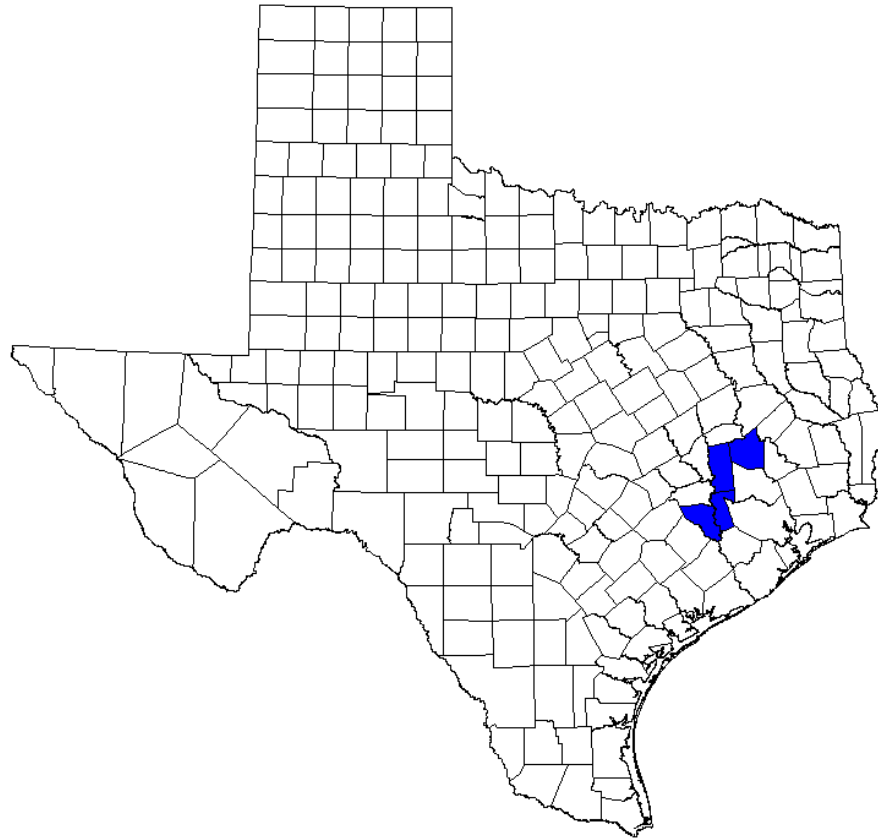


# **Bluebonnet Groundwater Conservation District Groundwater Management Plan - 2023**



***Final Approved***

**September 25, 2023**

# Bluebonnet Groundwater Conservation District Groundwater Management Plan - 2023

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- B – Estimated Historical Groundwater Use and 2022 State Water Plan Datasets: Bluebonnet Groundwater Conservation District**
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- D – Rules of the Bluebonnet Groundwater Conservation District (April 13, 2023)**
- E – Documentation Associated with Updated Guidelines for Preparation of Hydrogeologic Reports in Support of Applications for the Permitted Use of Groundwater**
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- G – Resolution Adopting Management Plan and Notices of Public Hearing**

## **1.0 Introduction**

The Bluebonnet Groundwater Conservation District (the “District”) was created by the 77th Texas Legislature under the authority of Section 59, Article XVI, of the Texas Constitution, and in accordance with Chapter 36 of the Texas Water Code (“Water Code”), by the Act of May 21, 2001, 77th Leg., R.S., ch. 1361, 2001 Tex. Gen. and Spec. Laws, codified May 29, 2009, 81<sup>st</sup> Leg., R.S., ch. 1139. sec. 8825 (“the District Act”).

The District is a governmental agency and a body politic and corporate. 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 boundaries are coextensive with the boundaries of Austin, Grimes, Walker, and Waller Counties, Texas, and lands and other property within these boundaries will benefit from the works and projects that will be accomplished by the District.

### **1.1 District Mission and Purpose of Management Plan**

The 75<sup>th</sup> Texas Legislature in 1997 enacted Senate Bill 1 (SB 1) to establish a comprehensive statewide water planning process. SB 1 contained provisions that required groundwater conservation districts to prepare management plans to identify the water supply resources and water demands that will shape the decisions of each district. SB 1 required that the management plans include management goals for each district to manage and conserve the groundwater resources within their boundaries. In 2001, the Texas Legislature enacted Senate Bill 2 (SB 2) to build on the planning requirements of SB 1 and to further clarify the actions necessary for districts to manage and conserve the groundwater resources of the state of Texas.

The Texas Legislature enacted significant changes to the management of groundwater resources in Texas with the passage of House Bill 1763 (HB 1763) in 2005. HB 1763 created a long-term joint planning process in which groundwater conservation districts (GCDs) in each Groundwater Management Area (GMA) are required to meet and determine the Desired Future Conditions (DFCs) for the groundwater resources within their boundaries by September 1, 2010. In addition, HB 1763 required GCDs to share management plans with the other GCDs in the GMA for review by the other GCDs.

The Bluebonnet Groundwater Conservation District’s management plan satisfies the requirements of SB 1, SB 2, HB 1763, the statutory requirements of Chapter 36 of the Texas Water Code, and the administrative requirements of the Texas Water Development Board’s (TWDB) rules.

## 2.0 Technical Information Required by Texas Administrative Code

The information in this section is provided pursuant to statutes and rules as summarized in the TWDB Groundwater Conservation District Management Plan Checklist (dated December 6, 2012). The information is organized according to the order in the checklist.

### 2.1 Estimate of the Modeled Available Groundwater

Texas Water Code § 36.001 defines modeled available groundwater (MAG) as “the amount of water that the executive administrator determines may be produced on an average annual basis to achieve a desired future condition established under Section 36.108”.

Bluebonnet Groundwater Conservation District is within the boundaries of Groundwater Management Area 14 (GMA 14). GMA 14 adopted the following desired future condition (DFC) for all of GMA 14 on January 5, 2022:

*In each county in GMA 14, no less than 70 percent median available drawdown remaining in 2080 or no more than an average of 1.0 additional foot of subsidence between 2009 and 2080.*

The specific model run was named: **32\_PEST\_ConsFac\_Base16\_30kLim\_1.0-70\_2080**. A more complete description of the various assumptions and constraints is provided below:

- 70 percent median available drawdown remaining in 2080 (using 2009 as a base condition),
- No more than 1 ft additional average subsidence in 2080 (using 2009 as a base condition),
- Pumping in a county is no more than 30,000 above the maximum projected water demand between 2020 and 2070 as defined in the current state water plan,
- The initial pumping distribution was taken from the 2016 modeled available groundwater simulation of the HAGM for the second round of desired future conditions.

The modeled available groundwater (MAG) was calculated by the Texas Water Development Board and was provided in GAM Run 21-019 MAG, dated September 8, 2022, which is attached as Appendix A to this plan. The MAG is a constant value in all reported decades (2020 to 2080), and is reported by county and by district total as follows:

- Austin County: 46,560 AF/yr
- Grimes County: 51,487 AF/yr
- Walker County: 42,504 AF/yr
- Waller County: 55,533 AF/yr
- Bluebonnet GCD Total: 196,084 AF/yr

## **2.2 Estimate of the Amount of Groundwater Being Used Within District on an Annual Basis**

Please refer to Appendix B: Estimated Historical Use and 2022 State Water Plan Datasets, Bluebonnet Groundwater Conservation District, dated April 5, 2023.

## **2.3 Estimate of the Annual Amount of Recharge from Precipitation**

Please refer to Appendix C: GAM Run 23-005, Bluebonnet Groundwater Conservation District Management Plan, dated June 9, 2023.

## **2.4 Estimate of the Annual Volume of Water That Discharges to Springs and Surface Water Bodies**

Please refer to Appendix C: GAM Run 23-005, Bluebonnet Groundwater Conservation District Management Plan, dated June 9, 2023.

## **2.5 Estimate of the Annual Volume of Flow into the District, out of the District, and between Aquifers**

Please refer to Appendix C: GAM Run 23-005, Bluebonnet Groundwater Conservation District Management Plan, dated June 9, 2023.

## **2.6 Estimate of the Projected Surface Water Supply within the District**

Please refer to Appendix B: Estimated Historical Use and 2022 State Water Plan Datasets, Bluebonnet Groundwater Conservation District, dated April 5, 2023.

In summary, the total surface water supplies by county are:

- Austin County = 0 AF/yr
- Grimes County = 22,283 AF/yr
- Walker County = 22,986 AF/yr
- Waller County = 93 AF/yr

## **2.7 Estimate of the Projected Total Demand for Water within District**

Please refer to Appendix B: Estimated Historical Use and 2022 State Water Plan Datasets, Bluebonnet Groundwater Conservation District, dated April 5, 2023.

In summary, the projected total demands for water by county in 2070 are:

- Austin County = 16,586 AF/yr
- Grimes County = 23,687 AF/yr
- Walker County = 15,458 AF/yr
- Waller County = 39,686 AF/yr

## **2.8 Water Supply Needs**

Please refer to Appendix B: Estimated Historical Use and 2022 State Water Plan Datasets, Bluebonnet Groundwater Conservation District, dated April 5, 2023.

In summary, the number of Water User Groups with water supply needs (supplies less than projected demands) by county are:

- Austin County: 5 (maximum need = 1,766 AF/yr)
- Grimes County: 5 (maximum need = 288 AF/yr)
- Walker County: 0
- Waller County: 5 (maximum need = 1,895 AF/yr)

The District will continue to work with both Region G and H Regional Water Planning Groups in the identification of projected water supply needs.

## **2.9 Water Management Strategies**

Please refer to Appendix B: Estimated Historical Use and 2022 State Water Plan Datasets, Bluebonnet Groundwater Conservation District, dated April 5, 2023. The District continues to encourage conservation, water loss reduction, and reuse to meet the listed strategies.

In summary, the number of water management strategies to meet water supply needs by county are:

- Austin County: 23 (total of 6,242 AF/yr in 2070)
- Grimes County: 13 (total of 1,043 AF/yr in 2070)
- Walker County: 19 (total of 1,219 AF/yr in 2070)
- Waller County: 28 (total of 13,513 AF/yr in 2070)

These specific water management strategies were considered and included in the overall preparation of this management plan as most of the water user groups are solely dependent on groundwater. The surface water dependent strategies were considered in relation to their expanded use or development of groundwater. These strategies are considered feasible by TWDB and the Regional Water Planning Groups to be included in the State Water Plan. The actual feasibility and usefulness of these, and other, strategies will not be realized until, or if, they are implemented by the individual water user group.

Two notable strategies for the County-Other WUG are the expanded use of groundwater in Austin County (1,900 AF/yr by 2070 over two river basins) and expanded use of groundwater in Waller

County (3,400 AF/yr by 2070 over two river basins). Water management strategies are considered as part of the desired future condition development criteria in TWC 36.108(d)(2) the District participates in with GMA 14. These considerations contribute to the MAG values exceeding current production to accommodate existing and future groundwater users. As more fully described below, the District's permitting process was recently updated to streamline review of permits that supply relatively low production requests that would result in a more efficient means of meeting these water supply needs.

## **2.10 How the District Will Manage Groundwater Supplies**

The District's Management Plan is promulgated under the District's statutory authority to protect private property rights, balance the conservation and development of groundwater to meet the needs of this state, use the best available science in the conservation and development of groundwater and to achieve the following objectives; to provide for conserving, preserving, protecting, and recharging of the groundwater or of a groundwater reservoir of its subdivisions in order to control subsidence, prevent degradation of water quality, or prevent waste of groundwater.

