2018 GROUNDWATER MANAGEMENT PLAN

Goliad County Groundwater Conservation District

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Adopted by GCGCD Board of Directors: _____

GOLIAD COUNTY GROUNDWATER CONSERVATION DISTRICT
MANAGEMENT PLAN
2018

The Goliad County Groundwater Conservation District ("GCGCD") was created in 2001 by authority of HB3651 of the 77th Texas Legislature. The District was created to serve a public use and benefit, and is essential to accomplish the objectives set forth in Section 59, Article XVI, of the Texas Constitution. The District's boundary is coextensive with the boundary of Goliad County and contains 551,040 acres of land with 90 percent of the acreage being utilized as rangeland for livestock production. The District is bounded on the north by DeWitt County, on the east by Victoria County, on the south by Refugio County, and on the west by Bee and Karnes Counties.

DISTRICT MISSION

The mission of the Goliad County Groundwater Conservation District is to develop rules to provide for the protection, preservation, and conservation of groundwater, and to prevent waste of groundwater from the Gulf Coast Aquifer System to the extent of which the District has jurisdiction.

The District is committed to manage and protect the groundwater resources within its jurisdiction and to work with others to ensure a sustainable, adequate, high quality and cost-effective supply of water, now and in the future. The District will strive to develop, promote, and implement water conservation and management strategies to protect water resources for the benefit of the citizens, economy, and environment of the District. The preservation of this most valuable resource can be achieved in a prudent and cost-effective manner through conservation, education, management, and cooperation

STATEMENT OF GUIDING PRINCIPLES

Goliad and surrounding counties have a large agricultural based rural community, which relies heavily on groundwater and exclusively on groundwater during periods of drought. Therefore, groundwater resources are of vital importance to the continued vitality of the citizens, economy and environment within the District area.

Goliad County is located over the recharge area of the Evangeline and Chicot segment of the Gulf Coast Aquifer System. It is imperative that the Gulf Coast Aquifer System be managed on a sustainable basis to protect the many shallow domestic and livestock supply wells in the District and many more in surrounding counties. These drinking water supply wells are the life-blood for maintaining the agricultural economy.

TIME PERIOD OF THIS PLAN

This District Groundwater Management Plan becomes effective immediately following adoption by the Goliad County Groundwater Conservation District Board of Directors and is approved as administratively complete by the Texas Water Development Board. This plan will remain in effect for a period of 5 years or until a revised or amended plan may be approved, whichever comes first.

GROUNDWATER RESOURCES

The outcrop area of the Evangeline Aquifer and the Chicot Aquifer, both components of the Gulf Coast Aquifer System, exist in Goliad County. The outcrop area for the Evangeline Aquifer is in the northern part of Goliad County and the outcrop area for the Chicot Aquifer is in the Southern part of Goliad County. Most of the wells in the County are producing from these two aquifers.

Gulf Coast Aquifer

The Gulf Coast Aquifer System forms a wide belt along the Gulf of Mexico from Florida to Mexico. In Texas, the aquifer provides water to all or parts of 54 counties and extends from the Rio Grande northeastward to the Louisiana-Texas border. Municipal and irrigation uses account for approximately 90 percent of the total pumpage from the aquifer. The aquifer consists of complex interbedded clays, silts, sands, and gravels of Cenozoic Era, which are hydrologically connected to form a large, leaky artesian aquifer system. This system comprises four major components consisting of the following generally recognized water-producing formations. The deepest is the Catahoula, which contains ground water near the outcrop in relatively restricted sand layers. Above the Catahoula is the Jasper Aquifer, primarily contained within the Oakville Sandstone. The Burkeville confining layer separates the Jasper from the overlying Evangeline Aquifer, which is contained within the Fleming and Goliad sands. The Chicot Aquifer, or upper component of the Gulf Coast Aquifer System, consists of the Lissie, Willis, Bentley, Montgomery, and Beaumont formations, and overlying alluvial deposits. Not all formations are present throughout the system, and nomenclature often differs from one end of the system to the other.

