek to cooperate and coordinate with state and regional water planning authorities and agencies and adjacent groundwater conservation districts. The CCGCD is committed to work and plan cooperatively with other GCDs in GMA 15. While managing the supply of groundwater within the district, CCGCD will account for the desired future conditions and modeled available groundwater derived from the GMA 15 planning process.

The CCGCD will treat all citizens equally. Citizens may apply to the District for discretion in enforcement of the rules on grounds of adverse economic effect or unique local conditions. The Board shall consider the potential adverse effect on adjacent landowners in granting any discretionary ruling. Exercise of its discretion should not be construed as limiting the power and authority of the CCGCD.

SECTION 7.2 – Tracking Performance

An annual report will be prepared and presented to the Board of Directors on District performance with regard to achieving management goals and objectives. The presentation of this report will occur within 120 days of the end of each fiscal year. The Annual Report will be prepared in a format that

will be reflective of the performance standards listed following each management objective. A copy of the annual audit of District financial records will also be presented to the Board. The District will maintain the reports on file for public inspection at the District's office upon adoption.

CHAPTER 8 – MANAGEMENT GOALS, OBJECTIVES AND PERFORMANCE STANDARDS

The CCGCD management plan shall address the goals, as applicable and specified by the Texas Water Code (§36.1071). Additionally, the management plan shall identify the management objectives and performance standards under which the District will operate to achieve the management goals identified.

Upon completion, the CCGCD management plan will be forwarded to Regional Water Planning Group K and Groundwater Management Area 15 member districts for use in their planning process (TWC, §36.1071(b)).

SECTION 8.1 – Goal 1: Providing for the Most Efficient Use of Groundwater (TWC §36.1071(a)(1))

Subsection 8.1.1 – Maintain a Well Registration Process

Management Objective – The CCGCD requires all exempt and non-exempt wells to be registered with the District and has the authority to impose fines against those who do not register their wells. District staff will at least twice annually report to the Board the number of historic and new well registrations for the year to date and the number of violations and associated fines for failure to register.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The number of reports on registration to the Board each year;
- The number of historical and current well registrations in the District; and,
- The number of registration violations and the associated fines.

Subsection 8.1.2 – Maintain a Well Permitting Process

Management Objective – The CCGCD requires all active non-exempt wells be permitted with the District. CCGCD staff will disclose to the Board at least twice annually, the number of permit applications, the number of permits granted and the number of permits pending. During these reports, staff will also report the associated total permitted amount. The District will impose fines as necessary to ensure adherence to District rules regarding permitting requirements. Staff will report the number of permit violations and associated fines.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The number of reports to the Board regarding permitting;
- The number of permit applications received and permits granted each year;

- The amount of associated permit volume for permits granted;
- The number of permits pending at year-end; and,
- The number and amount of fines imposed each year as a result of failure to permit.

Subsection 8.1.3 – Maintain a Well Metering Program and Enforce Rules Regarding Water Usage Reporting

Management Objective – CCGCD requires that Class C permit holders (wells with the capacity to pump more than 600 gpm) install meters on their wells unless exempted by the CCGCD Board. Additionally, Class C permit holders are required to report water usage annually at year end. CCGCD has the authority to impose fines against those who fail to meter their Class C wells or to report usage within the required timeframe.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The number of wells required to be metered and the number of wells actually metered;
- The total groundwater usage of Class C wells; and,
- The number of violations and total fines assessed as a result of not metering or failing to report usage.

SECTION 8.2 – Goal 2: Controlling and Preventing Waste of Groundwater (TWC §36.1071(a)(2))

Subsection 8.2.1 – Set and Enforce Spacing Requirements and Pumpage Regulations

Management Objective – In order to minimize the potential for waste of groundwater resources, the CCGCD shall mandate minimum spacing regulations from water production wells form property lines and from each other. For non-exempt wells, spacing form existing wells shall be defined by the pumpage rate put forth in the permit application. The CCGCCD also clearly establishes on the permit a maximum amount to be pumped over the course of the permit period. District staff will investigate and report to the Board all instances where spacing regulations were not followed and where pumpage exceeded the amount allowable.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The annual number of site visits to inspect wells; and,
- The annual number of notices and violations of District rules regarding well maintenance and/or groundwater waste.

Subsection 8.2.2 – Maintain a Water Well Inspection Program for Non-Exempt Wells

Management Objective – The District will monitor and communicate to well owners any indications of inefficiency in well operations that might cause waste of groundwater as defined in Appendix A.

The CCGCD staff will report to the Board at least annually, the number of site visits to check equipment and the number of notices and violations of District rules regarding waste.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The annual number of site visits to inspect wells; and,
- The annual number of notices and violations of District rules regarding well maintenance and/or groundwater waste.

Subsection 8.2.3 – Disseminate Information on Waste Prevention

Management Objective – In conjunction with efforts in water conservation, the CCGCD will implement a waste prevention program with the purpose of educating constituents of the District on ways to prevent waste of groundwater. The District staff at least once annually shall give notice to the public of ways to prevent waste of groundwater in one or more of the following ways: updates on the District website or District Facebook page; presentations to civic or governmental groups; articles in newspapers or newsletters; or by making available appropriate brochures.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The number of notices to the public of ways to prevent groundwater waste.

SECTION 8.3 – Goal 3: Addressing Conjunctive Surface Management Issues (TWC §36.1071(a)(4))

Subsection 8.3.1 – Participation in Regional Planning Processes

Management Objective – CCGCD is wholly within the Lower Colorado River Planning Group (Region K). Each year that the regional water planning process is underway, the District will attend at least one Region K meeting.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- Number of Region K meetings held and attended by a District representative each year.

Subsection 8.3.2 – Work with LCRA to Promote Positive Conjunctive Water Management Projects

Management Objective – The CCGCD will work with LCRA and appropriate government agencies to advance projects that might protect and/or supplement groundwater resources in the area. To help accomplish this, District staff will routinely monitor LCRA conjunctive water projects that might impact CCGCD and report the appropriate news to the Board at least twice annually. District representatives will attend at least one LCRA Regional Council meeting.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The number of updates to the CCGCD Board regarding LCRA conjunctive use projects; and,
- The number of LCRA regional council meetings attended.

Subsection 8.3.3 – Identify and Address Legislative Policies that Might Affect Groundwater Resources

Management Objective – The CCGCD staff regularly uses TAGD as a means to monitor Texas State legislative and judicial activity regarding groundwater issues. Staff will present to the Board at least twice annually while the Texas legislature is in session, updates on legislative and judicial activities that may impact CCGCD constituents. The District Board will pass resolutions, as needed, to help influence the formulation of legislative policies that might positively impact the District.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The number of updates to the Board of groundwater related legislative policies; and,
- The total number of resolutions passed by the Board and/or testimonies given that was meant to influence legislative policy.

SECTION 8.4 – Goal 4: Addressing Natural Resource Issues (TWC §36.1071(a)(5))

Subsection 8.4.1 – Establish and Maintain a Water-Quality Monitoring Program

Management Objective – Within five years of management plan approval, the CCGCD will establish a water-quality monitoring network consisting of at least three wells. Additionally, CCGCD will act on all reasonable requests from constituents involving water quality concerns. Once established, the CCGCD staff will report to the Board at least once annually, the number of samples collected and analyzed and a synopsis of the associated results.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The number of water-quality monitoring wells;
- The number of samples collected and analyzed;
- A synopsis of results highlighting any areas where contamination has been reported or discovered; and,
- The number of actions taken regarding water quality issues submitted by constituents.

Subsection 8.4.2 – Enforce Proper Maintenance of Suspended Wells and Encourage Plugging of Abandoned Wells

Management Objective – The CCGCD may inspect suspended and abandoned wells to ensure proper closing of wells in accordance to rules set forth by CCGCD. Notices will be sent and fines may be assessed against well owners whose wells do not adhere to District Rules. In order to incentivize well owners with abandoned wells to plug them, the District will maintain a rebate program whereby well owners can recover some of the cost of plugging their wells.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The number of notices sent out and possible fines assessed to well owners or operators concerning violations of District rules;
- The number of wells plugged each year;
- The number of plugging assistance requests each year; and,
- The annual amount of District money rebated to well owners requesting well plugging assistance.

Subsection 8.4.3 – Monitoring Mining and Oil & Gas Operations

Management Objective – The CCGCD staff will monitor the Texas Railroad Commission (RRC) and other appropriate databases to determine any new locations of salt water disposal wells and the location of wells that are being hydraulically fracture stimulated. District staff will also monitor new gravel mining operations. CCGCD staff will report to the Board at least annually, any new salt water or waste disposal wells in Colorado County, and any wells scheduled for fracking and any new gravel operations. The CCGCD staff will further report any violations for failure to permit groundwater wells in support of hydraulic fracking operations.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The number of new salt water or waste water disposal or injection wells in Colorado County;
- The number of groundwater wells being used to support fracking operations;
- The number of violations for failure to permit wells being sued in support of fracking operations; and
- The number of new gravel mining operations in Colorado County.

SECTION 8.5 – Goal 5: Addressing Drought Conditions (TWC §36.1071(a)(6))

Subsection 8.5.1 – Collect and Review Drought Condition Information

Management Objective – CCGCD will track information on weather, precipitation and drought data on the TWDB drought page (http://waterdatafortexas.org/drought/) and other key sites and post key

information and links on the District website at least annually. Extreme drought information will be posted on the CCGCD Facebook page on an as-needed basis.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- At least once annually, update the CCGCD website to reflect the latest drought index and precipitation totals; and,
- Provide periodic updates to the CCGCD Facebook page during times of extreme drought.

SECTION 8.6 – Goal 6: Addressing Conservation, Rainwater Harvesting and Brush Control (TWC §36.1071(a)(7))

Subsection 8.6.1 – Protect Exempt Usage from High Capacity Wells

Management Objective – District staff shall enforce the following District rules that were implemented to protect offset exempt usage: requiring high capacity wells to be screened in deeper intervals; requiring offset high capacity wells to be spaced a sufficient distance away from exempt wells; and, requiring permit applications requesting more than 1000 ac-ft average annual pumpage to provide a conservation plan. Violations will be reported to the Board as they occur.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The number of violations and associated fines regarding spacing rules;
- The number of violations and associated fines regarding failure to adhere to minimum screening depths; and,
- The number of hydrogeological studies, mitigations plans and conservation reports required by the District.

Subsection 8.6.2 – Establish a Program to Emphasize Water Conservation

Management Objective – In coordination with efforts in waste prevention, the CCGCD will implement a conservation program with the purpose of educating the constituents of the District on ways to conserve water. The District staff at least once annually shall give notice to the public of ways to prevent waste of groundwater in one or more of the following ways: updates on the District website or District Facebook page; presentations to civic or governmental groups; articles in newspapers or newsletters; or by making available appropriate brochures.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The number of notices to the public of ways to prevent groundwater waste.