The District's orders, rules, regulation, requirements, resolutions, policies, guidelines, or similar measures have been implemented to fulfill these objectives to minimize as far as practicable the drawdown of the water table or the reduction of artesian pressure, to prevent or control subsidence, to prevent interference between wells, to prevent degradation of water quality, and to prevent waste.

Permits are reviewed individually and independently. The District reviews and analyzes any potential impacts to existing or future users of groundwater. The District requires the submittal of Phase I and Phase II hydrogeologic reports for non-exempt wells with an inside casing diameter of eight (8) inches or greater as part of the permit application process. Phase I reports are further subdivided based on annual permit production. If the permit applicant requests less than 200 million gallons per year, a Phase I-a report is required that relies solely on data extracted from the Groundwater Availability Model. If the permit applicant requests more than 200 million gallons per year, a Phase I-b report is required that includes the Phase I-a requirements and a model simulation using the Groundwater Availability Model.

In general, the Phase I report is intended to evaluate the impacts of pumping, such as drawdown, well interference, potential for measurable subsidence and other relevant impacts, using existing data and the existing regional groundwater flow model of the area for the aquifer in which the well is to be completed. Phase II reports are intended to be a final report that relies on site specific data, information, test results and analyses. The District-provided guideline document sets standards and expectations for the investigations and reports. The District may exercise discretion in the application of the guidelines on an individual and site-specific basis to allow a practicable application of the guidelines while ensuring a result yielding the information needed by the District to process the permit application. The data and analyses are used to address production limits, monitoring requirements, and permit conditions.

Production of groundwater in any manner, including high volume, high rate, high frequency, long duration, or within a concentrated area, that causes the potential for measurable subsidence is



prohibited. Controlling and preventing measurable subsidence will be addressed during review and processing of new, renewed, and amended permit applications. If numerical modeling, local hydrogeological conditions including subsurface clay content, aquifer testing or other reliable data demonstrate the potential for measurable subsidence, the District will implement actions to address subsidence that may include (a) permit denial, revocation, suspension, cancellation, modification, or amendment, (b) setting production limits, (c) setting spacing requirements, (d) imposing special permit conditions requiring extensometer installation, subsidence monitoring and reporting, (e) establishing threshold limits that trigger reduces production based on monitoring results and (f) any other action reasonably necessary to control and prevent measurable subsidence. If the District has reason to believe that a non-exempt well has the potential to cause measurable subsidence, the District may take all actions it deems necessary to address the potential subsidence.

### **2.10.1 Methodology**

An annual report (“Annual Report”) will be created by the general manager and staff of the District and provided to the members of the Board of the District. The Annual Report will cover the activities of the District including information on the District’s performance regarding achievement of the District’s management goals and objectives. The Annual Report will be delivered to the Board each year coordinating collection of permitted pumping data, downloaded available drought information, and water level monitoring. A copy of the Annual Report will be kept on file and available for public inspection at the District’s offices upon adoption.

## **2.11 Actions, Procedures, Performance, and Avoidance**

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

The District has adopted rules in accordance with Chapter 36 of the Texas Water Code. The development of rules is based on the scientific information and technical evidence available to the District. Current rules were adopted on September 21, 2023, and are presented in Appendix D. The rules are also available at:

<http://www.bluebonnetgroundwater.org/regulations/rules/>

An important component of implementing the rules is the permitting of wells. The documentation for the Guidelines to prepare Phase I and Phase II reports in support of applications for permitted uses of groundwater is presented in Appendix E.

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

## **2.12 Evidence that the Plan was Adopted after Notice and Hearing**

The signed resolution associated with Board approval of this management plan after the public hearing is presented in Appendix G. The notices of the public hearing are also included in Appendix G.

### 3.0 Management Goals

#### 3.1 Providing the most efficient use of groundwater

**Objective:** Each year, the District will require all new exempt or non-exempt wells that are constructed within the boundaries of the District to be registered with the District in accordance with the District rules.

**Performance Standard:** The number of exempt and non-exempt wells registered by the District will be incorporated into the Managers Report submitted to the Board of Directors of the District at each regular meeting.

#### 3.2 Controlling and preventing waste of groundwater

##### 3.2.1 Rules Review

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

**Performance Standard:** The District will include a discussion of the annual evaluation of the District Rules and whether any amendments to the rules are recommended to prevent the waste of groundwater in a report to the District provided to the Board of Directors at a regular meeting.

##### 3.2.2 Public Information

**Objective:** The District will provide information to the public on eliminating and reducing wasteful practices in the use of groundwater.

**Performance Standard:** The District will post and maintain (on its website) an article or a link to an article relevant to the public on eliminating and reducing wasteful practices in the use of groundwater.

#### 3.3 Controlling and preventing subsidence

The subsidence tool developed by the Texas Water Development Board was used to assess the potential for subsidence in the aquifers in the District using the default values provided. The tool can be accessed at:

<http://www.twdb.texas.gov/groundwater/models/research/subsidence/subsidence.asp>

The tool provides a numeric total weighted risk factor that ranges from 0 (low risk) to 10 (high risk). The results of applying the default values from the tool yield the following scores:

- Brazos River Alluvium Aquifer = 5.63
- Carrizo-Wilcox Aquifer = 4.22

- Gulf Coast Aquifer System = 5.78
- Queen City Aquifer = 3.91
- Sparta Aquifer = 3.91
- Yegua-Jackson Aquifer = 5.47

**Objective:** Controlling and preventing subsidence will be addressed during the review and processing of new, renewed, and amended permit applications.

**Performance Standard:** The specific methods for permit application review are provided in Appendix E. If review results demonstrate potential subsidence, the District will implement actions ranging from reducing requested permitted pumping to including special permit conditions imposing subsidence monitoring requirements and establishment of threshold limits that could result in reduced production based on monitoring results.

### 3.4 Addressing conjunctive surface water management issues

**Objective:** To encourage the development of surface water supplies that can be managed conjunctively with groundwater, the District will attend, either in-person or through recording, 75% of the Region G and Region H Regional Water Planning Group meetings.

**Performance Standard:** The minutes for all Region G and Region H Regional Planning Group meetings attended (either in-person or through recording), will be maintained at the District for a period of three (3) years from their accepted date. A summary report of all attended meetings will be given to the Board at the regular meeting. A key element of the summary report will be a summary of conjunctive use discussions that occurred at the meeting.

### 3.5 Addressing natural resource issues that impact the use and availability of groundwater and which are impacted by the use of groundwater

Historically, there was considerable oil and gas exploration and development in the District. More recently, however, oil and gas activity is minimal, and the potential for contamination is limited to isolated areas.

**Objective:** To better understand groundwater quality issues and assess the need to understand how groundwater quality can impact the use and availability of groundwater, the District will complete a baseline groundwater quality study. This study will provide foundational information to assist in future District management activities.

**Performance Standard:** By December 31, 2026, the District will compile all groundwater quality data from the TWDB groundwater database within the District boundaries and complete a report that summarizes the data and characterizes groundwater quality in the District. This report will be shared with other Districts in GMA 14.

**Objective:** By attending GMA 14 meetings, there is the opportunity to participate in discussions, planning, and education concerning the interrelationship of groundwater with other natural

resource issues. A District appointed representative will attend 75% of the GMA 14 meetings annually.

**Performance Standard:** The minutes for all attended meetings of GMA 14 will be maintained at the District for a period of (3) years from their accepted date. A report of all attended meetings will be given to the Board at the regular meeting.

### **3.6 Addressing drought conditions**

**Objective:** Each month, the District will download available drought information, for the counties in the District, from available websites on the internet, such as:

<https://waterdatafortexas.org/drought>

<https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?TX>

**Performance Standard:** Quarterly, the District will assess the status of drought in the District and prepare a quarterly briefing for the Board of Directors. The downloaded maps, reports and information will be included with copies of the quarterly briefings and combined with results of groundwater monitoring data and permitted pumping data in the regular meeting of the Board.

### **3.7 Addressing conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, and brush control where appropriate and cost effective**

#### **3.7.1 Addressing Conservation**

**Objective** - The District will provide information relevant to public education and awareness regarding groundwater conservation.

**Performance Standard** - The District will post and maintain an article or a link to an article listed under conservation on the District website. A copy of the article posted on the District website regarding conservation will be included in the Annual Report to the Board of Directors.

#### **3.7.2 Addressing Recharge Enhancement**

This management goal is not applicable to the District due to lack of a cost-effective means to transport excess streamflow to suitable areas for recharge.

#### **3.7.3 Addressing Rainwater Harvesting**

**Objective** – The District will provide information relevant to public education and awareness regarding rainwater harvesting.

**Performance Standard** – The District will post and maintain an article or a link to an article listed under rainwater harvesting on the District website. A copy of the article posted on the District website regarding rainwater harvesting will be included in the Annual Report to the Board of Directors.

### **3.7.4 Addressing Precipitation Enhancement**

This management goal is not applicable to the District because of the generally high annual precipitation and character of recharge in the District. Most of the recharge occurs because of streamflow losses. Groundwater levels are generally high in the vicinity of the streams, and groundwater recharge increases with decreased groundwater levels. Thus, additional precipitation would result in higher streamflow, but not necessarily an increase in recharge. To increase recharge from the increased precipitation, groundwater levels would need to be reduced, which could result in higher rates of subsidence.

### **3.7.5 Addressing Brush Control**

This management goal is not applicable to the District as there is not a brush control program unique to the District. Brush control initiatives are managed by the Texas State Soil and Water Conservation Board and through the TWDB State Water Plan where applicable.

## **3.8 Addressing the desired future conditions established under TWC §36.108**

**Objective** – The desired future conditions established for the District were based on a simulation using the Groundwater Availability Model (GAM) for the Northern Portion of the Gulf Coast Aquifer (also known as the Houston Area Groundwater Model, or HAGM).

The implementation of the desired future condition for the District was documented in a report that is presented in Appendix F. This report also included an initial comparison of actual and simulated drawdowns. The comparison involves actual measured groundwater elevations stored in the TWDB Groundwater Database and cell-specific estimated groundwater elevations from the DFC simulation of the HAGM for each year of the predictive period.

To assess the desired future condition in the District, these model results will be compared annually to groundwater monitoring data that are available from the TWDB groundwater database.

**Performance Standard** – Each year, the District will download groundwater data from Austin, Grimes, Walker and Waller counties from the Texas Water Development Board groundwater database. The comparison of model results will be on a well-by-well basis for data that are available. The data downloaded from the database will be compared to model results each year and presented at a regular meeting in the form of tables and graphs as appropriate. These comparisons will be supplemented by data and information related to drought conditions and permitted pumping data.

Because the TWDB database is continuously updated, and end-of-year data that are needed for this comparison are not fully available for several months, this comparison will take place in the fall of each year to evaluate the conditions at the end of the previous year (i.e. at least nine months prior to the publication of the report).

## **Appendix A**

**GAM Run 21-019 MAG: Modeled Available Groundwater for the Gulf Coast  
Aquifer System in Groundwater Management Area 14**

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**GAM RUN 21-019 MAG:  
MODELED AVAILABLE GROUNDWATER FOR  
THE GULF COAST AQUIFER SYSTEM IN  
GROUNDWATER MANAGEMENT AREA 14**

Shirley C. Wade, Ph.D., P.G.  
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Groundwater Modeling Department  
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September 8, 2022



*Shirley C. Wade*  
10/6/2022



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# **GAM RUN 21-019 MAG: MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 14**

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Texas Water Development Board  
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September 8, 2022

## ***EXECUTIVE SUMMARY:***

The combined value of modeled available groundwater in Groundwater Management Area 14 and the projected groundwater pumpage in subsidence districts in Groundwater Management Area 14 for the Gulf Coast Aquifer System ranges from a maximum of 1,327,135 acre-feet per year in 2020 to a minimum of 1,107,263 acre-feet per year in 2040 (Tables 1 and 2). Table 1 presents the modeled available groundwater summarized by decade from 2020 to 2080 for groundwater conservation districts. Table 2 presents the projected groundwater pumpage in regulatory plans adopted by subsidence districts and factored into the development of desired future conditions adopted by groundwater conservation districts. Table 3 summarizes the modeled available groundwater (for groundwater conservation district and non-district counties) and the projected groundwater pumpage (for subsidence district counties) by decade from 2030 to 2080 and by county, regional water planning area, and river basin for use in the regional water planning process. The estimates are based on the desired future conditions for the Gulf Coast Aquifer System adopted by groundwater conservation districts in Groundwater Management Area 14 on January 5, 2022. The explanatory report and other materials submitted to the Texas Water Development Board (TWDB) were determined to be administratively complete on June 15, 2022.