Water quality is generally good in the shallower portion of the aquifer. From the San Antonio River Basin southwestward to Mexico, quality deterioration is evident in the form of increased chloride concentration and saltwater encroachment along the coast. Little of this ground water is suitable for prolonged irrigation due to either high salinity or alkalinity, or both. In several areas at or near the coast, including Galveston Island and the central and southern parts of Orange County, heavy municipal or industrial pump age had previously caused an updip migration, or saltwater intrusion, of poor-quality water into the aquifer. Recent reductions in pumpage here have resulted in stabilization and, in some cases, even improvement of ground-water quality. Years of heavy pumpage for municipal and manufacturing use in portions of the aquifer have resulted in areas of significant water-level decline. Declines of 200 feet to 300 feet have been measured in some areas of eastern and southeastern Harris and northern Galveston counties. Other areas of significant water-level declines include the Kingsville area in Kleberg County and portions of Jefferson, Orange, and Wharton counties. Some of these declines have resulted in compaction of dewatered clays and significant land surface subsidence. Subsidence is generally less than 0.5 foot over most of the Texas coast, but has been as much as nine feet in Harris and surrounding counties. As a result, structural damage and flooding have occurred in many low-lying areas along Galveston Bay in Baytown, Texas City, and Houston. Conversion to surface-water use in many of the problem areas has reversed the decline trend. The portion of the Gulf Coast Aquifer System in the Goliad County area contains generally good quality water. The aquifer depth ranges from approximately 450 feet in north Goliad County to approximately 1200 feet in south Goliad County. Reference: Baker, E.T., Jr., 1979, Stratigraphic and hydrologic framework of part of the Coastal Plain of Texas: TWDB Report 236. http://www.twdb.texas.gov/publications/reports/numbered_reports/doc/R236/Report236.asp

GROUNDWATER RECHARGE

Recharge rates for the Major Aquifers (from TWDB Website) are decided as follows: The main techniques for estimating recharge are Darcy's law, groundwater modeling, and base flow. Recharge rates in the Gulf Coast Aquifer System range from 0.1 to 2 in/yr. An additional study conducted by the Bureau of Economic Geology, Jackson School of Geosciences, University of Texas at Austin, for TWDB in 2011 is attached in Appendix A. This study also provides graphic and tabular data showing that recharge in the Goliad County area is in the range of 0.25" to 1" per year. The complete report can be accessed at: www.twdb.texas.gov

GCGCD monitors water levels once or twice per year. This monitoring program was begun in 2003. The program has been expanding and currently the District is monitoring 90+ wells annually. The recorded water level results are provided in Appendix B. These results show significant drawdown in north Goliad County pumping from the Evangeline Aquifer with some drawdown in south Goliad County from the Chicot Aquifer. The recorded drawdown since 2003 far exceeds the modeled drawdown. This mismatch in values is not considered a result of a period of drought.

The historic values used for recharge in Goliad County may no longer be valid. The change in surface land use since the drought of the 1950's, especially over the Evangeline Aquifer, has had a major impact on recharge values. The EDYS ecological model (brush management) prepared for Goliad County provides extensive scientific data. Appendix C as follows:

1. Cultivated acreage decreased substantially during and following the drought of the 1950's. Cultivated land was replaced with native vegetation including brush and hardwoods. Page 103.
2. Change in surface land use has significantly increased evapotranspiration (ET) which in most years exceeds rainfall with a result of no recharge.

AMOUNT OF GROUNDWATER BEING USED WITHIN THE DISTRICT ANNUALLY

There are two sets of data provided. In Appendix D, Estimated Historic Water Use TWDB Data for years 2000 through 2016 is shown. In Appendix E, the last five years (2012-2015) prepared by GCGCD is shown. The last five years data provided by GCGCD is based on Historic Use Allocations on file, estimated exempt use, and permitted water use. The projected groundwater to be used in the District is shown in Appendix F.

TWDB GROUNDWATER AVAILABLILITY MODEL (GAM) RUN 12-018 v. 2 DATA

ANNUAL AMOUNT OF RECHARGE FROM PRECIPITATION TO THE GROUNDWATER RESOURCES IN THE DISTRICT is shown in Appendix G.

ANNUAL VOLUME OF WATER THAT DISCHARGES FROM THE AQUIFER TO SPRINGS AND SURFACE WATER BODIES is shown in Appendix G.

ESTIMATE OF THE ANNUAL VOLUME OF FLOW INTO THE DISTRICT, OUT OF THE DISTRICT, AND BETWEEN AQUIFERS IN THE DISTRICT is shown in Appendix G.