Subsection 8.6.3 – Monitor Potential Ways to Emphasize Rainwater Harvesting and Brush Control

Management Objective – The CCGCD staff will keep abreast of brush control and rainwater harvesting technologies and make that information available at least once annually, to the constituents of the District through brochures, Facebook announcements or website links.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The number of web updates, Facebook announcements or brochures made available each year.

SECTION 8.7 – Goal 7: Addressing the Desired Future Conditions (TWC §36.1071(a)(8))

Subsection 8.7.1 – Expand and Maintain a Water Level Monitoring Program

Management Objective – The CCGCD will expand and maintain a District water-level monitoring network. By year-end 2018, the program will expand from 12 to 15 wells. The depth to the water level will be measured at least annually and results will be recorded in the District's database.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The number of new CCGCD monitor wells established by year-end 2018; and,
- The number of times each monitor well was measured each calendar year.

Subsection 8.7.2 – Analyze Water Level Data for Adherence to DFC

Management Objective – At least once at year-end, charts will be constructed of each CCGCD monitor well showing the changes in water level through time. The data and charts for the CCGCD monitor wells will be updated on the District website at least annually. The District will also chart TWDB monitor wells within Colorado County. At least once annually, this data will be assimilated to determine compliance with the desired future conditions (DFC) of the Gulf Coast Aquifer in Colorado County.

Performance Standard – The following will be the expected key metrics used to measure progress of management objectives:

- The number of graphic displays (charts) generated for CCGCD monitor wells;
- The number of District website updates of CCGCD monitor well data; and,
- An annual comparison of water level changes compared to the CCGCD DFC.

SECTION 8.8 – Management Goals Not Applicable to the District (TWC §36.1071(a))

The management goal specified in TWC §36.1071(a)(3), 'controlling and preventing subsidence', is not applicable to the District at this time since there is no indications of significant subsidence in the area. CCGCD will periodically monitor publications and surrounding districts for evidence of subsidence.

Additionally, the time allocation and associated cost was deemed prohibitive for CCGCD for the 'recharge enhancement' and 'precipitation enhancement' goals as specified in TWC §36.1071(a)(7).

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APPENDIX A – Definitions, Acronyms and Abbreviations

DEFINITIONS

- ***Abandoned well*** – a well that has not been used for six consecutive months. A well is considered to be in use in the following cases:
    - A non-deteriorated well which contains casing, pump, and pump column in good condition; or,
    - A non-deteriorated well which has been capped.
- ***Acre-foot*** – the volume of water necessary to cover one acre of land one foot deep. Equivalent to about 325,851 gallons.
- ***Alluvium*** – an unconsolidated terrestrial sediment composed of sorted or unsorted sand, gravel, and clay deposited by water from rivers, streams or tributaries.
- ***Aquifer*** – a geologic formation that contains sufficient saturated permeable material to yield water to a spring or well in sufficient quantities to make the production of water from this formation feasible for beneficial use. The formation could be sand, gravel, limestone, sandstone, or fracture igneous rocks. **
- ***Beneficial purpose*** – use for:
    - Agriculture, gardening, domestic, stock raising, municipal, mining, manufacturing, industrial, commercial, recreational, or pleasure purposes;
    - Exploring for, producing, handling, or treating oil, gas, sulfur, or other minerals;
    - Any other purpose that is useful and beneficial to the user. *
- ***Board*** – the board of directors of the CCGCD unless otherwise specified.
- ***Brush control*** – the select control, removal, or reduction of noxious brush that consume water to a degree that is detrimental to water conservation.
- ***Confining unit (or layer)*** – a hydrogeologic unit of impermeable or distinctly less permeable material bounding one or more aquifers.
- ***Conjunctive use*** – the combined use of groundwater and surface water sources that optimize the beneficial characteristics of each source. *
- ***Conservation*** – those water saving practices, techniques, and technologies that will reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative use. **
- ***Desired future conditions (DFC)*** – the desired, quantified conditions of groundwater resources (such as water levels, water quality, spring flows, or volumes), adopted in accordance with Section 36.108 of the Texas Water Code, at a specified time or times in the future or in perpetuity. *
- ***Director*** – a member of the CCGCD Board unless otherwise specified.
- ***Discharge*** – the amount of water that leaves an aquifer by natural or artificial means.
- ***Disposal well*** – see injection well.

- ***Domestic use*** – the use of water not delivered through a public water system for personal hygiene needs or for household purposes such as drinking, bathing, heating, cooking, or cleaning in a residence, including pleasure uses, landscape irrigation, and non-commercial gardening use so long as no more than 50% of the garden product is sold or leased.
- ***Drawdown*** – a lowering of the groundwater surface (potentiometric surface) caused by withdrawal or pumping of water from a well. At the well, it is the difference between the static water level and the pumping water level in a well pumped at a constant flow rate.
- ***Drought*** – generally applied to periods of less than average precipitation over a certain period of time.
- ***Drought of record (DOR)*** – period of time during recorded history when natural hydrological conditions provided the least amount of water supply. For Texas as a whole, the drought of record is generally considered to be from about 1950 to 1957. #
- ***Exempt well*** – a well that is exempt from the requirements to obtain a permit. In the CCGCD, this includes most domestic, livestock, mining (excluding gravel), rig supply and abandoned wells.
- ***Fluvial*** – of or pertaining to a river.
- ***Formation*** – the basic unit for the naming of rocks in lithostratigraphy; a set of rocks that are or once were, horizontally continuous, that share some distinctive feature of lithology, and that are large enough to be mapped.
- ***Fracking (also hydraulic fracturing)*** – a method used by oil and gas operators to artificially 'fracture' the hydrocarbon reservoir in order to enhance production. The method may consume relatively large quantities of water.
- ***General Manager*** – an individual employed by the Board of Directors of a district that is the chief administrator of the office and who has full authority to manage and operate the affairs of the district subject to Board approval.
- ***Groundwater*** – water located beneath the earth's surface.
- ***Groundwater availability model (GAM)*** – numerical groundwater flow models used by the TWDB to determine groundwater availability of the major and minor aquifers in Texas. #
- ***Groundwater management area (GMA)*** – a group of district representatives covering an area designated by the TWDB, that have the task of, at least every five years, considering groundwater availability models and other data or information for the management area and establishing desired future conditions for the relevant aquifers within the area. CCGCD is within GMA 15.
- ***Highland Lakes*** – lake system composed of two major storage reservoirs – Lake Buchanan and Travis – which are owned and operated by LCRA. In addition, the system contains three intermediary lakes owned and operated by the LCRA – Inks Lake, Lake LBJ,

and Lake Marble Falls. Lake Austin is owned by the City of Austin and is operated by the LCRA through an agreement.

- ***Injection well (also disposal well)*** – an artificial excavation or opening in the ground made by digging, boring, drilling, jetting, driving, or some other method, and used to inject, transmit, or dispose of industrial and municipal waste or oil and gas waste into a subsurface stratum; or a well initially drilled to produce oil and gas which is used to transmit, inject, or dispose of industrial and municipal waste or oil and gas waste into a subsurface stratum; or a well used for the injection of any other fluid; but the term does not include any surface pit, surface excavation, or natural depression used to dispose of industrial and municipal waste or oil and gas waste.
- ***Interruptible supply*** – water that is supplied only on an annual basis as water is available that is subject to interruption or curtailment such as during droughts.
- ***Irrigation use*** – the use of water for the purpose of providing water to crops with the intent of growing and sustaining those crops for the consumption by humans or other domestic animals. In Colorado County, rice-growers are the heaviest users of irrigation water.
- ***Irrigation districts*** – LCRA-owned irrigation systems consisting of hundreds of miles of canals that can divert water from the Colorado River to individual farmers. LCRA has senior water rights for direct diversion of water from the Colorado River thereby relieving LCRA from responsibility of releasing water from storage in the Highland Lakes.
- ***Lithology*** – the physical characteristics of a rock based in part on texture and composition.
- ***Management plan*** – a plan approved by the TWDB Executive Administrator, that addresses the efficiency of groundwater use, the prevention of waste and subsidence, the conjunctive use of surface water, natural resource issues, drought conditions and conservation. The plan identifies a district's performance standards and management objectives under which it will operate, and includes groundwater availability and use estimates. Regional water planning groups are required to consider these plans in developing their regional plans.
- ***Meter*** – A device used to measure water flow. On well, it typically measures rate of flow in gallons per minute and cumulative production in gallons or acre-feet.
- ***Modeled available groundwater (MAG)*** – the amount of water that the TWDB determines may be produced on an average annual basis to achieve a desired future condition as established under Section 36.108 of the Texas Water Code. *
- ***Monitor well*** – a well that is used to measure or monitor the level, quality, quantity, or movement of subsurface waters.
- ***Needs*** – projected water demands in excess of existing water supplies for a water user group or a wholesale water provider.

- ***Non-exempt well*** – a well required to obtain a permit for the production of groundwater from within the District.
- ***Permit*** – an authorization issued by the District allowing the withdrawal of a specific amount of groundwater from a non-exempt well for a designated period of time, generally in the form of millions of gallons or acre-feet per year.
- ***Plug*** – to close a well permanently in accordance with approved District standards.
- ***Rainwater harvesting*** – accumulation and use of water from precipitation as a supplement to normal water usage.
- ***Recharge*** – the amount of water that infiltrates to the water table of an aquifer. #
- ***Regional Water Planning Group*** – a quasi-governmental body representing regional interests and having voting as well as nonvoting members who develop a regional water plan. It provides direction and guidance, determines policy issues, and oversees the progress of the regional plan. The interests presented generally include counties, municipalities, industries, the public, agriculture, environmental interests, small businesses, electric generating utilities, river authorities, water districts, water utilities and groundwater management areas. CCGCD is wholly within Region K Regional Water Planning Group. The TWDB is the lead state agency for coordinating the regional water planning process and developing a comprehensive state water plan.
- ***Registration*** – basic information provided to the groundwater District by the well or landowner usually containing information about the well location, type of use, well capacity and depth. A well identification number is designated by the District for reference purposes. Registration provides the owner or operator of the well with spacing protection and allows for notification in case of spills or accidents.
- ***Return Flows*** – that portion of water diverted from a water supply and beneficially used that is not consumed as a consequence of that use and returns to a watercourse. Return flows include sewage effluent. **
- ***Reuse*** – use of surface water that has already been beneficially used once under a water right or the use of groundwater that has already been used. #
- ***Riparian rights*** – the right to use the riverbed by one who owns river frontage land.
- ***ROR (run-of-river) water rights*** – water right permit that allows the permit holder to divert water directly out of a stream or river.
- ***Rules*** – standards and regulations promulgated by the District.
- ***Spacing*** – a mandated distance between wells implemented to conserve the aquifer.
- ***Texas Administrative Code*** – the codified body of laws that define the processes and operations of state agencies and their rulemaking authority. TWDB and TCEQ are generally governed by Title 30, Environmental Quality, and Title 31, Natural Resources and Conservation, of the Code.
- ***Texas Water Code*** – the codified portion of state water laws. It is the public policy of the state to provide for the conservation and development of the state's natural resources.