## ***REQUESTOR:***

Mr. John Martin, chair and technical coordinator of Groundwater Management Area 14.

## ***DESCRIPTION OF REQUEST:***

Mr. John Martin provided the TWDB with the desired future conditions of the Gulf Coast Aquifer System on behalf of Groundwater Management Area (GMA) 14. These desired future conditions were adopted by the groundwater conservation districts in Groundwater

Management Area 14 on January 5, 2022. The desired future conditions, as described in Resolution 2021-10-5 (GMA 14 and Oliver, 2022; Appendix G) are:

- “In each county in GMA 14, no less than 70 percent median available drawdown remaining in 2080 or no more than an average of 1.0 additional foot of subsidence between 2009 and 2080.”

The Carrizo-Wilcox, Queen City, Sparta, Yegua-Jackson, and Brazos River Alluvium aquifers were declared not relevant for purposes of joint planning by Groundwater Management Area 14 in Resolution 2021-10-5 (GMA 14 and Oliver, 2022; Appendix G).

On March 4, 2022, Mr. John Martin, technical coordinator of Groundwater Management Area 14, submitted the desired future conditions packet for Groundwater Management Area 14. TWDB staff reviewed the model files associated with the desired future conditions and received clarification on assumptions from the Groundwater Management Area 14 technical coordinator on March 23, 2022. In Resolution 2021-10-5, the desired future condition is defined for “each county in GMA 14”; however, Groundwater Management Area 14 clarified that it is their intent per pages 15 and 38 of the explanatory report that the subsidence district counties are not to be included in the county-specific desired future condition definition. For this reason, the TWDB did not consider subsidence district counties during the desired future conditions evaluation. An additional clarification from Groundwater Management Area 14 was a request that the modeled available groundwater values and modeled pumping values be provided by model aquifer layer in addition to the total values for the entire Gulf Coast Aquifer System. These additional splits are included in the current report in Appendix A.

### **Harris, Galveston, and Fort Bend counties (Subsidence Districts)**

Harris-Galveston Subsidence District and Fort Bend Subsidence District are not subject to the provisions of Section 36.108 of the Texas Water Code and, therefore, have not specified desired future conditions. Because desired future conditions were not adopted for the counties in the subsidence districts, the TWDB does not provide “modeled available groundwater” values for those counties. However, the districts in Groundwater Management Area 14 incorporated the groundwater pumpage projections made by the subsidence districts in their regulatory plans so that all known regional groundwater pumping was factored into the joint planning process. Therefore, the subsidence district “groundwater pumpage projections” are still provided in this report (Table 2 and Table 3) even though these values are not official “modeled available groundwater” values.

### ***METHODS:***

The TWDB ran the groundwater availability model (version 3.01; Kasmarek, 2013) for the northern part of the Gulf Coast Aquifer System (Figure 1) using the predictive model files

submitted with the explanatory report (GMA 14 and Oliver, 2022; Appendix R) on March 4, 2022. 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 were divided by county, river basin, regional water planning area, and groundwater conservation district within Groundwater Management Area 14 (Figures 1 and 2; Tables 1 through 3).

As part of the process to calculate modeled available groundwater, the TWDB checked the model files submitted by Groundwater Management Area 14 to determine if the groundwater pumping scenario was compatible with the adopted desired future conditions. The TWDB used these model files to extract model-calculated water levels for 2009 (stress period 78) and 2080 (stress period 149), and to calculate the available drawdown according to the methodology described in the explanatory report (GMA 14 and Oliver, 2022; Appendix R). The TWDB applied this methodology to a dataset submitted as part of the explanatory report, which contained well locations and well depths for 61,880 wells. The ratio of available drawdown in 2080 to available drawdown in 2009 was calculated for each well and the median was determined for each county. As specified in the explanatory report (GMA 14 and Oliver, 2022; Appendix R), if the water level in a model cell dropped below the base of the cell the available drawdown for wells located in that model cell was set to zero.

The subsidence values were also extracted from the model results for 2009 (stress period 78) and 2080 (stress period 149) and average change in subsidence was calculated for each county. The median percent available drawdown and average change in subsidence for each county were compared to the desired future conditions to confirm that the model scenario was compatible with the desired future conditions.

### **Modeled Available Groundwater and Permitting**

As defined in Chapter 36 of the Texas Water Code (2011), “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 modeled available groundwater estimates are described below:

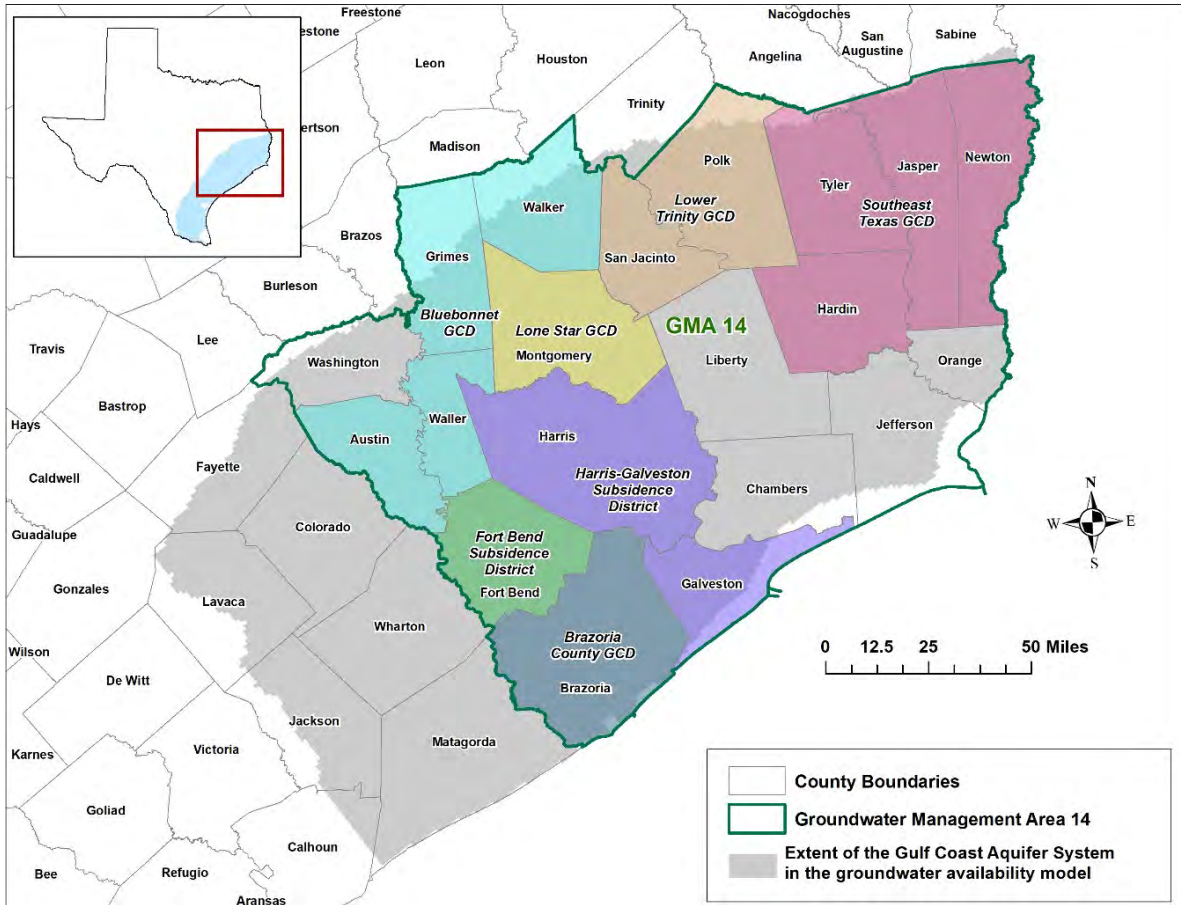
- Version 3.01 of the groundwater availability model for the northern portion of the Gulf Coast Aquifer System was used for this analysis. See Kasmarek (2013) for assumptions and limitations of the model.
- The model has four layers which represent the Chicot aquifer (Layer 1), the Evangeline aquifer (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-2000 (Harbaugh and others, 2000).
- Available drawdown for cells with water levels below the base elevation of the cell ("dry" cells) was set to zero for the analysis.
- Cells with water levels below the base are "dry" in terms of water level. However, the transmissivity of those cells remains constant and pumping from those cells continues. Therefore, pumping is included in the modeled available groundwater values for those cells.
- The subsidence district counties (Harris, Galveston, and Fort Bend) were not included in the evaluation of the desired future condition.
- The evaluation of the desired future condition for available drawdown was based on the 61,880 observation well locations and the MODFLOW pumping file submitted by Groundwater Management Area 14.
- The evaluation of the desired future condition for subsidence was based on the extent of the official TWDB boundary for the Gulf Coast Aquifer System within the groundwater model and the MODFLOW pumping file submitted by Groundwater Management Area 14.
- The calculation of modeled available groundwater values was based on the extent of the official TWDB boundary for the Gulf Coast Aquifer System within the groundwater model and the MODFLOW pumping file submitted by Groundwater Management Area 14.
- The most recent TWDB model grid file dated June 10, 2020 (glfc\_n\_01062020.csv), was used to determine model cell entity assignment (county, groundwater management area, groundwater conservation district, river basin, regional water planning area).