2017 TEXAS STATE WATER PLAN DATA

GCGCD has reviewed the Projected Water Supply Needs and the Projected Water Management Strategies tables in the Historical Water Use / State Water Plan related to groundwater. The District has considered the water supply needs and water management strategies included in the adopted state water plan. There are no water supply needs identified in the county. In addition, there are four water management strategies for municipal water conservation based on demand reduction which the District has considered.

PROJECTED SURFACE WATER SUPPLY WITHIN THE DISTRICT is shown in Appendix H.
PROJECTED TOTAL DEMAND FOR WATER WITHIN THE DISTRICT is shown in Appendix H.
WATER SUPPLY NEEDS is shown in Appendix H.
WATER MANAGEMENT STRATEGIES is shown in Appendix H.

MANAGEMENT OF GROUNDWATER SUPPLIES

The District will manage and conserve the supply of groundwater within the District in order to maintain the economic viability of the District, county, and region. This will be done through coordination with and cooperation with Groundwater Conservation Districts in GMA 15.

A monitor well observation network is established to track any changes in water level or quality. The District will make a regular assessment of conditions and report those conditions to the public.
The District will adopt and update rules to regulate groundwater withdrawals by means of well spacing and production limits. The District may deny a well construction permit or limit groundwater withdrawals in accordance with district rules.

Goliad County Groundwater Conservation District will manage groundwater availability from the Gulf Coast Aquifer System on a sustainable basis to the extent possible. Any permitted pumping will be subject to curtailment based on water levels recorded by multiple monitor wells throughout the District.

One permit for in-situ mining of uranium has been approved in Goliad County. Chapter 36 Texas Water Code does not address groundwater use and potential contamination associated with uranium exploration and mining.

The District has implemented an extensive baseline water quality testing program which will continue as required.

A necessary ingredient in the management of groundwater supplies is an accurate identification of historic, current and future use. GCGCD has determined that historic pumping has been greatly understated primarily for oil and gas exploration and for irrigation.

SURFACE WATER SUPPLIES

The San Antonio River runs through Goliad County. The only use of river water in the District is for irrigation. There is one major surface water lake in the District. Coleto Creek Reservoir is located at the boundary of Victoria and Goliad counties in the lower Guadalupe River Basin, and is a cooling reservoir for steam electric power generation. This constructed reservoir supplies water for steam-electric power generation at Coleto Creek Power Station located in Goliad County. Because the predominant agriculture product is the raising of livestock, there are numerous stock tanks located within the District. These stock tanks provide surface water for livestock and wildlife consumption and provide some aquifer recharge. Many of these stock tanks go dry during drought periods requiring additional pumping of groundwater. The District has participated in two programs with USGS and others to qualify and quantify interface between the Gulf Coast Aquifer System and the San Antonio River and between the Gulf Coast Aquifer System and the fifteen-mile Coleto Creek. Both studies concluded that the Aquifer provides a gaining stream to the two listed surface streams. The reports of these two studies can be accessed at www.goliadcogcd.org.

REGIONAL (L) WATER PLAN

As required by Texas Water Code Chapter 36.1071(b) this management plan and any amendments thereon shall be considered in the development of the regional water plan. Considering this local management plan will meet the intent of Senate Bill #1 and therefore, result in a regional management plan, which is consistent with this local management plan, resulting in the protection of the local control of groundwater management by the local people who elected the Board of Directors to operate the District.

ACTIONS, PROCEDURES, PERFORMANCE AND AVOIDANCE FOR PLAN IMPLEMENTATION

The District will implement the provisions of this plan and will utilize the provisions of this plan as a guidepost for determining the direction of priority for 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. A copy of the Rules of Goliad County Groundwater Conservation District may be found at www.goliadcogcd.org.

The District will update and adopt rules relating to the permitting of wells and the production of groundwater. The rules adopted by the District shall be pursuant to the TWC Ch36 and the provisions of this plan. All rules will be adhered to and enforced. The promulgation and enforcement of the rules will be based on the best technical evidence available.

The District shall treat all citizens with equality. Citizens may apply to the District for discretion in enforcement of the rules on grounds of adverse economic effect or unique local conditions. In granting of discretion to any rule, the Board shall consider the potential for adverse effect on adjacent landowners. The exercise of said discretion by the Board shall not be construed as limiting the power of the Board.