- ***Transmissivity*** – the capacity of an aquifer to transmit water and is dependent on the water-transmitting characteristics of the saturated formation and the saturated thickness.
- ***Unconformity*** – a surface that separates two strata and represents an interval of time in which deposition stopped, erosion removed some sediment and rock, and then deposition resumed.
- ***Waste*** – any one or more of the following:
  - 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 agriculture, gardening, domestic, or stock raising purposes;
  - The flowing or producing of wells from a groundwater reservoir if the water produced is not used for a beneficial purpose;
  - Escape of groundwater from a groundwater reservoir to any other reservoir or geologic strata that does not contain groundwater;
  - Pollution or harmful alteration of groundwater in a groundwater reservoir by saltwater or by other deleterious mater admitted from another stratum or from the surface of the ground;
  - 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 order issued by the commission under Chapter 26;
  - 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; or,
  - For water produced from an artesian well, "waste" has the meaning assigned by Section 11.205.
- ***Water budget*** – an accounting of the water that enters and leaves an aquifer.
- ***Water demand*** – quantity of water projected to meet the overall necessities of a water user group in a specific future year.
- ***Water management strategy*** – a strategy or specific project identified in a water plan whose purpose is to provide water to meet a demand or identified need. These water management strategies must be specific and provide sufficient detail to allow state agencies to make financial or regulatory decisions.
- ***Water needs*** – see Needs.
- ***Water table*** – the upper boundary of the saturated zone in an unconfined aquifer.
- ***Water-user group (WUG)*** – identified user or group of users for which water demands and water supplies have been identified and analyzed and plans developed to meet water needs. Water user groups are defined at the county level for the manufacturing, irrigation, steam-electric power generation, mining and municipal water use categories. #

- ***Well*** – any artificial excavation or borehole constructed for the purpose of exploring for or producing groundwater, or for injection, monitoring, or dewatering purposes.

* Definitions taken from Chapter 36 of the Texas Water Code
**Definitions were taken from the "Texas Water Law Glossary" (Flores and Wasinger, 2005)
#Definitions taken from 2012 State Water Plan (TWDB, 2012)
##Definitions taken from Chapter 27 of the Texas Water Code

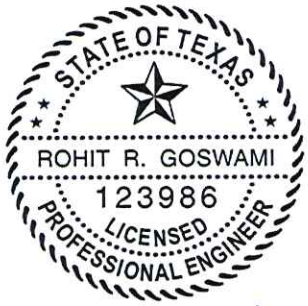
ACRONYMS AND ABBREVIATIONS

- **CCGCD** – Colorado County Groundwater Conservation District
- **COA** – City of Austin
- **DOR** – drought of record
- **GAM** – groundwater availability model
- **GCD** – groundwater conservation district
- **GMA** – groundwater management area
- **LCRA** – Lower Colorado River Authority
- **LCRPG** – Lower Colorado River Planning Group (Region K)
- **MAG** – modeled available groundwater
- **ROR** – run-of-river
- **RRC** – Texas Railroad Commission
- **RWPG** – regional water planning group
- **TAGD** – Texas Alliance of Groundwater Districts
- **TCEQ** – Texas Commission on Environmental Quality
- **TWDB** – Texas Water Development Board
- **WUG** – water user group

Appendix B:

GAM RUN 16-025 MAG:
MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15

Rohit Raj Goswami, Ph.D., P.E.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Section
(512) 463-0495
March 22, 2017



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GAM RUN 16-025 MAG: MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15

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Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Section
(512) 463-0495
March 22, 2017

EXECUTIVE SUMMARY:

The modeled available groundwater for Groundwater Management Area 15 for the Gulf Coast Aquifer System is summarized by decade for the groundwater conservation districts (Table 1) and for use in the regional water planning process (Table 2). The modeled available groundwater estimates range from approximately 515,000 acre-feet per year in 2020 to approximately 518,000 acre-feet per year in 2069(Table 1). The estimates were extracted from results of a model run using the groundwater availability model for the central part of the Gulf Coast Aquifer System (version 1.01). The model run files, which meet the desired future conditions adopted by district representatives of Groundwater Management Area 15, were submitted to the Texas Water Development Board (TWDB) on June 28, 2016, as part of the Desired Future Conditions Explanatory Report for Groundwater Management Area 15. The explanatory report and other materials submitted to the Texas Water Development Board (TWDB) were determined to be administratively complete on October 20, 2016.

REQUESTOR:

Mr. Tim Andruss, chair of Groundwater Management Area 15.

DESCRIPTION OF REQUEST:

In a letter dated June 23, 2016, Mr. Tim Andruss provided the TWDB with the desired future conditions of the Gulf Coast Aquifer System adopted by the groundwater conservation districts in Groundwater Management Area 15. The Gulf Coast Aquifer System includes the Chicot Aquifer, Evangeline Aquifer, Burkeville Confining Unit and the Jasper Aquifer (including parts of the Catahoula Formation). TWDB staff worked with INTERA Incorporated, the consultant for Groundwater Management Area 15, in reviewing

model files associated with the desired future conditions. We received clarification from INTERA Incorporated, on behalf of Groundwater Management Area 15, on September 18, 2016, concerning assumptions on variances of average drawdown values per county to model results, which was ±3.5 feet for nearly all areas within the Groundwater Management Area 15. The exception is Goliad County which has a variance in drawdown of ±5 feet. The desired future conditions for the Gulf Coast Aquifer System, as described in Resolution No. 2016-01 and adopted April 29, 2016, by the groundwater conservation districts within Groundwater Management Area 15, are described below:

Groundwater Management Area 15 [all counties]

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 13 feet in December 2069 from estimated year 2000 conditions.

Aransas County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 0 feet in December 2069 from estimated year 2000 conditions.

Bee County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 7 feet in December 2069 from estimated year 2000 conditions.

Calhoun County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 5 feet in December 2069 from estimated year 2000 conditions.

Colorado County

Drawdown shall not exceed an average of 17 feet in Chicot and Evangeline Aquifers and 23 feet in in the Jasper Aquifer in December 2069 from estimated year 2000 conditions.

DeWitt County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 17 feet in December 2069 from estimated year 2000 conditions.

Fayette County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 16 feet in December 2069 from estimated year 2000 conditions.

Goliad County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 10 feet in December 2069 from estimated year 2000 conditions.

Jackson County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 15 feet in December 2069 from estimated year 2000 conditions.

Karnes County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 22 feet in December 2069 from estimated year 2000 conditions.

Lavaca County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 18 feet in December 2069 from estimated year 2000 conditions.

Matagorda County

Drawdown shall not exceed an average of 11 feet in Chicot and Evangeline Aquifers in December 2069 from estimated year 2000 conditions.

Refugio County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 5 feet in December 2069 from estimated year 2000 conditions.

Victoria County

Drawdown of the Gulf Coast Aquifer System shall not exceed an average of 5 feet in December 2069 from estimated year 2000 conditions.

Wharton County

Drawdown shall not exceed an average of 15 feet in Chicot and Evangeline Aquifers in December 2069 from estimated year 2000 conditions.

Based on the adopted desired future conditions, TWDB has estimated the modeled available groundwater for the Gulf Coast Aquifer System in Groundwater Management Area 15.

METHODS:

The groundwater availability model for the central part of the Gulf Coast Aquifer System (Figure 1) was run using the model files submitted with the explanatory report (GMA 15 and others, 2016). Model-calculated water levels were extracted for the year 2000 and the end of the year 2069, and drawdown was calculated as the difference between water levels at the beginning of 2000 and water levels at the end of 2069. Drawdown averages were calculated for each county by aquifer and for the entire Groundwater Management Area 15 by aquifer. As specified in the explanatory report (GMA 15 and others, 2016), drawdown for cells which 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 achieved the desired future conditions within one foot.

The modeled available groundwater values were determined by extracting pumping rates by decade from the model results using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Annual pumping rates are presented by county and groundwater conservation district, subtotaled by groundwater conservation district, and then summed by Groundwater Management Area 15 (Figure 2 and Table 1). Annual pumping rates are also presented by county, river basin, and regional water planning area within Groundwater Management Area 15 (Figure 2 and Table 2).

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 are required to consider modeled available groundwater, along with several other factors, when issuing permits in order to manage groundwater production to achieve the desired future condition(s). The other factors districts must consider include 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:

- Version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer System was used for this analysis. See Chowdhury and others (2004) and Waterstone and others (2003) for assumptions and limitations of the 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).
- The model was run with MODFLOW-96 (Harbaugh and others, 1996).
- Drawdown averages and modeled available groundwater values are based on the extent of the model area rather than official aquifer boundaries (Figures 1 and 2).
- Drawdown for cells with water levels below the base elevation of the cell ("dry" cells) were excluded from the averaging per emails exchanged with INTERA, Inc. dated October 21, 2015.
- Estimates of modeled available groundwater from the model simulation were rounded to whole numbers.
- A model drawdown tolerance of up to 5 feet was assumed for Goliad County and up to 3.5 feet for the rest of Groundwater Management Area 15 when comparing desired future conditions (average drawdown values per county) to model drawdown results.
- Average drawdown by 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 15 increases from approximately 515,000 acre-feet per year in 2020 to approximately 518,000 acre-feet per year in 2069 (Table 1). The modeled available groundwater is summarized by groundwater conservation district and county (Table 1). The modeled available groundwater has also been summarized 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.