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

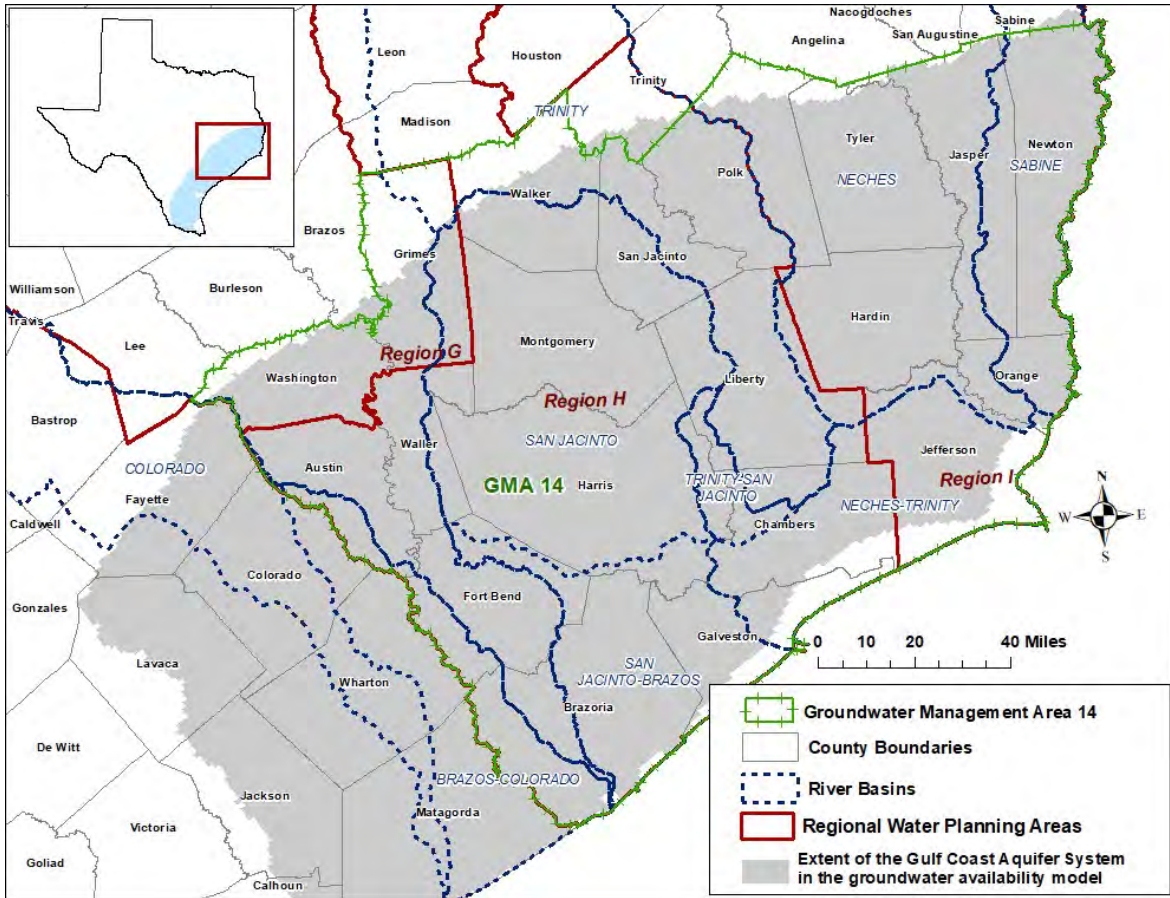
***RESULTS:***

The modeled available groundwater for the Gulf Coast Aquifer System that achieves the desired future conditions adopted by Groundwater Management Area 14 ranges from 781,781 to 781,753 acre-feet per year between 2020 and 2080 (Table 1). Projected Gulf Coast Aquifer System groundwater pumpage from the three counties in the Harris Galveston Subsidence District and Fort Bend Subsidence District ranges between 545,354 and 325,510 acre-feet per year during the period 2020 to 2080 (Table 2). The combination of modeled available groundwater and projected groundwater pumpage values in the Gulf Coast Aquifer System has also been summarized by county, river basin, and regional water planning area in order to be consistent with the format used in the regional water planning process. (Table 3).

The modeled available groundwater values and projected groundwater pumpage values are also tabulated by model aquifer layer in Appendix A.



**FIGURE 1. THE EXTENT OF THE GULF COAST AQUIFER SHOWN WITH GROUNDWATER CONSERVATION DISTRICTS AND SUBSIDENCE DISTRICTS IN GROUNDWATER MANAGEMENT AREA 14.**



**FIGURE 2. LOCATION OF REGIONAL WATER PLANNING AREAS AND RIVER BASINS IN GROUNDWATER MANAGEMENT AREA 14.**



**TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 14 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES EXCLUDE SUBSIDENCE DISTRICTS. VALUES ARE IN ACRE-FEET PER YEAR.**

Groundwater Conservation District	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Bluebonnet GCD	Austin	Gulf Coast Aquifer	46,560	46,560	46,560	46,560	46,560	46,560	46,560
Bluebonnet GCD	Grimes	Gulf Coast Aquifer	51,487	51,487	51,487	51,487	51,487	51,487	51,487
Bluebonnet GCD	Walker	Gulf Coast Aquifer	42,504	42,504	42,504	42,504	42,504	42,504	42,504
Bluebonnet GCD	Waller	Gulf Coast Aquifer	55,533	55,533	55,533	55,533	55,533	55,533	55,533
<b>Bluebonnet GCD Total</b>		<b>Gulf Coast Aquifer System</b>	<b>196,084</b>	<b>196,084</b>	<b>196,084</b>	<b>196,084</b>	<b>196,084</b>	<b>196,084</b>	<b>196,084</b>
Brazoria County	Brazoria	Gulf Coast Aquifer	54,955	54,930	54,908	54,895	54,888	54,886	54,886
<b>Brazoria County GCD Total</b>		<b>Gulf Coast Aquifer System</b>	<b>54,955</b>	<b>54,930</b>	<b>54,908</b>	<b>54,895</b>	<b>54,888</b>	<b>54,886</b>	<b>54,886</b>
Lone Star GCD	Montgomery	Gulf Coast Aquifer	96,965	96,954	96,945	96,930	96,916	96,873	96,873
<b>Lone Star GCD Total</b>		<b>Gulf Coast Aquifer System</b>	<b>96,965</b>	<b>96,954</b>	<b>96,945</b>	<b>96,930</b>	<b>96,916</b>	<b>96,873</b>	<b>96,873</b>
Lower Trinity GCD	Polk	Gulf Coast Aquifer	40,746	40,746	40,746	40,746	40,746	40,746	40,746
Lower Trinity GCD	San Jacinto	Gulf Coast Aquifer	35,037	35,048	35,057	35,071	35,086	35,128	35,128
<b>Lower Trinity GCD Total</b>		<b>Gulf Coast Aquifer System</b>	<b>75,783</b>	<b>75,794</b>	<b>75,803</b>	<b>75,817</b>	<b>75,832</b>	<b>75,874</b>	<b>75,874</b>

**TABLE 1 (CONTINUED). MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 14 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES EXCLUDE SUBSIDENCE DISTRICTS. VALUES ARE IN ACRE-FEET PER YEAR.**

<b>Groundwater Conservation District</b>	<b>County</b>	<b>Aquifer</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>	<b>2080</b>
Southeast Texas	Hardin	Gulf Coast Aquifer System	37,721	37,721	37,721	37,721	37,721	37,721	37,721
Southeast Texas	Jasper	Gulf Coast Aquifer System	73,365	73,365	73,365	73,365	73,365	73,365	73,365
Southeast Texas	Newton	Gulf Coast Aquifer System	37,508	37,508	37,508	37,508	37,508	37,508	37,508
Southeast Texas	Tyler	Gulf Coast Aquifer System	34,390	34,390	34,390	34,390	34,390	34,390	34,390
<b>Southeast Texas GCD Total</b>		<b>Gulf Coast Aquifer System</b>	<b>182,984</b>	<b>182,984</b>	<b>182,984</b>	<b>182,984</b>	<b>182,984</b>	<b>182,984</b>	<b>182,984</b>
<b>All District Total</b>		<b>Gulf Coast Aquifer System</b>	<b>606,771</b>	<b>606,746</b>	<b>606,724</b>	<b>606,710</b>	<b>606,704</b>	<b>606,701</b>	<b>606,701</b>
No District-County	Chambers	Gulf Coast Aquifer System	22,321	22,332	22,343	22,352	22,353	22,355	22,355
No District-County	Jefferson	Gulf Coast Aquifer System	15,425	15,425	15,425	15,425	15,425	15,425	15,425
No District-County	Liberty	Gulf Coast Aquifer System	71,661	71,660	71,658	71,659	71,660	71,660	71,660
No District-County	Orange	Gulf Coast Aquifer System	25,205	25,205	25,205	25,205	25,205	25,205	25,205
No District-County	Washington	Gulf Coast Aquifer System	40,398	40,398	40,398	40,398	40,398	40,398	40,398
<b>No District Total</b>		<b>Gulf Coast Aquifer System</b>	<b>175,010</b>	<b>175,020</b>	<b>175,029</b>	<b>175,039</b>	<b>175,041</b>	<b>175,043</b>	<b>175,043</b>
<b>GMA 14</b>	<b>Total</b>	<b>Gulf Coast Aquifer System</b>	<b>781,781</b>	<b>781,766</b>	<b>781,753</b>	<b>781,749</b>	<b>781,745</b>	<b>781,744</b>	<b>781,744</b>

**TABLE 2. GROUNDWATER PUMPAGE PROJECTIONS FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 14 FOR SUBSIDENCE DISTRICT COUNTIES FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.**

<b>Subsidence District</b>	<b>County</b>	<b>Aquifer</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>	<b>2080</b>
Fort Bend	Fort Bend	Gulf Coast Aquifer System	129,845	103,942	119,557	135,158	151,334	169,347	169,347
<b>Fort Bend Subsidence District Total</b>		<b>Gulf Coast Aquifer System</b>	<b>129,845</b>	<b>103,942</b>	<b>119,557</b>	<b>135,158</b>	<b>151,334</b>	<b>169,347</b>	<b>169,347</b>
Harris-Galveston	Galveston	Gulf Coast Aquifer System	6,032	6,788	7,435	8,060	8,646	9,181	9,181
Harris-Galveston	Harris	Gulf Coast Aquifer System	409,477	290,583	198,518	211,370	220,049	228,828	228,828
<b>Harris-Galveston Subsidence District Total</b>		<b>Gulf Coast Aquifer System</b>	<b>415,509</b>	<b>297,371</b>	<b>205,953</b>	<b>219,430</b>	<b>228,695</b>	<b>238,009</b>	<b>238,009</b>
<b>GMA 14</b>	<b>Total</b>	<b>Gulf Coast Aquifer System</b>	<b>545,354</b>	<b>401,313</b>	<b>325,510</b>	<b>354,588</b>	<b>380,029</b>	<b>407,356</b>	<b>407,356</b>

**TABLE 3. MODELED AVAILABLE GROUNDWATER AND PROJECTED GROUNDWATER PUMPAGE VALUES (*IN ITALICS*) BY DECADE FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 14. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.**

County	RWPA	River Basin	Aquifer	2030	2040	2050	2060	2070	2080
Austin	H	Brazos-Colorado	Gulf Coast	20,652	20,652	20,652	20,652	20,652	20,652
Austin	H	Brazos	Gulf Coast	25,243	25,243	25,243	25,243	25,243	25,243
Austin	H	Colorado	Gulf Coast	665	665	665	665	665	665
Brazoria	H	Brazos-Colorado	Gulf Coast	10,049	9,846	9,582	9,324	9,072	9,072
Brazoria	H	Brazos	Gulf Coast	3,641	3,578	3,510	3,454	3,407	3,407
Brazoria	H	San Jacinto-Brazos	Gulf Coast	41,240	41,483	41,803	42,110	42,408	42,408
Chambers	H	Neches-Trinity	Gulf Coast	9,968	9,968	9,968	9,968	9,968	9,968
Chambers	H	Trinity-San Jacinto	Gulf Coast	2,142	2,152	2,161	2,163	2,164	2,164
Chambers	H	Trinity	Gulf Coast	10,222	10,222	10,222	10,222	10,222	10,222
<i>Fort Bend</i>	<i>H</i>	<i>Brazos-Colorado</i>	<i>Gulf Coast</i>	<i>7,891</i>	<i>9,586</i>	<i>12,056</i>	<i>15,660</i>	<i>20,927</i>	<i>20,927</i>
<i>Fort Bend</i>	<i>H</i>	<i>Brazos</i>	<i>Gulf Coast</i>	<i>37,845</i>	<i>46,525</i>	<i>55,134</i>	<i>64,011</i>	<i>73,732</i>	<i>73,732</i>
<i>Fort Bend</i>	<i>H</i>	<i>San Jacinto-Brazos</i>	<i>Gulf Coast</i>	<i>40,844</i>	<i>45,913</i>	<i>50,471</i>	<i>54,218</i>	<i>57,258</i>	<i>57,258</i>
<i>Fort Bend</i>	<i>H</i>	<i>San Jacinto</i>	<i>Gulf Coast</i>	<i>17,362</i>	<i>17,532</i>	<i>17,497</i>	<i>17,445</i>	<i>17,430</i>	<i>17,430</i>
<i>Galveston</i>	<i>H</i>	<i>Neches-Trinity</i>	<i>Gulf Coast</i>	<i>0<sup>1</sup></i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
<i>Galveston</i>	<i>H</i>	<i>San Jacinto-Brazos</i>	<i>Gulf Coast</i>	<i>6,788</i>	<i>7,435</i>	<i>8,060</i>	<i>8,646</i>	<i>9,181</i>	<i>9,181</i>
Grimes	G	Brazos	Gulf Coast	31,117	31,117	31,117	31,117	31,117	31,117
Grimes	G	San Jacinto	Gulf Coast	19,087	19,087	19,087	19,087	19,087	19,087
Grimes	G	Trinity	Gulf Coast	1,283	1,283	1,283	1,283	1,283	1,283
Hardin	I	Neches	Gulf Coast	37,571	37,571	37,571	37,571	37,571	37,571
Hardin	I	Trinity	Gulf Coast	150	150	150	150	150	150
<i>Harris</i>	<i>H</i>	<i>San Jacinto-Brazos</i>	<i>Gulf Coast</i>	<i>6,956</i>	<i>7,617</i>	<i>8,282</i>	<i>8,819</i>	<i>9,463</i>	<i>9,463</i>
<i>Harris</i>	<i>H</i>	<i>San Jacinto</i>	<i>Gulf Coast</i>	<i>280,676</i>	<i>187,992</i>	<i>199,990</i>	<i>208,033</i>	<i>216,067</i>	<i>216,067</i>