The District may amend the District rules as necessary to comply with changes to Chapter 36 of the Texas Water Code and to insure the best management practices of the groundwater in the District. The implementation of the rules of the District will be based on the best available scientific and technical data, and on fair and reasonable evaluation.

The District has encouraged and will continue to encourage public cooperation in the implementation of the management plan for the District.

ESTABLISHMENT OF DESIRED FUTURE CONDITIONS (DFC) AND ESTIMATE OF THE MODELED AVAILABLE GROUNDWATER

The District is a member of GMA-15 that is comprised of thirteen wholly or in part groundwater conservation districts. On April 29, 2016, GMA-15 members adopted a DFC to manage the groundwater resources to achieve no more than 13 feet of average drawdown in the Gulf Coast Aquifer System within the GMA-15 boundary at December 2069. As presented in GAM Run 16-025 MAG (Appendix I), the Districts DFC for Goliad County is 10 feet and the modeled available groundwater (overall pumping) is 11,539 acre-feet/year.

The resolution to adopt Desired Future Conditions, transmittal letter to submit the adopted DFC's for GMA-15, and Explanatory Report are included in Appendix J-L.

During the development of the DFC it became apparent that modeled available groundwater and associated drawdown was not compatible with the Districts pumping and drawdown data. GCGCD requested and was granted a greater variance for the District. See Appendix M.

During the next five-year GMA-15 planning cycle, GCGCD will continue efforts to remedy discrepancies between model and District data to provide for a long-term ability to manage groundwater in the District.

METHODOLOGY FOR TRACKING DISTRICT PROGRESS IN ACHIEVING MANAGEMENT GOALS

A Performance Review will be prepared by the general manager and staff of the District. The Performance Review will cover the activities of the District including information on the District's performance in regards to achieving management goals and objectives. The presentation of the report will occur during a monthly Board meeting in the first quarter of the next fiscal year beginning October 1, 2018. The report will include the number of instances in which each of the activities specified in the District's management objectives was engaged in during the fiscal year. Each activity will be referenced to the estimated expenditure of staff time and budget in accomplishment of the activity. The notations of activity frequency, staff time and budget will be referenced to the appropriate performance standard for each management objective describing the activity, so that the effectiveness and efficiency of the District's operations may be evaluated. The Board will maintain the report on file, for public inspection at the District's offices upon adoption and on the District website at www.goliadcogcd.org.

GOAL 1.0
PROVIDING THE MOST EFFICIENT USE OF GROUNDWATER

Management Objective - The District will maintain an aquifer water level program monitoring a minimum of 50 wells in the District annually.
Performance Standard - The District will include water level monitoring data on its website and in the Performance Review.
Management Objective - The District will continue to require the registration and location of all new and replacement wells drilled within the boundary of the District.
Performance Standard - The number of wells drilled each year will be included in the Performance Review. The wells are to be reported by category as replacement, new exempt, and new permitted.

GOAL 2.0
CONTROLLING AND PREVENTING WASTE OF GROUNDWATER

Management Objective - Each year, the District will sample the water quality in at least five (5) selected wells in order to monitor water quality trends and identify if contamination of groundwater is occurring. The District will also make available to well owners a service for well water quality analysis, to be paid for by the well owner.
Performance Standard – 1. Annual report of wells sampled for water quality by the District. 2. Annual report of wells sampled by the District upon request.
Management Objective - When processing an application for a production permit, the District will evaluate and recommend selection of efficient pumping and distribution equipment. For process applications, the District will evaluate reprocessing and recovery options.
Performance Standard - Recommendations will be included in the approved application.

GOAL 3.0
CONTROLLING AND PREVENTING SUBSIDENCE

Goliad County Groundwater Conservation District recognizes subsidence is a potentially important issue associated with the management of groundwater. Based on studies done in GMA-15, subsidence has occurred in some locations of the management area. In the studies conducted, Goliad County was not

included. As information becomes available, GCGCD may adjust their management plan and groundwater rules to address subsidence if it becomes an issue. Therefore, this goal is not applicable.