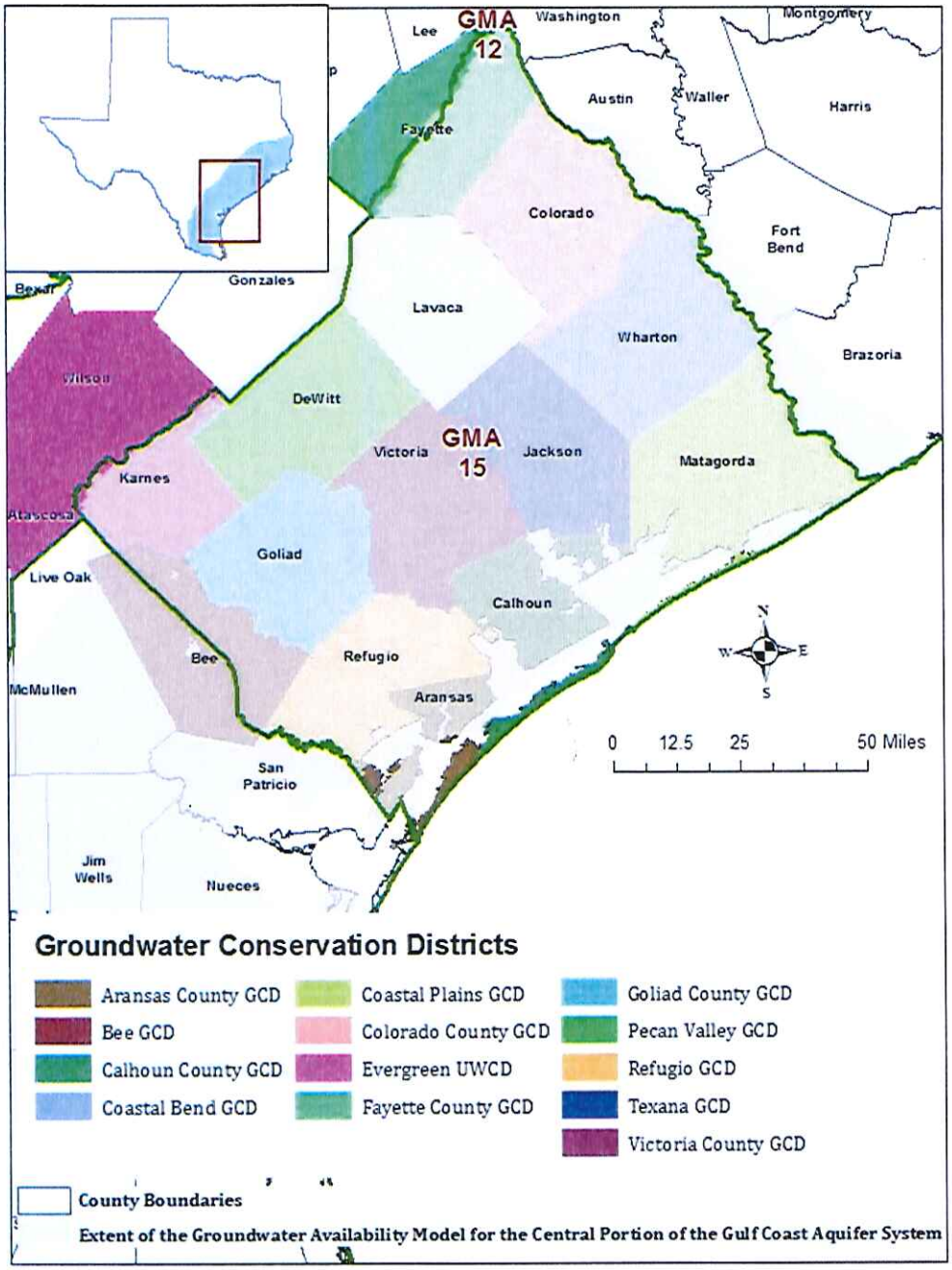

FIGURE 1. MAP SHOWING GROUNDWATER CONSERVATION DISTRICTS (GCDS) AND COUNTIES IN GROUNDWATER MANAGEMENT AREA 15 OVERLAIN ON THE EXTENT OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CENTRAL PORTION OF THE GULF COAST AQUIFER SYSTEM.

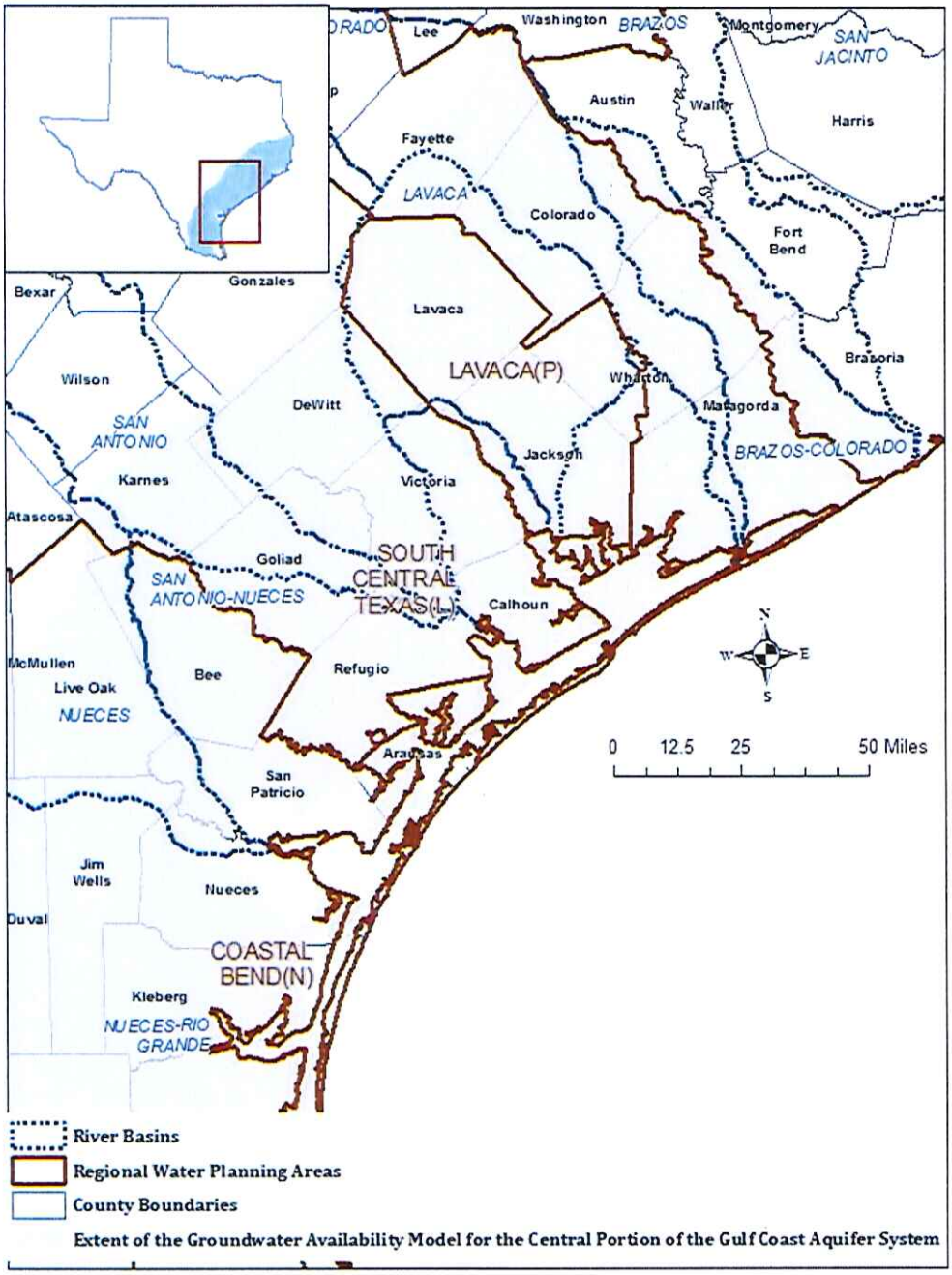

FIGURE 2. MAP SHOWING REGIONAL WATER PLANNING AREAS, GROUNDWATER CONSERVATION DISTRICTS (GCDS), COUNTIES, AND RIVER BASINS IN GROUNDWATER MANAGEMENT AREA 15 OVERLAIN ON THE EXTENT OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CENTRAL PORTION OF THE GULF COAST AQUIFER SYSTEM.

TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2010 AND 2069. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2069
Aransas County GCD Total	Aransas	Gulf Coast Aquifer System	1,542	1,542	1,542	1,542	1,542	1,542	1,542
Bee County GCD Total	Bee	Gulf Coast Aquifer System	9,456	9,456	9,431	9,431	9,379	9,379	9,361
Calhoun County GCD Total	Calhoun	Gulf Coast Aquifer System	2,569	7,565	7,565	7,565	7,565	7,565	7,565
Coastal Bend GCD Total	Wharton	Gulf Coast Aquifer System (Chicot and Evangeline)	181,168	181,168	181,168	181,168	181,168	181,168	181,168
Coastal Plains GCD Total	Matagorda	Gulf Coast Aquifer System (Chicot and Evangeline)	38,828	38,828	38,828	38,828	38,828	38,828	38,828
Colorado County GCD	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	79,780	74,964	74,964	72,765	72,765	71,618	71,618
Colorado County GCD	Colorado	Gulf Coast Aquifer System (Jasper)	918	918	918	918	918	918	918
Colorado County GCD Total	Colorado	Gulf Coast Aquifer System	80,698	75,882	75,882	73,683	73,683	72,536	72,536
Evergreen UWCD Total	Karnes	Gulf Coast Aquifer System	10,196	10,196	10,196	3,015	2,917	2,751	2,751
Fayette County GCD Total	Fayette	Gulf Coast Aquifer System	1,977	1,853	1,853	1,853	1,853	1,853	1,703
Goliad County GCD Total	Goliad	Gulf Coast Aquifer System	11,420	11,539	11,539	11,539	11,539	11,552	11,539

Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2069
Pecan Valley GCD Total	**DeWitt**	**Gulf Coast Aquifer System**	**15,471**	**15,476**	**15,476**	**14,485**	**14,485**	**14,485**	**14,485**
Refugio GCD Total	**Refugio**	**Gulf Coast Aquifer System**	**5,847**	**5,847**	**5,847**	**5,847**	**5,847**	**5,847**	**5,847**
Texana GCD Total	**Jackson**	**Gulf Coast Aquifer System**	**76,787**	**90,482**	**90,482**	**90,482**	**90,482**	**90,482**	**90,482**
Victoria County GCD Total	**Victoria**	**Gulf Coast Aquifer System**	**35,640**	**44,974**	**49,970**	**54,966**	**54,966**	**59,963**	**59,963**
Total (GCDs)		**Gulf Coast Aquifer System**	**471,599**	**494,808**	**499,779**	**494,404**	**494,254**	**497,951**	**497,770**
No District-County	Bee	Gulf Coast Aquifer System	10	10	10	10	10	10	10
No District-County	Lavaca	Gulf Coast Aquifer System	20,253	20,253	20,253	20,253	20,253	20,253	20,239
No district-County Total		**Gulf Coast Aquifer System**	**20,263**	**20,263**	**20,263**	**20,263**	**20,263**	**20,263**	**20,249**
Total for GMA 15		**Gulf Coast Aquifer System**	**491,862**	**515,071**	**520,042**	**514,667**	**514,517**	**518,214**	**518,019**

TABLE 2 MODELED AVAILABLE GROUNDWATER BY DECADE FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 15. 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
Aransas	N	San Antonio- Nueces	Gulf Coast Aquifer System	1,542	1,542	1,542	1,542	1,542
Bee	N	San Antonio- Nueces	Gulf Coast Aquifer System	9,439	9,414	9,414	9,362	9,362
Bee	N	Nueces	Gulf Coast Aquifer System	27	27	27	27	27
Calhoun	L	Colorado- Lavaca	Gulf Coast Aquifer System	5,210	5,210	5,210	5,210	5,210
Calhoun	L	Guadalupe	Gulf Coast Aquifer System	18	18	18	18	18
Calhoun	L	Lavaca-Guadalupe	Gulf Coast Aquifer System	2,330	2,330	2,330	2,330	2,330
Calhoun	L	San Antonio- Nueces	Gulf Coast Aquifer System	7	7	7	7	7
Colorado	K	Brazos-Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	15,342	15,342	15,342	15,342	15,342
Colorado	K	Brazos-Colorado	Gulf Coast Aquifer System (Jasper Aquifer)	49	49	49	49	49
Colorado	K	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	20,506	20,506	20,066	20,066	20,066
Colorado	K	Colorado	Gulf Coast Aquifer System (Jasper Aquifer)	273	273	273	273	273
Colorado	K	Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	39,116	39,116	37,357	37,357	36,210
Colorado	K	Lavaca	Gulf Coast Aquifer System (Jasper Aquifer)	596	596	596	596	596
Dewitt	L	Guadalupe	Gulf Coast Aquifer System	11,358	11,358	10,470	10,470	10,470
Dewitt	L	Lavaca-Guadalupe	Gulf Coast Aquifer System	417	417	417	417	417
Dewitt	L	Lavaca	Gulf Coast Aquifer System	2,935	2,935	2,935	2,874	2,874
Dewitt	L	San Antonio	Gulf Coast Aquifer System	766	766	724	724	724