<sup>1</sup> A zero value in the table indicates the groundwater availability model pumping scenario did not include any pumping in that part of the aquifer.



**TABLE 3 (CONTINUED). MODELED AVAILABLE GROUNDWATER AND PROJECTED GROUNDWATER PUMPAGE VALUES (*IN ITALICS*) BY DECADE FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 14. RESULTS ARE IN ACRE-FEET PER YEAR AND ARE SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN.**

<b>County</b>	<b>RWPA</b>	<b>River Basin</b>	<b>Aquifer</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>	<b>2080</b>
Waller	H	Brazos	Gulf Coast	23,397	23,397	23,397	23,397	23,397	23,397
Waller	H	San Jacinto	Gulf Coast	32,136	32,136	32,136	32,136	32,136	32,136
Washington	G	Brazos	Gulf Coast	40,164	40,164	40,164	40,164	40,164	40,164
Washington	G	Colorado	Gulf Coast	233	233	233	233	233	233
<b>GMA 14 Total</b>			<b>Gulf Coast Aquifer System</b>	<b>1,183,076</b>	<b>1,107,256</b>	<b>1,136,332</b>	<b>1,161,772</b>	<b>1,189,096</b>	<b>1,189,096</b>

### ***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.

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***APPENDIX A***

***Total Pumping Associated with Modeled Available Groundwater Run for  
the Gulf Coast Aquifer System Split by Model Layers for Groundwater  
Management Area 14***

**TABLE A.1. MODELED AVAILABLE GROUNDWATER FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 14 SPLIT BY MODEL LAYER AND SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.**

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Bluebonnet GCD	Austin	Chicot aquifer	2,894	2,894	2,894	2,894	2,894	2,894	2,894
Bluebonnet GCD	Austin	Evangeline aquifer	41,695	41,695	41,695	41,695	41,695	41,695	41,695
Bluebonnet GCD	Austin	Burkeville confining	0 <sup>2</sup>	0	0	0	0	0	0
Bluebonnet GCD	Austin	Jasper aquifer	1,972	1,972	1,972	1,972	1,972	1,972	1,972
Bluebonnet GCD	Grimes	Chicot aquifer	0	0	0	0	0	0	0
Bluebonnet GCD	Grimes	Evangeline aquifer	15,917	15,917	15,917	15,917	15,917	15,917	15,917
Bluebonnet GCD	Grimes	Burkeville confining	0	0	0	0	0	0	0
Bluebonnet GCD	Grimes	Jasper aquifer	35,570	35,570	35,570	35,570	35,570	35,570	35,570
Bluebonnet GCD	Walker	Chicot aquifer	0	0	0	0	0	0	0
Bluebonnet GCD	Walker	Evangeline aquifer	3,143	3,143	3,143	3,143	3,143	3,143	3,143
Bluebonnet GCD	Walker	Burkeville confining	0	0	0	0	0	0	0
Bluebonnet GCD	Walker	Jasper aquifer	39,361	39,361	39,361	39,361	39,361	39,361	39,361
Bluebonnet GCD	Waller	Chicot aquifer	791	791	791	791	791	791	791
Bluebonnet GCD	Waller	Evangeline aquifer	54,413	54,413	54,413	54,413	54,413	54,413	54,413
Bluebonnet GCD	Waller	Burkeville confining	0	0	0	0	0	0	0
Bluebonnet GCD	Waller	Jasper aquifer	329	329	329	329	329	329	329
<b>Bluebonnet GCD Total</b>		<b>Gulf Coast Aquifer System</b>	<b>196,085</b>	<b>196,085</b>	<b>196,085</b>	<b>196,085</b>	<b>196,085</b>	<b>196,085</b>	<b>196,085</b>
Brazoria County	Brazoria	Chicot aquifer	43,086	43,060	43,040	43,027	43,021	43,018	43,018
Brazoria County	Brazoria	Evangeline aquifer	11,869	11,870	11,868	11,868	11,868	11,868	11,868

<sup>2</sup> A zero value in the table indicates the groundwater availability model pumping scenario did not include any pumping in that part of the aquifer.

**TABLE A.1. (CONTINUED)**

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
<b>Brazoria County GCD Total</b>		<b>Gulf Coast Aquifer System</b>	<b>54,955</b>	<b>54,930</b>	<b>54,908</b>	<b>54,895</b>	<b>54,889</b>	<b>54,886</b>	<b>54,886</b>
Lone Star GCD	Montgomery	Chicot aquifer	20,868	22,117	22,136	23,202	22,878	21,030	21,030
Lone Star GCD	Montgomery	Evangeline aquifer	41,172	41,160	41,397	40,200	40,269	39,815	39,815
Lone Star GCD	Montgomery	Burkeville confining	0 <sup>3</sup>	0	0	0	0	0	0
Lone Star GCD	Montgomery	Jasper aquifer	34,925	33,676	33,412	33,527	33,769	36,028	36,028
<b>Lone Star GCD Total</b>		<b>Gulf Coast Aquifer System</b>	<b>96,965</b>	<b>96,953</b>	<b>96,945</b>	<b>96,929</b>	<b>96,916</b>	<b>96,873</b>	<b>96,873</b>
Lower Trinity GCD	Polk	Chicot aquifer	0	0	0	0	0	0	0
Lower Trinity GCD	Polk	Evangeline aquifer	9,486	9,486	9,486	9,486	9,486	9,486	9,486
Lower Trinity GCD	Polk	Burkeville confining	828	828	828	828	828	828	828
Lower Trinity GCD	Polk	Jasper aquifer	30,432	30,432	30,432	30,432	30,432	30,432	30,432
Lower Trinity GCD	San Jacinto	Chicot aquifer	0	0	0	0	0	0	0
Lower Trinity GCD	San Jacinto	Evangeline aquifer	15,110	15,116	15,120	15,127	15,135	15,156	15,156
Lower Trinity GCD	San Jacinto	Burkeville confining	2,762	2,762	2,762	2,762	2,762	2,762	2,762
Lower Trinity GCD	San Jacinto	Jasper aquifer	17,164	17,170	17,174	17,182	17,189	17,210	17,210
<b>Lower Trinity GCD Total</b>		<b>Gulf Coast Aquifer System</b>	<b>75,782</b>	<b>75,794</b>	<b>75,802</b>	<b>75,817</b>	<b>75,832</b>	<b>75,874</b>	<b>75,874</b>
Southeast Texas	Hardin	Chicot aquifer	1,492	1,492	1,492	1,492	1,492	1,492	1,492
Southeast Texas	Hardin	Evangeline aquifer	36,229	36,229	36,229	36,229	36,229	36,229	36,229
Southeast Texas	Hardin	Burkeville confining	0	0	0	0	0	0	0
Southeast Texas	Hardin	Jasper aquifer	0	0	0	0	0	0	0
Southeast Texas	Jasper	Chicot aquifer	10,858	10,858	10,858	10,858	10,858	10,858	10,858
Southeast Texas	Jasper	Evangeline aquifer	43,842	43,842	43,842	43,842	43,842	43,842	43,842
Southeast Texas	Jasper	Burkeville confining	8	8	8	8	8	8	8

<sup>3</sup> A zero value in the table indicates the groundwater availability model pumping scenario did not include any pumping in that part of the aquifer.

**TABLE A.1 (CONTINUED)**

GCD	County	Aquifer	2020	2030	2040	2050	2060	2070	2080
Southeast Texas	Jasper	Jasper aquifer	18,657	18,657	18,657	18,657	18,657	18,657	18,657
Southeast Texas	Newton	Chicot aquifer	547	547	547	547	547	547	547
Southeast Texas	Newton	Evangeline aquifer	23,162	23,162	23,162	23,162	23,162	23,162	23,162
Southeast Texas	Newton	Burkeville confining	0 <sup>4</sup>	0	0	0	0	0	0
Southeast Texas	Newton	Jasper aquifer	13,800	13,800	13,800	13,800	13,800	13,800	13,800
Southeast Texas	Tyler	Chicot aquifer	0	0	0	0	0	0	0
Southeast Texas	Tyler	Evangeline aquifer	18,519	18,519	18,519	18,519	18,519	18,519	18,519
Southeast Texas	Tyler	Burkeville confining	0	0	0	0	0	0	0
Southeast Texas	Tyler	Jasper aquifer	15,871	15,871	15,871	15,871	15,871	15,871	15,871
<b>Southeast Texas GCD Total</b>		<b>Gulf Coast Aquifer System</b>	<b>182,985</b>	<b>182,985</b>	<b>182,985</b>	<b>182,985</b>	<b>182,985</b>	<b>182,985</b>	<b>182,985</b>
<b>District Total</b>		<b>Gulf Coast Aquifer System</b>	<b>606,772</b>	<b>606,747</b>	<b>606,725</b>	<b>606,711</b>	<b>606,707</b>	<b>606,703</b>	<b>606,703</b>
No District-County	Chambers	Chicot aquifer	21,935	21,946	21,957	21,966	21,967	21,968	21,968
No District-County	Chambers	Evangeline aquifer	386	386	386	386	386	386	386
No District-County	Jefferson	Chicot aquifer	15,214	15,214	15,214	15,214	15,214	15,214	15,214
No District-County	Jefferson	Evangeline aquifer	211	211	211	211	211	211	211
No District-County	Liberty	Chicot aquifer	18,594	18,594	18,593	18,594	18,594	18,594	18,594
No District-County	Liberty	Evangeline aquifer	51,924	51,923	51,922	51,922	51,923	51,924	51,924
No District-County	Liberty	Burkeville confining	243	243	243	243	243	243	243
No District-County	Liberty	Jasper aquifer	900	900	900	900	900	900	900
No District-County	Orange	Chicot aquifer	22,854	22,854	22,854	22,854	22,854	22,854	22,854

<sup>4</sup> A zero value in the table indicates the groundwater availability model pumping scenario did not include any pumping in that part of the aquifer.