GOAL 4.0
ADDRESSING CONJUNCTIVE SURFACE WATER MANAGEMENT ISSUES

Management Objectives - Each year the District will participate in the regional water planning process by attending at least one meeting of Region L Planning Group to encourage the development of alternative water supplies to reduce the reliance on groundwater.
Performance Standard - Report the number of Region L meetings attended.

GOAL 5.0
ADDRESSING NATURAL RESOURCE ISSUES THAT IMPACT THE USE AND AVAILABILITY OF GROUNDWATER AND WHICH ARE IMPACTED BY THE USE OF GROUNDWATER

Management Objectives - Each year the District will locate all of the wells drilled that year for compliance of well spacing including minimum distance from septic systems or other defined potential contamination.
Performance Standard - The District will include in the Performance Review a record of any deficiencies found and the corrective action that was taken.

GOAL 6.0
ADDRESSING DROUGHT CONDITIONS

Management Objectives - Semiannually the District will update the rainfall values for the District for the previous six months.
Performance Standard - The District will issue one report semiannually, listing the rainfall values for the county. This report will be entered on the District website and included in the Performance Review. The following link has much useful information and includes links to major drought reporting websites.
https://waterdatafortexas.org/drought

GOAL 7.0
ADDRESSING CONSERVATION, RECHARGE ENHANCEMENT, RAINWATER HARVESTING, PRECIPITATION ENHANCEMENT AND BRUSH CONTROL

CONSERVATION
Management Objective - The District will at least on two occasions each year provide public information on water conservation and waste prevention through presentations at public schools, civic organizations, newspaper articles, or articles posted on the District website.
Performance Standard - The District will report in the Performance Review the number of speaking appearances made by the District each year and the number of newspaper articles published in the local newspaper and on the District website each year addressing conservation.

RECHARGE ENHANCEMENT
Management Objective - The District recommends that the most efficient method for increasing recharge is continued brush and weed control.
Performance Standard - See "Brush Control" Goal.

RAINWATER HARVESTING

Management Objectives - The District will provide current information on rainwater harvesting on the District web site. The District will provide information to the public on rainwater harvesting through literature in the office.

Performance Standard - The District will include the number of persons receiving literature from the office on rainwater harvesting and report any known District application in the Performance Review.

PRECIPITATION ENHANCEMENT

The District has evaluated a precipitation enhancement program and has determined that it is not appropriate or cost effective. Therefore, the District has determined that a precipitation enhancement goal is not applicable at this time.

BRUSH CONTROL

Management Objective - Brush control is extensively practiced in the county and the practice is encouraged by the Farm Service Agency and the GCGCD. The District will continue to support an educational program to inform the stakeholders of the benefits of controlling brush on their property.

Performance Standard - The District will publish at least one article annually in the local newspaper on the benefits to the water cycle of controlling the amount of brush on your property. A copy of this article will be included in the Performance Review to the District Board of Directors and published on the District website.

GOAL 8.0
ADDRESSING THE DESIRED FUTURE CONDITIONS (DFC)

Management Objective - At the end of each fiscal year, the District will prepare an updated data sheet of the estimated total groundwater pumping in the District for the past year. The District Board of Directors will review the total groundwater pumping data along with the water level data from Goal 1 and make an evaluation for compliance to the DFC. The Board of Directors will also review the data and compare it to the Modeled Available Groundwater.

Performance Standard - The data and evaluation will be included in the Performance Review.

Goliad County Groundwater Conservation District Management Plan Appendices

Appendix A -	Bureau of Economic Geology, Jackson School of Geosciences, University of Texas at Austin, for TWDB in 2011
Appendix B -	Water Level Monitoring Data 2003-2016: Goliad County Groundwater Conservation District
Appendix C -	EDYS Report
Appendix D -	TWDB Estimated Historical Water Use: Goliad County Groundwater Conservation District
Appendix E -	2012-2017 Documented Water Use: Goliad County Groundwater Conservation District
Appendix F -	GCGCD Projected Water Use
Appendix G -	GAM Run 12-018 v. 2
Appendix H -	2017 State Water Plan Data sets.
Appendix I -	GAM Run16-025 MAG Modeled Available Groundwater for the Gulf Coast Aquifer System in Groundwater Management Area 15
Appendix J -	GMA 15 Resolution
Appendix K -	GMA 15 Transmittal Letter
Appendix L -	DFC Explanatory Report
Appendix M -	GCGCD Proposed Desired Future Conditions