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Fayette	K	Brazos	Gulf Coast Aquifer System	2	2	2	2	2
Fayette	K	Colorado	Gulf Coast Aquifer System	989	989	989	989	989
Fayette	K	Lavaca	Gulf Coast Aquifer System	862	862	862	862	862
Goliad	L	Guadalupe	Gulf Coast Aquifer System	4,377	4,377	4,377	4,377	4,380
Goliad	L	San Antonio- Nueces	Gulf Coast Aquifer System	1,190	1,190	1,190	1,190	1,195
Goliad	L	San Antonio	Gulf Coast Aquifer System	5,972	5,972	5,972	5,972	5,977
Jackson	P	Colorado-Lavaca	Gulf Coast Aquifer System	28,025	28,025	28,025	28,025	28,025
Jackson	P	Lavaca-Guadalupe	Gulf Coast Aquifer System	12,875	12,875	12,875	12,875	12,875
Jackson	P	Lavaca	Gulf Coast Aquifer System	49,582	49,582	49,582	49,582	49,582
Karnes	L	Guadalupe	Gulf Coast Aquifer System	11	11	11	11	11
Karnes	L	Nueces	Gulf Coast Aquifer System	1,057	1,057	78	78	78
Karnes	L	San Antonio	Gulf Coast Aquifer System	9,082	9,082	2,880	2,782	2,616
Karnes	L	San Antonio-Nueces	Gulf Coast Aquifer System	46	46	46	46	46
Lavaca	P	Guadalupe	Gulf Coast Aquifer System	41	41	41	41	41
Lavaca	P	Lavaca-Guadalupe	Gulf Coast Aquifer System	401	401	401	401	401
Lavaca	P	Lavaca	Gulf Coast Aquifer System	19,811	19,811	19,811	19,811	19,811
Matagorda	K	Brazos-Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	15,282	15,282	15,282	15,282	15,282
Matagorda	K	Colorado-Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	20,329	20,329	20,329	20,329	20,329
Matagorda	K	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	3,217	3,217	3,217	3,217	3,217
Refugio	L	San Antonio- Nueces	Jasper Aquifer	5,526	5,526	5,526	5,526	5,526
Refugio	L	San Antonio	Gulf Coast Aquifer System	321	321	321	321	321
Victoria	L	Guadalupe	Gulf Coast Aquifer System	17,600	22,596	27,592	27,592	27,592
Victoria	L	Lavaca-Guadalupe	Gulf Coast Aquifer System	25,451	25,451	25,451	25,451	30,448
Victoria	L	Lavaca	Gulf Coast Aquifer System	234	234	234	234	234
Victoria	L	San Antonio	Gulf Coast Aquifer System	1,689	1,689	1,689	1,689	1,689

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060
Wharton	K	Brazos-Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	50,527	50,527	50,527	50,527	50,527
Wharton	K	Colorado-Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	16,196	16,196	16,196	16,196	16,196
Wharton	P	Colorado-Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	14,091	14,091	14,091	14,091	14,091
Wharton	K	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	35,910	35,910	35,910	35,910	35,910
Wharton	P	Colorado	Gulf Coast Aquifer System (Chicot and Evangeline)	873	873	873	873	873
Wharton	K	Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	579	579	579	579	579
Wharton	P	Lavaca	Gulf Coast Aquifer System (Chicot and Evangeline)	62,992	62,992	62,992	62,992	62,992
GMA 15 Total			**Gulf Coast Aquifer System**	**515,071**	**520,042**	**514,667**	**514,517**	**518,214**

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:

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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.

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.

Waterstone Engineering, Inc., and Parsons, Inc., 2003, Groundwater Availability of the Central Gulf Coast Aquifer: Numerical Simulations to 2050, Central Gulf Coast, Texas: Contract draft report submitted to Texas Water Development Board

Appendix C: Estimated Historical Water Use And 2012 State Water Plan Datasets:

Colorado County Groundwater Conservation District

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Texas Water Development Board
Groundwater Resources Division
Groundwater Technical Assistance Section
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July 11, 2014

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 part 1 are:

1. Estimated Historical Water 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)
   reports 2-5 are from the 2012 Texas State Water Plan (SWP)

Part 2 of the 2-part package is the groundwater availability model (GAM) report. 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 2012 SWP data available as of 7/11/2014. Although it does not happen frequently, neither of these datasets are static so they are subject to change pending the availability of more accurate WUS data or an amendment to the 2012 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 2012 SWP dataset can be verified by contacting Sabrina Anderson (sabrina.anderson@twdb.texas.gov or 512-936-0886).

For additional questions regarding this data, please contact Stephen Allen (stephen.allen@twdb.texas.gov or 512-463-7317) or Rima Petrossian (rima.petrossian@twdb.texas.gov or 512-936-2420).

Appendix C1: Estimated Historical Water Use
TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water historical use estimates are currently unavailable for calendar year 2012. TWDB staff anticipates the calculation and posting of these estimates at a later date.

COLORADO COUNTY

All values are in acre-fee/year

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2011	GW	3,746	849	1,038	0	50,965	583	57,181
	SW	0	0	2,144	0	163,583	874	166,601
2010	GW	3,110	844	2,543	0	46,451	595	53,543
	SW	0	0	1,620	0	103,587	893	106,100
2009	GW	3,368	840	681	0	21,311	579	26,779
	SW	0	0	2,965	0	127,689	869	131,523
2008	GW	3,249	843	2,092	0	14,179	654	21,017
	SW	0	0	15,769	0	120,541	981	137,291
2007	GW	2,885	846	1,540	0	27,117	678	33,066
	SW	0	0	14,597	0	90,000	1,017	105,614
2006	GW	3,489	846	1,540	0	22,175	609	28,659
	SW	0	0	14,597	0	90,000	914	105,511
2005	GW	3,207	945	1,537	0	22,115	660	28,464
	SW	0	0	14,472	0	94,150	989	109,611
2004	GW	3,044	913	1,467	0	18,193	494	24,111
	SW	0	0	14,393	0	101,250	1,219	116,862
2003	GW	3,200	906	1,467	0	16,944	496	23,013
	SW	0	0	14,393	0	143,200	1,224	158,817
2002	GW	3,219	1,380	1,467	0	16,256	445	22,767
	SW	0	0	14,394	0	92,118	1,100	107,612
2001	GW	3,197	1,412	1,467	0	17,388	445	23,909
	SW	0	0	14,382	0	156,399	1,100	171,881
2000	GW	3,354	1,417	1,469	0	20,616	884	27,740
	SW	0	0	16,765	0	117,889	589	135,243

Appendix C2: Projected Surface Water Supplies TWDB 2012 State Water Plan Data

COLORADO COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
K	IRRIGATION	BRAZOS-COLORADO	COLORADO RIVER RUN-OF-RIVER	6,340	6,331	6,331	6,331	6,331	6,331
K	IRRIGATION	BRAZOS-COLORADO	COLORADO RIVER RUN-OF-RIVER	25,143	25,143	25,143	25,143	25,143	25,143
K	IRRIGATION	COLORADO	COLORADO RIVER COMBINED RUN-OF-RIVER IRRIGATION	3,000	3,000	3,000	3,000	3,000	3,000
K	IRRIGATION	COLORADO	COLORADO RIVER RUN-OF-RIVER	3,078	3,073	3,073	3,073	3,073	3,073
K	IRRIGATION	COLORADO	COLORADO RIVER RUN-OF-RIVER	12,207	12,207	12,207	12,207	12,207	12,207
K	IRRIGATION	LAVACA	COLORADO RIVER RUN-OF-RIVER	13,553	13,534	13,534	13,534	13,534	13,534
K	IRRIGATION	LAVACA	COLORADO RIVER RUN-OF-RIVER	53,749	53,749	53,749	53,749	53,749	53,749
K	IRRIGATION	LAVACA	LAVACA RIVER COMBINED RUN-OF-RIVER IRRIGATION	4,002	4,002	4,002	4,002	4,002	4,002
K	LIVESTOCK	BRAZOS-COLORADO	LIVESTOCK LOCAL SUPPLY	39	39	39	39	39	39
K	LIVESTOCK	COLORADO	LIVESTOCK LOCAL SUPPLY	860	860	860	860	860	860
K	LIVESTOCK	LAVACA	LIVESTOCK LOCAL SUPPLY	177	177	177	177	177	177
K	MANUFACTURING	COLORADO	OTHER LOCAL SUPPLY	1,215	1,285	1,353	1,418	1,481	1,481
K	MINING	COLORADO	OTHER LOCAL SUPPLY	10,508	11,391	12,443	13,785	15,402	15,402
	Sum of Projected Surface Water Supplies (acre-feet/year)			**133,871**	**134,791**	**135,911**	**137,318**	**138,998**	**138,998**

Appendix C3: Projected Water Demands
TWDB 2012 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.

COLORADO COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
K	MINING	BRAZOS-COLORADO	119	122	123	124	125	126
K	IRRIGATION	BRAZOS-COLORADO	55,427	53,120	50,889	48,729	46,629	44,619
K	LIVESTOCK	BRAZOS-COLORADO	103	103	103	103	103	103
K	EAGLE LAKE	BRAZOS-COLORADO	173	183	186	181	187	196
K	COUNTY-OTHER	BRAZOS-COLORADO	114	115	114	111	110	109
K	LIVESTOCK	COLORADO	899	899	899	899	899	899
K	IRRIGATION	COLORADO	26,910	25,791	24,707	23,659	22,639	21,663
K	MINING	COLORADO	18,958	19,316	19,515	19,704	19,885	20,044
K	EAGLE LAKE	COLORADO	400	421	428	418	432	452
K	WEIMAR	COLORADO	253	268	272	267	275	289
K	COLUMBUS	COLORADO	1,026	1,099	1,128	1,113	1,153	1,206
K	MANUFACTURING	COLORADO	176	192	205	217	227	245
K	COUNTY-OTHER	COLORADO	724	732	725	707	700	692
K	WEIMAR	LAVACA	110	115	119	115	120	125
K	COUNTY-OTHER	LAVACA	355	359	356	347	343	340
K	MINING	LAVACA	1,727	1,759	1,778	1,795	1,811	1,826
K	IRRIGATION	LAVACA	118,485	113,554	108,784	104,167	99,678	95,381
K	LIVESTOCK	LAVACA	471	471	471	471	471	471
	Sum of Projected Water Demands (acre-feet/year)		**226,430**	**218,619**	**210,802**	**203,127**	**195,787**	**188,786**

Appendix C4: Projected Water Supply Needs TWDB 2012 State Water Plan Data

Negative values (in red) reflect a projected water supply need, positive values a surplus.