**TABLE A.1 (CONTINUED)**

<b>GCD</b>	<b>County</b>	<b>Aquifer</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>	<b>2080</b>
No District-County	Orange	Evangeline aquifer	2,351	2,351	2,351	2,351	2,351	2,351	2,351
No District-County	Washington	Evangeline aquifer	11,231	11,231	11,231	11,231	11,231	11,231	11,231
No District-County	Washington	Burkeville confining	421	421	421	421	421	421	421
No District-County	Washington	Jasper aquifer	28,746	28,746	28,746	28,746	28,746	28,746	28,746
<b>No District Total</b>		<b>Gulf Coast Aquifer System</b>	<b>175,010</b>	<b>175,020</b>	<b>175,029</b>	<b>175,039</b>	<b>175,041</b>	<b>175,043</b>	<b>175,043</b>
<b>GMA 14</b>	<b>Total</b>	<b>Gulf Coast Aquifer System</b>	<b>781,782</b>	<b>781,767</b>	<b>781,754</b>	<b>781,750</b>	<b>781,748</b>	<b>781,746</b>	<b>781,746</b>

**TABLE A. GROUNDWATER PUMPAGE PROJECTIONS FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 14 SPLIT BY MODEL LAYER FOR SUBSIDENCE DISTRICT COUNTIES FOR EACH DECADE BETWEEN 2020 AND 2080. VALUES ARE IN ACRE-FEET PER YEAR.**

<b>Subsidence District</b>	<b>County</b>	<b>Aquifer</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>	<b>2080</b>
Fort Bend	Fort Bend	Chicot aquifer	58,273	52,870	62,897	73,277	84,381	97,154	97,154
Fort Bend	Fort Bend	Evangeline aquifer	71,572	51,072	56,659	61,881	66,953	72,193	72,193
Fort Bend	Fort Bend	Burkeville confining	0 <sup>5</sup>	0	0	0	0	0	0
Fort Bend	Fort Bend	Jasper aquifer	0	0	0	0	0	0	0
<b>Fort Bend Subsidence District Total</b>		<b>Gulf Coast Aquifer System</b>	<b>129,845</b>	<b>103,942</b>	<b>119,556</b>	<b>135,158</b>	<b>151,334</b>	<b>169,347</b>	<b>169,347</b>
Harris-Galveston	Galveston	Chicot aquifer	5,817	6,535	7,151	7,746	8,301	8,807	8,807
Harris-Galveston	Galveston	Evangeline aquifer	215	254	284	314	346	373	373
Harris-Galveston	Harris	Chicot aquifer	136,644	108,688	80,496	86,816	90,263	93,781	93,781
Harris-Galveston	Harris	Evangeline aquifer	264,622	176,464	114,859	121,185	126,268	131,389	131,389
Harris-Galveston	Harris	Burkeville confining	0	0	0	0	0	0	0
Harris-Galveston	Harris	Jasper aquifer	8,212	5,432	3,164	3,368	3,519	3,658	3,658
<b>Harris-Galveston Subsidence District Total</b>		<b>Gulf Coast Aquifer System</b>	<b>415,510</b>	<b>297,373</b>	<b>205,954</b>	<b>219,429</b>	<b>228,697</b>	<b>238,008</b>	<b>238,008</b>
<b>GMA 14</b>	<b>Total</b>	<b>Gulf Coast Aquifer System</b>	<b>545,355</b>	<b>401,315</b>	<b>325,510</b>	<b>354,587</b>	<b>380,031</b>	<b>407,355</b>	<b>407,355</b>

<sup>5</sup> A zero value in the table indicates the groundwater availability model pumping scenario did not include any pumping in that part of the aquifer.

**TABLE A.3. MODELED AVAILABLE GROUNDWATER AND PROJECTED GROUNDWATER PUMPAGE VALUES (*IN ITALICS*) BY DECADE FOR THE GULF COAST AQUIFER SYSTEM IN GROUNDWATER MANAGEMENT AREA 14 SPLIT BY MODEL LAYER. 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	Gulf Coast Aquifer System	2030	2040	2050	2060	2070	2080
Austin	H	Brazos-Colorado	Chicot aquifer	1,432	1,432	1,432	1,432	1,432	1,432
Austin	H	Brazos-Colorado	Evangeline aquifer	19,027	19,027	19,027	19,027	19,027	19,027
Austin	H	Brazos-Colorado	Burkeville confining unit	0 <sup>6</sup>	0	0	0	0	0
Austin	H	Brazos-Colorado	Jasper aquifer	192	192	192	192	192	192
Austin	H	Brazos	Chicot aquifer	1,462	1,462	1,462	1,462	1,462	1,462
Austin	H	Brazos	Evangeline aquifer	22,217	22,217	22,217	22,217	22,217	22,217
Austin	H	Brazos	Burkeville confining unit	0	0	0	0	0	0
Austin	H	Brazos	Jasper aquifer	1,565	1,565	1,565	1,565	1,565	1,565
Austin	H	Colorado	Chicot aquifer	0	0	0	0	0	0
Austin	H	Colorado	Evangeline aquifer	450	450	450	450	450	450
Austin	H	Colorado	Burkeville confining unit	0	0	0	0	0	0
Austin	H	Colorado	Jasper aquifer	214	214	214	214	214	214
Brazoria	H	Brazos-Colorado	Chicot aquifer	10,044	9,842	9,577	9,319	9,066	9,066
Brazoria	H	Brazos-Colorado	Evangeline aquifer	4	5	5	5	5	5
Brazoria	H	Brazos	Chicot aquifer	3,641	3,578	3,510	3,454	3,407	3,407
Brazoria	H	Brazos	Evangeline aquifer	0	0	0	0	0	0
Brazoria	H	San Jacinto-Brazos	Chicot aquifer	29,375	29,620	29,940	30,248	30,545	30,545
Brazoria	H	San Jacinto-Brazos	Evangeline aquifer	11,865	11,863	11,863	11,863	11,863	11,863
Chambers	H	Neches-Trinity	Chicot aquifer	9,968	9,968	9,968	9,968	9,968	9,968
Chambers	H	Neches-Trinity	Evangeline aquifer	0	0	0	0	0	0
Chambers	H	Trinity-San Jacinto	Chicot aquifer	1,756	1,766	1,775	1,777	1,778	1,778
Chambers	H	Trinity-San Jacinto	Evangeline aquifer	386	386	386	386	386	386
Chambers	H	Trinity	Chicot aquifer	10,222	10,222	10,222	10,222	10,222	10,222

<sup>6</sup> A zero value in the table indicates the groundwater availability model pumping scenario did not include any pumping in that part of the aquifer.

**TABLE A.3 (CONTINUED)**

County	RWPA	River Basin	Gulf Coast Aquifer System	2030	2040	2050	2060	2070	2080
Chambers	H	Trinity	Evangeline aquifer	0 <sup>7</sup>	0	0	0	0	0
Fort Bend	H	Brazos-Colorado	Chicot aquifer	7,162	8,504	10,466	13,339	17,547	17,547
Fort Bend	H	Brazos-Colorado	Evangeline aquifer	729	1,082	1,590	2,321	3,380	3,380
Fort Bend	H	Brazos-Colorado	Burkeville confining unit	0 <sup>7</sup>	0	0	0	0	0
Fort Bend	H	Brazos-Colorado	Jasper aquifer	0	0	0	0	0	0
Fort Bend	H	Brazos	Chicot aquifer	24,308	30,446	36,552	42,837	49,691	49,691
Fort Bend	H	Brazos	Evangeline aquifer	13,537	16,080	18,582	21,174	24,041	24,041
Fort Bend	H	Brazos	Burkeville confining unit	0	0	0	0	0	0
Fort Bend	H	Brazos	Jasper aquifer	0	0	0	0	0	0
Fort Bend	H	San Jacinto-Brazos	Chicot aquifer	15,320	17,795	20,101	22,054	23,759	23,759
Fort Bend	H	San Jacinto-Brazos	Evangeline aquifer	25,524	28,118	30,370	32,165	33,499	33,499
Fort Bend	H	San Jacinto-Brazos	Burkeville confining unit	0	0	0	0	0	0
Fort Bend	H	San Jacinto-Brazos	Jasper aquifer	0	0	0	0	0	0
Fort Bend	H	San Jacinto	Chicot aquifer	6,081	6,153	6,157	6,151	6,156	6,156
Fort Bend	H	San Jacinto	Evangeline aquifer	11,282	11,379	11,340	11,293	11,273	11,273
Fort Bend	H	San Jacinto	Burkeville confining unit	0	0	0	0	0	0
Fort Bend	H	San Jacinto	Jasper aquifer	0	0	0	0	0	0
Galveston	H	Neches-Trinity	Chicot aquifer	0	0	0	0	0	0
Galveston	H	Neches-Trinity	Evangeline aquifer	0	0	0	0	0	0
Galveston	H	San Jacinto-Brazos	Chicot aquifer	6,535	7,151	7,746	8,301	8,807	8,807
Galveston	H	San Jacinto-Brazos	Evangeline aquifer	254	284	314	346	373	373
Grimes	G	Brazos	Chicot aquifer	0	0	0	0	0	0
Grimes	G	Brazos	Evangeline aquifer	8,670	8,670	8,670	8,670	8,670	8,670
Grimes	G	Brazos	Burkeville confining unit	0	0	0	0	0	0
Grimes	G	Brazos	Jasper aquifer	22,446	22,446	22,446	22,446	22,446	22,446

<sup>7</sup> A zero value in the table indicates the groundwater availability model pumping scenario did not include any pumping in that part of the aquifer.



**TABLE A.3 (CONTINUED)**

County	RWPA	River Basin	Gulf Coast Aquifer System	2030	2040	2050	2060	2070	2080
Grimes	G	San Jacinto	Chicot aquifer	0 <sup>8</sup>	0	0	0	0	0
Grimes	G	San Jacinto	Evangeline aquifer	7,247	7,247	7,247	7,247	7,247	7,247
Grimes	G	San Jacinto	Burkeville confining unit	0	0	0	0	0	0
Grimes	G	San Jacinto	Jasper aquifer	11,840	11,840	11,840	11,840	11,840	11,840
Grimes	G	Trinity	Jasper aquifer	1,283	1,283	1,283	1,283	1,283	1,283
Hardin	I	Neches	Chicot aquifer	1,492	1,492	1,492	1,492	1,492	1,492
Hardin	I	Neches	Evangeline aquifer	36,079	36,079	36,079	36,079	36,079	36,079
Hardin	I	Neches	Burkeville confining unit	0	0	0	0	0	0
Hardin	I	Neches	Jasper aquifer	0	0	0	0	0	0
Hardin	I	Trinity	Chicot aquifer	0	0	0	0	0	0
Hardin	I	Trinity	Evangeline aquifer	150	150	150	150	150	150
Hardin	I	Trinity	Burkeville confining unit	0	0	0	0	0	0
Hardin	I	Trinity	Jasper aquifer	0	0	0	0	0	0
Harris	H	San Jacinto-Brazos	Chicot aquifer	4,859	5,406	5,959	6,383	6,906	6,906
Harris	H	San Jacinto-Brazos	Evangeline aquifer	2,097	2,212	2,323	2,436	2,557	2,557
Harris	H	San Jacinto	Chicot aquifer	101,266	72,533	78,138	81,077	83,988	83,988
Harris	H	San Jacinto	Evangeline aquifer	173,978	112,296	118,483	123,437	128,422	128,422
Harris	H	San Jacinto	Burkeville confining unit	0	0	0	0	0	0
Harris	H	San Jacinto	Jasper aquifer	5,432	3,164	3,368	3,519	3,658	3,658
Harris	H	Trinity-San Jacinto	Chicot aquifer	2,563	2,557	2,718	2,803	2,887	2,887
Harris	H	Trinity-San Jacinto	Evangeline aquifer	389	351	379	395	410	410
Harris	H	Trinity-San Jacinto	B Burkeville confining unit	0	0	0	0	0	0
Harris	H	Trinity-San Jacinto	Jasper aquifer	0	0	0	0	0	0
Jasper	I	Neches	Chicot aquifer	7,740	7,740	7,740	7,740	7,740	7,740
Jasper	I	Neches	Evangeline aquifer	18,534	18,534	18,534	18,534	18,534	18,534

<sup>8</sup> A zero value in the table indicates the groundwater availability model pumping scenario did not include any pumping in that part of the aquifer.