COLORADO COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
K	COLUMBUS	COLORADO	324	251	222	237	197	144
K	COUNTY-OTHER	BRAZOS-COLORADO	8	7	8	11	12	13
K	COUNTY-OTHER	COLORADO	76	68	75	93	100	108
K	COUNTY-OTHER	LAVACA	-105	-109	-106	-97	-93	-90
K	EAGLE LAKE	BRAZOS-COLORADO	245	235	232	237	231	222
K	EAGLE LAKE	COLORADO	52	31	24	34	20	0
K	IRRIGATION	BRAZOS-COLORADO	-16,169	-13,871	-11,640	-9,480	-7,380	-5,370
K	IRRIGATION	COLORADO	2,566	3,680	4,764	5,812	6,832	7,808
K	IRRIGATION	LAVACA	-33,131	-28,219	-23,449	-18,832	-14,343	-10,046
K	LIVESTOCK	BRAZOS-COLORADO	1	1	1	1	1	1
K	LIVESTOCK	COLORADO	-14	-14	-14	-14	-14	-14
K	LIVESTOCK	LAVACA	-11	-11	-11	-11	-11	-11
K	MANUFACTURING	COLORADO	1,039	1,093	1,148	1,201	1,254	1,236
K	MINING	BRAZOS-COLORADO	-19	-22	-23	-24	-25	-26
K	MINING	COLORADO	-8,450	-7,925	-7,072	-5,919	-4,483	-4,642
K	MINING	LAVACA	-100	-132	-151	-168	-184	-199
K	WEIMAR	COLORADO	1,551	1,536	1,532	1,537	1,529	1,515
K	WEIMAR	LAVACA	2,009	2,004	2,000	2,004	1,999	1,994
	Sum of Projected Water Supply Needs (acre-feet/year)		**-57,999**	**-50,303**	**-42,466**	**-34,545**	**-26,533**	**-20,398**

Appendix C5: Projected Water Management Strategies

COLORADO COUNTY

WUG, Basin (RWPG) All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
COUNTY-OTHER, LAVACA (K)							
EXPANSION OF GULF COAST AQUIFER	GULF COAST AQUIFER [COLORADO]	105	109	106	97	93	90
IRRIGATION, BRAZOS-COLORADO (K)							
AMENDMENT TO IRRIGATION WATER RIGHTS FOR MUNICIPAL AND INDUSTRIAL NEEDS	COLORADO RIVER RUN-OF-RIVER [COLORADO]	-4,568	-7,392	-9,240	-9,240	-11,550	-19,025
COA RETURN FLOWS	INDIRECT REUSE [TRAVIS]	620	728	936	1,143	1,220	1,388
CONJUNCTIVE USE OF GROUNDWATER - INCLUDES OVERDRAFTS	GULF COAST AQUIFER [COLORADO]	0	4,886	4,886	4,886	4,886	4,886
DEVELOPMENT OF NEW RICE VARIETIES	CONSERVATION [COLORADO]	0	4,548	4,548	4,548	4,548	4,548
DOWNSTREAM RETURN FLOWS	INDIRECT REUSE [TRAVIS]	0	0	6	28	55	65
FIRM-UP RUN-OF-RIVER WITH OFF-CHANNEL RESERVOIR - LCRA/SAWS PROJECT (REGION K COMPONENT)	COLORADO RIVER RUN-OF-RIVER EXCESS FLOWS PERMIT [MATAGORDA]	0	0	0	0	0	11,220
IRRIGATION DISTRICT CONVEYANCE IMPROVEMENTS	CONSERVATION [COLORADO]	0	8,282	8,282	8,282	8,282	8,282
IRRIGATION SUPPLY REDUCTION DUE TO LSWP	COLORADO RIVER RUN-OF-RIVER [COLORADO]	0	0	0	0	0	-8,326
LCRA WMP INTERRUPTIBLE WATER SUPPLY	COLORADO RIVER COMBINED RUN-OF-RIVER INTERRUPTIBLE [TRAVIS]	24,317	22,528	16,993	10,542	0	0
ON-FARM CONSERVATION	CONSERVATION [COLORADO]	0	4,715	4,715	4,715	4,715	4,715
IRRIGATION, LAVACA (K)							
AMENDMENT TO IRRIGATION WATER RIGHTS FOR MUNICIPAL AND INDUSTRIAL NEEDS	COLORADO RIVER RUN-OF-RIVER [COLORADO]	-10,079	-15,008	-18,760	-18,760	-23,450	-38,627
COA RETURN FLOWS	INDIRECT REUSE [TRAVIS]	1,256	1,478	1,900	2,321	2,570	3,373
CONJUNCTIVE USE OF GROUNDWATER - INCLUDES OVERDRAFTS	GULF COAST AQUIFER [COLORADO]	0	9,920	9,920	9,920	9,920	9,920
DEVELOPMENT OF NEW RICE VARIETIES	CONSERVATION [COLORADO]	0	10,181	10,181	10,181	10,181	10,181
DOWNSTREAM RETURN FLOWS	INDIRECT REUSE [TRAVIS]	0	0	13	56	113	158

Appendix C5: Projected Water Management Strategies

WUG, Basin (RWPG) All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
FIRM-UP RUN-OF-RIVER WITH OFF-CHANNEL RESERVOIR - LCRA/SAWS PROJECT (REGION K COMPONENT)	COLORADO RIVER RUN-OF-RIVER EXCESS FLOWS PERMIT [MATAGORDA]	0	0	0	0	0	22,780
IRRIGATION DISTRICT CONVEYANCE IMPROVEMENTS	CONSERVATION [COLORADO]	0	14,056	14,056	14,056	14,056	14,056
IRRIGATION SUPPLY REDUCTION DUE TO LSWP	COLORADO RIVER RUN-OF-RIVER [COLORADO]	0	0	0	0	0	-17,704
LCRA WMP INTERRUPTIBLE WATER SUPPLY	COLORADO RIVER COMBINED RUN-OF-RIVER INTERRUPTIBLE [TRAVIS]	46,316	45,738	32,488	9,265	0	0
ON-FARM CONSERVATION	CONSERVATION [COLORADO]	0	9,405	9,405	9,405	9,405	9,405
LIVESTOCK, COLORADO (K)							
EXPANSION OF GULF COAST AQUIFER	GULF COAST AQUIFER [COLORADO]	14	14	14	14	14	14
LIVESTOCK, LAVACA (K)							
EXPANSION OF GULF COAST AQUIFER	GULF COAST AQUIFER [COLORADO]	11	11	11	11	11	11
MINING, BRAZOS-COLORADO (K)							
EXPANSION OF GULF COAST AQUIFER	GULF COAST AQUIFER [COLORADO]	19	22	23	24	25	26
MINING, COLORADO (K)							
DEVELOPMENT OF OTHER AQUIFER	OTHER AQUIFER [COLORADO]	4,269	4,269	4,269	4,269	4,269	4,269
EXPANSION OF GULF COAST AQUIFER	GULF COAST AQUIFER [COLORADO]	3,600	3,600	2,803	1,650	214	373
EXPANSION OF GULF COAST AQUIFER	GULF COAST AQUIFER [COLORADO]	581	56	0	0	0	0
MINING, LAVACA (K)							
EXPANSION OF GULF COAST AQUIFER	GULF COAST AQUIFER [COLORADO]	100	132	151	168	184	199
Sum of Projected Water Management Strategies (acre-feet/year)		**66,561**	**122,278**	**97,706**	**67,581**	**39,761**	**26,277**

APPENDIX D:
GAM RUN 13-027: COLORADO COUNTY GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

by Rohit Raj Goswami, Ph.D.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 463-0495
December 20, 2013

Cynthia K. Ridgeway is the Manager o[the Groundwater Availability Modeling Section and is responsible for oversight of work performed by Rohit Raj Goswami under her direct supervision, The seal appearing on this document was authorized by Cynthia K. Ridgeway, P.C. 471 on December 20,

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GAM RUN 13-027: COLORADO COUNTY GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

by Rohit Raj Goswami, Ph.D.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 463-0495
December 20, 2013

EXECUTIVE SUMMARY:

Texas State Water Code, Section 36.1071, Subsection (h) (Texas Water Code, 2011), 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. Information derived from groundwater availability models that shall be included in the groundwater management plan includes:

- the annual amount of recharge from precipitation to the groundwater resources within the district, if any;
- 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
- the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

This report—Part 2 of a two-part package of information from the TWDB to the Colorado County Groundwater Conservation District—fulfills the requirements noted above. Part 1 of the two-part package is the Historical Water Use/State Water Plan data report. The District will receive this data report from the TWDB Groundwater Technical Assistance Section. Questions about the data report can be directed to Mr. Stephen Allen, stephen.allen@twdb.texas.gov, (512) 463-7317.

The groundwater management plan for the Colorado County Groundwater Conservation District should be adopted by the district on or before September 18, 2014 and submitted to the executive administrator of the TWDB on or before October 18, 2014. The current management plan for the Colorado County Groundwater Conservation District expires on December 17, 2014.

This report discusses the methods, assumptions, and results from a model run using the groundwater availability model for the central portion of the Gulf Coast Aquifer System. This model run replaces the results of GAM Run 09-009 (Oliver, 2009). GAM Run 13-027 meets current standards set after the release of GAM Run 09-009 including use of the extent of the official aquifer boundaries within the district rather than the entire active area of the model within the district. 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 Colorado County Groundwater Conservation District determines that the district boundaries used in the assessment do not reflect current conditions, please notify the Texas Water Development Board immediately.

Per statute, TWDB is required to provide the districts with data from the official groundwater availability models; however, the TWDB has also approved, for planning purposes, the fully penetrating alternative model for the central portion of the Gulf Coast Aquifer System. The Colorado County Groundwater Conservation District is also included in the model area for the groundwater availability model for the northern portion of the Gulf Coast Aquifer System. Please contact the author of this report if a comparison report using one or both of these models is desired.

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 run for this analysis. The Colorado County Groundwater Conservation District water budgets were extracted for the historical model period (1980 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, net inter-aquifer flow (upper), and net inter-aquifer flow (lower) for the portion of the aquifer located within the district is summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Gulf Coast Aquifer System

- Version 1.01 of the groundwater availability model for the central portion of the Gulf Coast Aquifer System was used for this analysis. See Chowdhury and others (2004) and Waterstone and Parsons (2003) for assumptions and limitations of the groundwater availability model.
- The model for the central portion of the Gulf Coast Aquifer System assumes partially penetrating wells in the Evangeline Aquifer due to a lack of data for aquifer properties in the deeper section of the aquifer.
- This groundwater availability model includes four layers, which generally represent the Chicot Aquifer (Layer 1), the Evangeline Aquifer (Layer 2), the Burkeville Confining Unit (Layer 3), and the Jasper Aquifer including parts of the Catahoula Formation near the outcrop (Layer 4).
- The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).

RESULTS:

A groundwater budget summarizes the amount of water entering and leaving the aquifer according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the model results for the aquifers located within the district and averaged over the duration of the calibration and verification portion of the model run in the district, as shown in Table 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.
- Surface water outflow—The total water discharging from the aquifer (outflow) to surface water features such as streams, reservoirs, and springs.
- 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 or confining unit and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs.

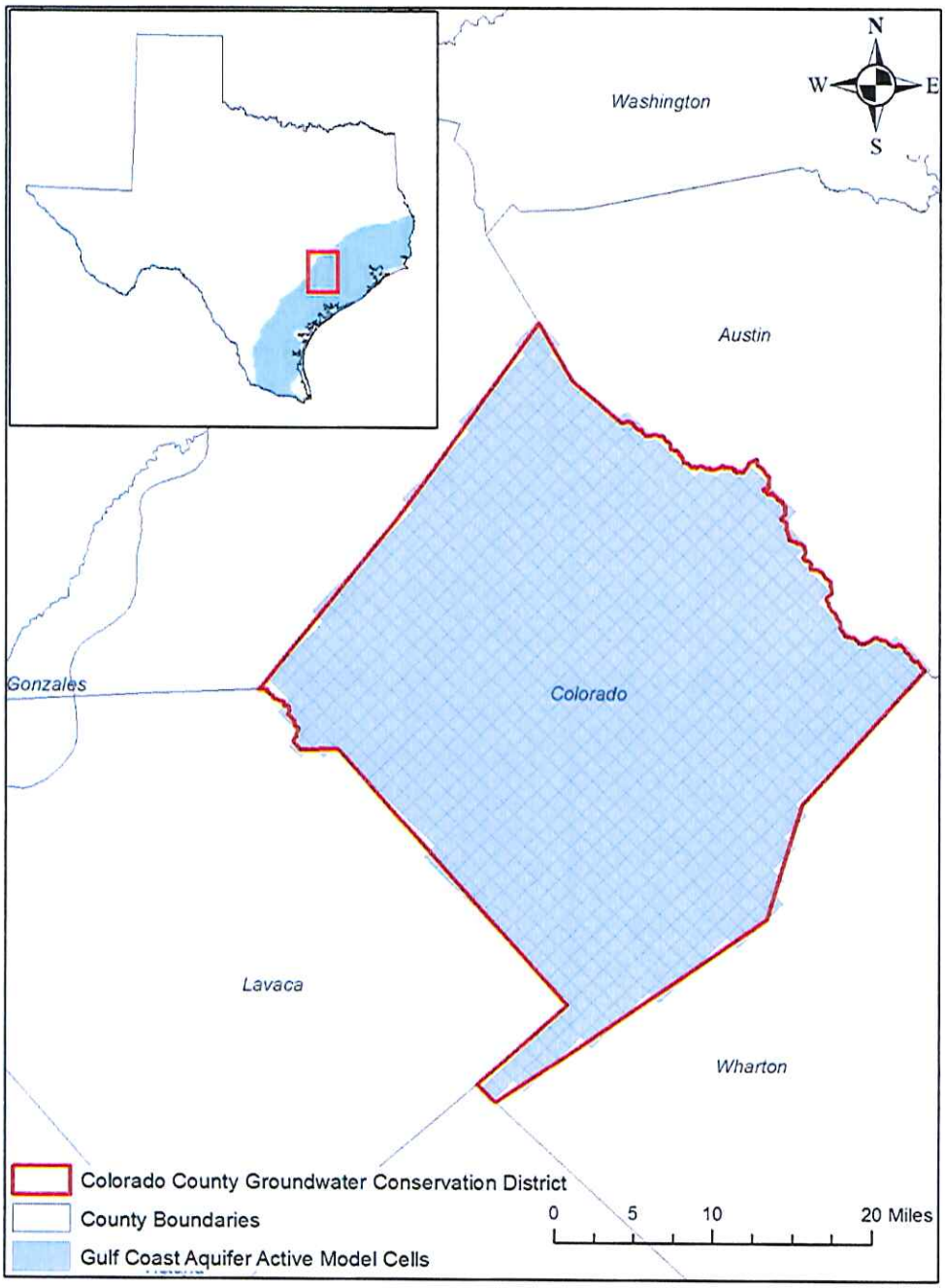
"Inflow" to an aquifer from an overlying or underlying aquifer will always equal the "Outflow" from the other aquifer.

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 THAT IS NEEDED FOR COLORADO COUNTY GROUNDWATER 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	34,764
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	11,412[1]
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	18,088
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	36,968
Estimated net annual volume of flow between each aquifer in the district	From underlying units into the Gulf Coast Aquifer System [2]	185[2]

[1] This total includes 14 acre-feet per year spring discharge and 11,398 acre-feet per year leakage to streams.
[2] Estimated from layer 1 of the Yegua-Jackson Aquifer groundwater availability model.



gcd boundary date = 09.25.13, county boundary date = 02.20.11, glfc_c model grid date = 08.20.13

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

LIMITATIONS:

The groundwater model(s) used in completing this analysis is the best available scientific tool that can be used to meet the stated objective(s). 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 interaction with streams are specific to particular historic 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. 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:

Chowdhury, Ali. 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.

Oliver, W., 2009, GAM Run 09-009: Texas Water Development Board, GAM Run 09-009 Report, 5 p., http://www.twdb.texas.gov/groundwater/docs/GAMruns/GR09-09.pdf.

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

APPENDIX E – Public Notices Regarding Hearing Related to Plan Adoption

CCGCD
COLORADO COUNTY GROUNDWATER CONSERVATION DISTRICT

NOTICE OF PUBLIC HEARING

Date: September 17, 2014
Time: 6:30 p.m.
Location: Stafford Opera House
425 Spring Street
Columbus, TX

AGENDA

Public Hearing of Proposed Management Plan

The Board will consider and/or take action on the following agenda items:

1. Call Public Hearing to Order
2. Pledge and Invocation
3. Public Comments and Presentations
4. Consider and Take Action on the District's Proposed Management Plan
5. Adjourn Public Hearing

FILED FOR RECORD
COLORADO COUNTY TX
2014 AUG 29 PM 2:45
DARLENE HAYEK
COLORADO CO. CLERK
DK

Citizens may comment for the record on items which are not on the agenda. The Board may not participate in discussion or deliberation of any item that is not on the agenda. Citizens may request that a topic be added to a future agenda. Citizens who wish to comment on a posted agenda item should sign a speaker's information card. Citizens may comment when the item is addressed by the board president. Citizens' comments are limited to three (3) minutes. The Board of Directors of the Colorado County Groundwater Conservation District reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Security Devices).

The Stafford Opera House is wheelchair accessible and accessible parking is available.

PUBLISHER'S AFFIDAVIT

STATE OF TEXAS

COLORADO COUNTY

Before me, the undersigned authority, this day appeared Michelle Bansa

and after being by me duly sworn, says that she is the Publisher

of *The Colorado County Citizen*, a newspaper published in Colorado County, Texas, and that the notice, a copy of which is hereto attached, was published in said newspaper on the following dates:

August 13 A.D. 2014

M Bansa

SUBSCRIBE AND SWORN TO before me, this the 14th day of August A.D. 2014

GINA SIDES
Notary Public, State of Texas
My Commission Expires
July 10, 2018

Notary Public in and for Colorado County, Texas

UBLICATION
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Colorado County, Texas
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bjection, intervention, or response
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rney for applicant(s) is:
T. Trefny
ox 458
Texas 78934

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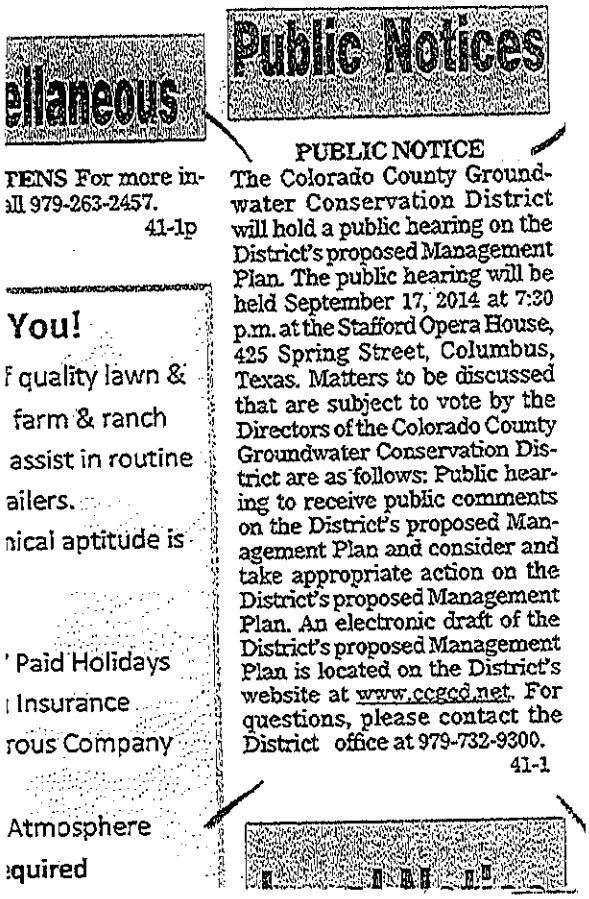
Hayek, Colorado County Clerk
ng Street, Suite 103
us, Texas 78934
mberly Menke, Deputy

The Colorado County Groundwater Conservation District will hold a **public hearing** on the **District's proposed Management Plan**. The public hearing will be held **September 17, 2014 at 7:00 p.m.** at the **910 Milam Street, Columbus, TX**. Matters to be discussed that are subject to vote by the Directors of the Colorado County Groundwater Conservation District are as follows: Public hearing to receive public comments on the District's proposed Management Plan and consider and take appropriate action on the District's proposed Management Plan. An electronic draft of the District's proposed Management Plan is located on the District's web site at www.ccgcd.net. For questions, please contact the District office at 979-732-9300.



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Public Notices

PUBLIC NOTICE

The Colorado County Groundwater Conservation District will hold a public hearing on the District's proposed Management Plan. The public hearing will be held September 17, 2014 at 7:30 p.m. at the Stafford Opera House, 425 Spring Street, Columbus, Texas. Matters to be discussed that are subject to vote by the Directors of the Colorado County Groundwater Conservation District are as follows: Public hearing to receive public comments on the District's proposed Management Plan and consider and take appropriate action on the District's proposed Management Plan. An electronic draft of the District's proposed Management Plan is located on the District's website at www.ccgcd.net. For questions, please contact the District office at 979-732-9300.
41-1

AFFIDAVIT OF PUBLICATION

THE STATE OF TEXAS,
COUNTY OF COLORADO

BEFORE ME, in person came Bruce Beal, the publisher of the Weimar Mercury, a newspaper published in Weimar, Colorado County, Texas, who being by me duly sworn says, that he published in said newspaper once a week for one week, the attached **(Public Notice – District's Proposed Management Plan)** the first insertion whereof was on the 28th day of August, 2014.