**TABLE A.3 (CONTINUED)**

County	RWPA	River Basin	Gulf Coast Aquifer System	2030	2040	2050	2060	2070	2080
Jasper	I	Neches	Burkeville confining unit	0 <sup>9</sup>	0	0	0	0	0
Jasper	I	Neches	Jasper aquifer	14,546	14,546	14,546	14,546	14,546	14,546
Jasper	I	Sabine	Chicot aquifer	3,118	3,118	3,118	3,118	3,118	3,118
Jasper	I	Sabine	Evangeline aquifer	25,308	25,308	25,308	25,308	25,308	25,308
Jasper	I	Sabine	Burkeville confining unit	8	8	8	8	8	8
Jasper	I	Sabine	Jasper aquifer	4,111	4,111	4,111	4,111	4,111	4,111
Jefferson	I	Neches-Trinity	Chicot aquifer	13,571	13,571	13,571	13,571	13,571	13,571
Jefferson	I	Neches-Trinity	Evangeline aquifer	0	0	0	0	0	0
Jefferson	I	Neches	Chicot aquifer	1,643	1,643	1,643	1,643	1,643	1,643
Jefferson	I	Neches	Evangeline aquifer	211	211	211	211	211	211
Liberty	H	Neches-Trinity	Chicot aquifer	1,397	1,397	1,397	1,397	1,397	1,397
Liberty	H	Neches-Trinity	Evangeline aquifer	656	656	656	656	656	656
Liberty	H	Neches	Chicot aquifer	2,860	2,860	2,860	2,860	2,860	2,860
Liberty	H	Neches	Evangeline aquifer	5,872	5,872	5,872	5,872	5,872	5,872
Liberty	H	Neches	Burkeville confining unit	0	0	0	0	0	0
Liberty	H	Neches	Jasper aquifer	0	0	0	0	0	0
Liberty	H	San Jacinto	Chicot aquifer	973	973	973	973	973	973
Liberty	H	San Jacinto	Evangeline aquifer	9,183	9,183	9,183	9,183	9,184	9,184
Liberty	H	San Jacinto	Burkeville confining unit	243	243	243	243	243	243
Liberty	H	San Jacinto	Jasper aquifer	900	900	900	900	900	900
Liberty	H	Trinity-San Jacinto	Chicot aquifer	3,330	3,329	3,330	3,330	3,330	3,330
Liberty	H	Trinity-San Jacinto	Evangeline aquifer	7,214	7,213	7,214	7,214	7,215	7,215
Liberty	H	Trinity-San Jacinto	Burkeville confining unit	0	0	0	0	0	0
Liberty	H	Trinity-San Jacinto	Jasper aquifer	0	0	0	0	0	0
Liberty	H	Trinity	Chicot aquifer	10,034	10,034	10,034	10,034	10,034	10,034

<sup>9</sup> A zero value in the table indicates the groundwater availability model pumping scenario did not include any pumping in that part of the aquifer.

**TABLE A.3 (CONTINUED)**

County	RWPA	River Basin	Gulf Coast Aquifer System	2030	2040	2050	2060	2070	2080
Liberty	H	Trinity	Evangeline aquifer	28,997	28,997	28,997	28,997	28,997	28,997
Liberty	H	Trinity	Burkeville confining unit	0	0	0	0	0	0
Liberty	H	Trinity	Jasper aquifer	0	0	0	0	0	0
Montgomery	H	San Jacinto	Chicot aquifer	22,117	22,136	23,202	22,878	21,030	21,030
Montgomery	H	San Jacinto	Evangeline aquifer	41,160	41,397	40,200	40,269	39,815	39,815
Montgomery	H	San Jacinto	Burkeville confining unit	0	0	0	0	0	0
Montgomery	H	San Jacinto	Jasper aquifer	33,676	33,412	33,527	33,769	36,028	36,028
Newton	I	Neches	Jasper aquifer	199	199	199	199	199	199
Newton	I	Sabine	Chicot aquifer	547	547	547	547	547	547
Newton	I	Sabine	Evangeline aquifer	23,162	23,162	23,162	23,162	23,162	23,162
Newton	I	Sabine	Burkeville confining unit	0	0	0	0	0	0
Newton	I	Sabine	Jasper aquifer	13,600	13,600	13,600	13,600	13,600	13,600
Orange	I	Neches-Trinity	Chicot aquifer	280	280	280	280	280	280
Orange	I	Neches-Trinity	Evangeline aquifer	0 <sup>10</sup>	0	0	0	0	0
Orange	I	Neches	Chicot aquifer	4,039	4,039	4,039	4,039	4,039	4,039
Orange	I	Neches	Evangeline aquifer	2,228	2,228	2,228	2,228	2,228	2,228
Orange	I	Sabine	Chicot aquifer	18,535	18,535	18,535	18,535	18,535	18,535
Orange	I	Sabine	Evangeline aquifer	124	124	124	124	124	124
Polk	I	Neches	Chicot aquifer	0	0	0	0	0	0
Polk	I	Neches	Evangeline aquifer	4,247	4,247	4,247	4,247	4,247	4,247
Polk	I	Neches	Burkeville confining unit	142	142	142	142	142	142
Polk	I	Neches	Jasper aquifer	12,376	12,376	12,376	12,376	12,376	12,376
Polk	H	Trinity	Chicot aquifer	0	0	0	0	0	0
Polk	H	Trinity	Evangeline aquifer	5,239	5,239	5,239	5,239	5,239	5,239
Polk	H	Trinity	Burkeville confining unit	687	687	687	687	687	687

<sup>10</sup> A zero value in the table indicates the groundwater availability model pumping scenario did not include any pumping in that part of the aquifer.

**TABLE A.3 (CONTINUED)**

County	RWPA	River Basin	Gulf Coast Aquifer System	2030	2040	2050	2060	2070	2080
Polk	H	Trinity	Jasper aquifer	18,055	18,055	18,055	18,055	18,055	18,055
San Jacinto	H	San Jacinto	Chicot aquifer	0	0	0	0	0	0
San Jacinto	H	San Jacinto	Evangelina aquifer	10,472	10,476	10,484	10,491	10,512	10,512
San Jacinto	H	San Jacinto	Burkeville confining unit	0	0	0	0	0	0
San Jacinto	H	San Jacinto	Jasper aquifer	7,972	7,976	7,983	7,991	8,012	8,012
San Jacinto	H	Trinity	Chicot aquifer	0	0	0	0	0	0
San Jacinto	H	Trinity	Evangelina aquifer	4,644	4,644	4,644	4,644	4,644	4,644
San Jacinto	H	Trinity	Burkeville confining unit	2,762	2,762	2,762	2,762	2,762	2,762
San Jacinto	H	Trinity	Jasper aquifer	9,198	9,198	9,198	9,198	9,198	9,198
Tyler	I	Neches	Chicot aquifer	0	0	0	0	0	0
Tyler	I	Neches	Evangelina aquifer	18,519	18,519	18,519	18,519	18,519	18,519
Tyler	I	Neches	Burkeville confining unit	0	0	0	0	0	0
Tyler	I	Neches	Jasper aquifer	15,871	15,871	15,871	15,871	15,871	15,871
Walker	H	San Jacinto	Chicot aquifer	0	0	0	0	0	0
Walker	H	San Jacinto	Evangelina aquifer	3,143	3,143	3,143	3,143	3,143	3,143
Walker	H	San Jacinto	Burkeville confining unit	0 <sup>11</sup>	0	0	0	0	0
Walker	H	San Jacinto	Jasper aquifer	23,479	23,479	23,479	23,479	23,479	23,479
Walker	H	Trinity	Jasper aquifer	15,881	15,881	15,881	15,881	15,881	15,881
Waller	H	Brazos	Chicot aquifer	632	632	632	632	632	632
Waller	H	Brazos	Evangelina aquifer	22,437	22,437	22,437	22,437	22,437	22,437
Waller	H	Brazos	Burkeville confining unit	0	0	0	0	0	0
Waller	H	Brazos	Jasper aquifer	329	329	329	329	329	329
Waller	H	San Jacinto	Chicot aquifer	159	159	159	159	159	159

<sup>11</sup> A zero value in the table indicates the groundwater availability model pumping scenario did not include any pumping in that part of the aquifer.

**TABLE A.3 (CONTINUED)**

County	RWPA	River Basin	Gulf Coast Aquifer	2030	2040	2050	2060	2070	2080
Waller	H	San Jacinto	Evangeline aquifer	31,976	31,976	31,976	31,976	31,976	31,976
Waller	H	San Jacinto	Burkeville confining unit	0 <sup>12</sup>	0	0	0	0	0
Waller	H	San Jacinto	Jasper aquifer	0	0	0	0	0	0
Washington	G	Brazos	Evangeline aquifer	11,231	11,231	11,231	11,231	11,231	11,231
Washington	G	Brazos	Burkeville confining unit	421	421	421	421	421	421
Washington	G	Brazos	Jasper aquifer	28,512	28,512	28,512	28,512	28,512	28,512
Washington	G	Colorado	Jasper aquifer	233	233	233	233	233	233
<b>GMA 14 Total</b>			<b>Gulf Coast Aquifer System</b>	<b>1,183,076</b>	<b>1,107,258</b>	<b>1,136,330</b>	<b>1,161,773</b>	<b>1,189,095</b>	<b>1,189,095</b>

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<sup>12</sup> A zero value in the table indicates the groundwater availability model pumping scenario did not include any pumping in that part of the aquifer.

## **Appendix B**

### **Estimated Historical Groundwater Use and 2022 State Water Plan Datasets: Bluebonnet Groundwater Conservation District**

# Estimated Historical Groundwater Use And 2022 State Water Plan Datasets:

## Bluebonnet Groundwater Conservation District

Texas Water Development Board  
Groundwater Division  
Groundwater Technical Assistance Section  
stephen.allen@twdb.texas.gov  
(512) 463-7317  
April 5, 2023

### ***GROUNDWATER MANAGEMENT PLAN DATA:***

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

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

The five reports included in this part are:

1. Estimated Historical Groundwater Use (checklist item 2)  
from the TWDB Historical Water Use Survey (WUS)
2. Projected Surface Water Supplies (checklist item 6)
3. Projected Water Demands (checklist item 7)
4. Projected Water Supply Needs (checklist item 8)
5. Projected Water Management Strategies (checklist item 9)  
from the 2022 Texas State Water Plan (SWP)

Part 2 of the 2-part package is the groundwater availability model (GAM) report for the District (checklist items 3 through 5). The District should have received, or may receive, this report from the Groundwater Availability Modeling Department. Questions about the GAM can be directed to Grayson Dowlearn grayson.dowlearn@twdb.texas.gov, (512) 475-1552.

## ***DISCLAIMER:***

The data presented in this report represents the most up to date WUS and 2022 SWP data available as of 4/5/2023. Although it does not happen frequently, either of these datasets are subject to change pending the availability of more accurate WUS data or an amendment to the 2022 SWP. District personnel must review these datasets and correct any discrepancies 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 2022 SWP dataset can be verified by contacting Sabrina Anderson (sabrina.anderson@twdb.texas.gov or 512-936-0886).