Bruce Beal

Publisher

ACKNOWLEDGED BEFORE ME on
17th day of September A.D. 2014.

KRISTI HILLJE
NOTARY PUBLIC
STATE OF TEXAS
EXPIRES
2-19-2015

By Kristi Hillje
Notary Public in and for Colorado County, Texas

(My Commission expires 2-19-2015)

CCGCD
COLORADO COUNTY GROUNDWATER CONSERVATION DISTRICT

FILED FOR RECORD
COLORADO COUNTY, TX
2018 MAR 27 AM 10:51
KIMBERLY MENKE
COUNTY CLERK

NOTICE OF PUBLIC HEARING

Date: April 19, 2018
Time: 7:00 p.m.
Location: 910 Milam St.
Columbus, TX

AGENDA

Public Hearing to Amend District Management Plan
The Board will consider and/or take action on the following agenda items:

1. Call Public Hearing to Order
2. Pledge and Invocation
3. Public Comments and Presentations
4. Review and Take Action on the Proposed Amended Management Plan
5. Adjourn Public Hearing

Citizens may comment for the record on items which are not on the agenda. The Board may not participate in discussion or deliberation of any item that is not on the agenda. Citizens may request that a topic be added to a future agenda. Citizens who wish to comment on a posted agenda item should sign a speaker's information card. Citizens may comment when the item is addressed by the board president. Citizens' comments are limited to three (3) minutes. The Board of Directors of the Colorado County Groundwater Conservation District reserves the right to adjourn into executive session at any time during the course of this meeting to discuss any of the matters listed above, as authorized by Texas Government Code Sections 551.071 (Consultation with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Security Devices).

The CCGCD office is wheelchair accessible and accessible parking spaces are available.

APPENDIX F – Letters Coordinating with Regional Surface Water Management Entities

The following is a list of surface water management entities that are present within the Colorado County Groundwater Conservation District boundaries. These entities have been forwarded a copy of the District's adopted Management Plan.

List of Texas Water Districts

Colorado County Water Control and Improvement District 2 (WCID #2)
Gay Stephens, President
P.O. Box 317
Garwood, TX 77442

Glidden Fresh Water Supply District (FWSD 1)
Edward Pavlicek, President
P.O. Box 85
Columbus, TX 78934-0085

The Falls Municipal Utility District (MUD)
c/o Smith, Murdaugh, Little & Bonham, L.L.P.
2727 Allen Pwky, Suite 1100
Houston, TX 77019-2191

Lower Colorado River Authority (LCRA)
Phil Wilson, General Manager
P.O. Box 220
Austin, TX 78767-0220

List of Texas Utilities (Water or Sewers)

Barten Water Supply Corporation (WSC)
Donnie Templeton, President
P.O. Box 805
Columbus, TX 78934-0805

City of Columbus (Water and Sewer Utilities)
Donald Warschak, City Manager
P.O. Box 87
Columbus, TX 78934-0087

City of Eagle Lake (Water and Sewer Utilities)
Sylvia Rucka, city Manager
P.O. Box 38
Eagle Lake, TX 77434-0038

City of Weimar (Water and Sewer Utilities)
Ray Miller, Jr., City Manager
106 E. Main St.
Weimar, TX 78962

Forest Oaks Water Supply Corporation (Water Utility)
Dennis Pavlicek
P.O. Box 325
Altair, TX 77412-0325

New Ulm Water Supply Corporation (Water Utility)
Charles L. Marshall, President
P.O. Box 73
New Ulm, TX 78950-0073

Rock Island Water Supply Corporation (Water Utility)
Calvin Harris President
P.O. Box 144
Rock Island, TX 77470-0144

Sheridan Water Supply Corporation (Water Utility)
Johnny Braddock, President
P.O. Box 206
Sheridan, TX 77475

APPENDIX G – Colorado County GCD Board of Directors Resolution Adopting Revised Management Plan

RESOLUTION

Resolution Adopting and Approving the Colorado County Groundwater Conservation District Management Plan

WHEREAS, The Colorado County Groundwater Conservation District (the "District") is a political subdivision of the State of Texas, created under authority of Section 59, article XVI of the Texas Constitution by the 80th Texas Legislature with the Act of May 23, 2007, House Bill 4032, as a governmental agency and a body politic and corporate; and,

WHEREAS, pursuant to the Texas Water Code §36.1072(e), the District must review and readopt the management plan at least once every five years; and,

WHEREAS, the prior Management Plan of the Colorado County Groundwater Conservation District was approved by resolution of the Board on November 23, 2009; and,

WHEREAS, during the week of August 25, 2014, a Notice of Hearing was published in three county newspapers and on August 29, 2014 a Notice of Hearing was posted at the District Office and Colorado County courthouse regarding a public hearing on the adoption of the Colorado County Groundwater Conservation District Management Plan; and,

WHEREAS, the proposed District Management Plan was made available for public review as of August 19, 2014; and,

WHEREAS, a public hearing was scheduled for September 17, 2014;

NOW THEREFORE BE IT RESOLVED THAT The Board of Directors of the Colorado County Groundwater Conservation District does hereby adopt and approve the Colorado County Groundwater Conservation District Management Plan and directs the submission of such Management Plan to the Executive Administrator of the Texas Water Development Board for review and approval.

CONSIDERED, PASSED, APPROVED, ADOPTED, RESOLVED, SIGNED AND DONE IN OPEN MEETING on this 17rd day of September, 2014.

By: Thomas L. Kelley
Tom Kelley, President

Attested by: Whyman D. Psencik
Whyman D. Psencik, Secretary

RESOLUTION: 2018 - 3

CCGCD
COLORADO COUNTY GROUNDWATER CONSERVATION DISTRICT

RESOLUTION APPROVING AMENDING THE DISTRICT'S MANAGEMENT PLAN

WHEREAS, the Colorado County Groundwater Conservation District (the "District") is a political subdivision of the State of Texas, created under authority of Section 59, article XVI of the Texas Constitution by the 80th Texas Legislature with the Act of May 23, 2007, House Bill 4032, as a governmental agency and a body politic and corporate; and,

WHEREAS, the prior Management Plan of the District was approved by resolution of the Board on September 17, 2014; and,

WHEREAS, the District is responsible for taking part in the joint planning in the District's Groundwater Management Area pursuant to the Texas Water Code §36.108; and,

WHEREAS, the District shall incorporate approved desired future conditions and modeled available groundwater into the District's management plan within two years of Groundwater Management Area 15 and Texas Water Development Board approval; and,

WHEREAS, a Notice of Hearing was posted March 27, 2018 at the District Office and Colorado County courthouse regarding a public hearing on the amendment of the District's management plan; and

WHEREAS, a public hearing was scheduled for April 19, 2018;

NOW, THEREFORE BE IT RESOLVED THAT The Board of Directors of the Colorado County Groundwater Conservation District does hereby amend the District's Management Plan to include required information regarding desired future conditions and modeled available groundwater and directs the submission of such amended Management Plan to the Executive Administrator of the Texas Water Development Board for review and approval.

CONSIDERED, PASSED, APPROVED, ADOPTED, RESOLVED, SIGNED AND DONE IN OPEN MEETING on this 19th day of April, 2018.

Thomas L. Kelley, President

Sam Parks, Secretary

APPENDIX H – Minutes of Colorado County GCD Board of Directors Meeting Related to the Public Hearing for Adoption of the Management Plan

CCGCD
COLORADO COUNTY GROUNDWATER CONSERVATION DISTRICT

PUBLIC HEARING MEETING MINUTES

Management Plan Hearing Minutes
September 17, 2014

The Directors of the Colorado County Groundwater Conservation District met on September 17, 2014 at 6:30 p.m. at the Stafford Opera House located at 425 Spring Street, Columbus. A quorum to conduct business was declared present.

Directors Present:	Tom Kelley, Scott Brasher, Whyman Psencik and Russell Trefny
Directors Absent:	Mary Stavinoha and Andrew Labay
Staff Present:	Jim Brasher, Kim Kansteiner, and CCGCD Attorney, Monique Norman
Guests:	Martin Herman and Sam Pirtle

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1. Director Kelley called the Public Hearing to order at 9:17 p.m.

2. There were no public comments or presentations.

3. GM Brasher presented a timeline for submission of the District's proposed Management Plan. Director Brasher motioned to approve the proposed Management Plan for submission. Director Trefny seconded the motion. The vote was as follows: Ayes: Directors Kelley, Brasher, Psencik and Trefny. Nayes: None. Absent from vote: Directors Stavinoha and Labay. Vote: Motion approved unanimously.

4. Director Kelley adjourned the Public Hearing at 9:20 p.m.

Thomas L. Kelley

Thomas L. Kelley, Board President, CCGCD

ATTEST:

Kim Kansteiner

Kim Kansteiner, Office Manager, CCGCD

CCGCD
COLORADO COUNTY GROUNDWATER CONSERVATION DISTRICT

Public Hearing MEETING MINUTES

Public Hearing Meeting Minutes: April 19, 2018

The Directors of the Colorado County Groundwater Conservation District met on April 19, 2018 at 7:00 p.m. at 910 Milam Street, Columbus, TX. A quorum to conduct business was declared present.

Directors Present:	Tom Kelley, Andy Labay, Mary Stavinoha, Sam Parks, Larry Solansky
Directors Absent:	Russell Trefny, Travis Wegenhoft
Staff Present:	Jim Brasher
Guests:	Vince Leibowitz

Director Kelley called the Public Hearing to order at 7:06 p.m.

Director Kelley led the pledge and invocation.

There were no public comments or presentations.

GM Brasher presented the proposed amended DFC Management Plan.

Director Stavinoha moved to have the amended DFC Management Plan approved as submitted. The motion was seconded, the motion carried

The public hearing was adjourned at 7:21 p.m.

Minutes Submitted By: Sam Parks, Secretary

Meeting minutes approved:

_____ _____

Sam Parks, Secretary Date

APPENDIX I – Colorado County GCD Contact Information

Mailing Address:

P.O. Box 667
Columbus, TX 78934

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District Staff:

General Manager: James E. Brasher
Office Manager: Kim Kansteiner

Board of Directors:

President: Thomas L. Kelley (Place 4)
Vice-President: Mary Stavinoha (Place 1)
Secretary: Sam Parks (Place 3)
Treasurer: Larry Solansky (Place 5)
Director: Andrew Labay (Place 6)
Director: Charles R. Trefny (Place 2)
Director: Travis Wegenhoft (Place 7)