The values presented in the data tables of this report are county-based. In cases where groundwater conservation districts cover only a portion of one or more counties the data values are modified with an apportioning multiplier to create new values that more accurately represent conditions within district boundaries. The multiplier used in the following formula is a land area ratio:  $(\text{data value} * (\text{land area of district in county} / \text{land area of county}))$ . For two of the four SWP tables (Projected Surface Water Supplies and Projected Water Demands) only the county-wide water user group (WUG) data values (county other, manufacturing, steam electric power, irrigation, mining and livestock) are modified using the multiplier. WUG values for municipalities, water supply corporations, and utility districts are not apportioned; instead, their full values are retained when they are located within the district, and eliminated when they are located outside (we ask districts to identify these entity locations).

The remaining SWP tables (Projected Water Supply Needs and Projected Water Management Strategies) are not modified because district-specific values are not statutorily required. Each district needs only "consider" the county values in these tables.

In the WUS table every category of water use (including municipal) is apportioned. Staff determined that breaking down the annual municipal values into individual WUGs was too complex.

TWDB recognizes that the apportioning formula used is not ideal but it is the best available process with respect to time and staffing constraints. If a district believes it has data that is more accurate it can add those data to the plan with an explanation of how the data were derived. Apportioning percentages that the TWDB used are listed above each applicable table.

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



# Estimated Historical Water Use

## TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water historical use estimates are currently unavailable for calendar years 2020. TWDB staff anticipates the calculation and posting of these estimates at a later date.

### AUSTIN COUNTY

*100% (multiplier)*

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	3,813	6	0	0	5,773	347	9,939
	SW	0	0	46	0	5	810	861
2018	GW	3,863	6	0	0	5,951	347	10,167
	SW	0	0	111	0	0	809	920
2017	GW	4,034	6	0	0	5,793	337	10,170
	SW	0	0	186	0	0	789	975
2016	GW	3,782	14	0	0	4,894	367	9,057
	SW	0	0	13	0	0	855	868
2015	GW	3,785	14	0	0	4,951	359	9,109
	SW	0	0	45	0	0	837	882
2014	GW	4,107	23	0	0	6,007	354	10,491
	SW	0	0	179	0	0	823	1,002
2013	GW	4,350	28	0	0	7,101	326	11,805
	SW	0	0	678	0	0	760	1,438
2012	GW	4,369	35	6	0	4,514	297	9,221
	SW	0	0	185	0	80	695	960
2011	GW	5,322	51	4	0	5,303	339	11,019
	SW	0	0	0	0	0	792	792
2010	GW	4,351	106	8	0	3,986	346	8,797
	SW	0	0	6	0	0	807	813
2009	GW	4,003	112	4	0	3,083	438	7,640
	SW	0	0	3	0	0	1,023	1,026
2008	GW	3,349	86	0	0	3,634	379	7,448
	SW	0	0	0	0	0	885	885
2007	GW	2,954	73	0	0	3,364	521	6,912
	SW	0	2	0	0	0	1,214	1,216
2006	GW	3,373	74	0	0	3,101	485	7,033
	SW	0	2	0	0	0	1,133	1,135
2005	GW	3,561	100	0	0	6,479	461	10,601
	SW	0	0	0	0	0	1,076	1,076
2004	GW	3,011	64	0	0	8,251	96	11,422
	SW	0	0	0	0	0	1,492	1,492

**GRIMES COUNTY**

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	3,089	246	73	1	443	327	4,179
	SW	0	0	8	3,725	0	763	4,496
2018	GW	3,099	260	0	1	412	326	4,098
	SW	0	0	0	8,411	1,559	761	10,731
2017	GW	2,982	230	0	1	399	318	3,930
	SW	0	0	0	8,648	0	741	9,389
2016	GW	2,832	156	28	1	376	415	3,808
	SW	0	0	3	9,100	0	968	10,071
2015	GW	2,852	236	15	1	206	403	3,713
	SW	0	0	2	10,536	0	941	11,479
2014	GW	3,110	295	171	1	517	545	4,639
	SW	0	0	19	6,859	0	1,272	8,150
2013	GW	4,218	302	35	1	176	515	5,247
	SW	0	0	4	15,015	391	1,201	16,611
2012	GW	4,074	327	0	1	215	510	5,127
	SW	0	0	0	12,326	361	1,189	13,876
2011	GW	4,601	324	49	2	49	820	5,845
	SW	0	0	6	13,185	1,085	1,912	16,188
2010	GW	4,162	216	17	1	75	796	5,267
	SW	0	0	0	13,535	200	1,857	15,592
2009	GW	4,855	202	0	1	0	453	5,511
	SW	0	0	0	11,840	0	1,056	12,896
2008	GW	4,712	349	0	1	275	436	5,773
	SW	0	0	0	12,405	33	1,017	13,455
2007	GW	4,378	274	0	2	333	502	5,489
	SW	0	0	0	9,210	0	1,168	10,378
2006	GW	4,737	365	0	3	612	421	6,138
	SW	0	0	0	4,188	27	982	5,197
2005	GW	4,855	298	0	4	89	445	5,691
	SW	0	0	0	5,305	21	1,039	6,365
2004	GW	4,244	269	0	2	60	227	4,802
	SW	6	0	0	7,794	208	1,107	9,115

**WALKER COUNTY***100% (multiplier)*

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	3,325	50	0	0	146	223	3,744
	SW	8,119	3	0	0	137	520	8,779
2018	GW	3,030	59	0	0	148	224	3,461
	SW	7,926	7	0	0	139	522	8,594
2017	GW	3,207	201	0	0	99	217	3,724
	SW	9,055	4	0	0	137	504	9,700
2016	GW	3,900	57	0	0	124	234	4,315
	SW	13,275	188	0	0	124	546	14,133
2015	GW	4,151	40	10	0	119	230	4,550
	SW	13,498	190	1	0	112	536	14,337
2014	GW	5,946	42	81	0	198	272	6,539
	SW	9,281	190	9	0	138	635	10,253
2013	GW	6,319	60	45	0	242	256	6,922
	SW	12,550	186	5	0	140	595	13,476
2012	GW	5,165	48	0	0	172	162	5,547
	SW	11,718	171	0	0	223	376	12,488
2011	GW	5,851	38	11	0	117	221	6,238
	SW	7,172	169	1	0	443	514	8,299
2010	GW	5,461	47	7	0	570	221	6,306
	SW	6,671	202	6	0	0	514	7,393
2009	GW	4,409	34	0	0	377	181	5,001
	SW	7,193	214	0	0	298	421	8,126
2008	GW	3,241	35	0	0	0	190	3,466
	SW	4,242	20	0	0	241	445	4,948
2007	GW	2,841	47	0	0	34	199	3,121
	SW	3,621	20	0	0	141	464	4,246
2006	GW	3,740	45	0	0	153	222	4,160
	SW	7,382	16	0	0	247	518	8,163
2005	GW	4,476	40	0	0	0	187	4,703
	SW	6,936	32	0	0	276	435	7,679
2004	GW	3,655	209	0	0	1	122	3,987
	SW	3,244	18	0	0	7	487	3,756

**WALLER COUNTY**

100% (multiplier)

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2019	GW	5,060	132	0	0	12,043	456	17,691
	SW	0	0	93	0	179	456	728
2018	GW	4,866	136	0	0	10,172	456	15,630
	SW	0	0	0	0	180	456	636
2017	GW	4,771	123	0	0	11,683	444	17,021
	SW	0	0	0	0	259	444	703
2016	GW	5,043	124	0	0	12,167	593	17,927
	SW	0	0	0	0	229	593	822
2015	GW	4,836	122	0	0	8,771	579	14,308
	SW	0	0	0	0	252	579	831
2014	GW	4,418	139	9	0	9,203	575	14,344
	SW	0	0	1	0	314	575	890
2013	GW	5,202	140	1	0	12,323	496	18,162
	SW	0	0	0	0	217	496	713
2012	GW	5,867	133	0	0	18,016	392	24,408
	SW	0	0	0	0	313	392	705
2011	GW	6,641	155	0	0	23,599	753	31,148
	SW	0	0	0	0	85	753	838
2010	GW	5,578	149	4	0	21,937	732	28,400
	SW	0	0	4	0	107	732	843
2009	GW	4,854	40	2	0	20,070	459	25,425
	SW	0	0	2	0	233	460	695
2008	GW	4,556	34	0	0	19,639	482	24,711
	SW	0	0	0	0	117	482	599
2007	GW	4,396	26	110	0	12,518	538	17,588
	SW	0	0	0	0	4,419	538	4,957
2006	GW	4,657	26	86	0	17,785	627	23,181
	SW	0	0	0	0	104	627	731
2005	GW	4,538	26	442	0	20,990	567	26,563
	SW	0	0	0	0	108	567	675
2004	GW	4,231	21	44	0	24,384	372	29,052
	SW	0	0	0	0	343	666	1,009

# Projected Surface Water Supplies

## TWDB 2022 State Water Plan Data

### GRIMES COUNTY

*100% (multiplier)*

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
G	Livestock, Grimes	Brazos	Brazos Livestock Local Supply	1,233	1,233	1,233	1,233	1,233	1,233
G	Livestock, Grimes	San Jacinto	Brazos Livestock Local Supply	523	523	523	523	523	523
G	Livestock, Grimes	Trinity	Brazos Livestock Local Supply	367	367	367	367	367	367
G	Manufacturing, Grimes	Brazos	Brazos Run-of-River	100	100	100	100	100	100
G	Steam-Electric Power, Grimes	Brazos	Brazos River Authority Main Stem Lake/Reservoir System	1,284	1,284	1,284	1,284	1,284	1,284
G	Steam-Electric Power, Grimes	Brazos	Gibbons Creek Lake/Reservoir	9,740	9,740	9,740	9,740	9,740	9,740
G	Steam-Electric Power, Grimes	Brazos	Livingston-Wallisville Lake/Reservoir System	4,704	4,704	4,704	4,704	4,704	4,704
G	Steam-Electric Power, Grimes	San Jacinto	Brazos River Authority Main Stem Lake/Reservoir System	2,316	2,316	2,316	2,316	2,316	2,316
G	Steam-Electric Power, Grimes	San Jacinto	Livingston-Wallisville Lake/Reservoir System	2,016	2,016	2,016	2,016	2,016	2,016
<b>Sum of Projected Surface Water Supplies (acre-feet)</b>				<b>22,283</b>	<b>22,283</b>	<b>22,283</b>	<b>22,283</b>	<b>22,283</b>	<b>22,283</b>

### WALKER COUNTY

*100% (multiplier)*

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
H	County-Other, Walker	San Jacinto	Livingston-Wallisville Lake/Reservoir System	1,603	1,640	1,666	1,691	1,709	1,723
H	County-Other, Walker	Trinity	Livingston-Wallisville Lake/Reservoir System	1,397	1,360	1,334	1,309	1,291	1,277
H	Huntsville	San Jacinto	Livingston-Wallisville Lake/Reservoir System	16,103	16,102	16,102	16,101	16,102	16,101
H	Huntsville	Trinity	Livingston-Wallisville Lake/Reservoir System	3,297	3,298	3,298	3,299	3,298	3,299
H	Irrigation, Walker	Trinity	Trinity Run-of-River	122	122	122	122	122	122
H	Lake Livingston WSC	Trinity	Livingston-Wallisville Lake/Reservoir System	12	11	12	11	11	11
H	Manufacturing, Walker	Trinity	Trinity Run-of-River	337	337	337	337	337	337
H	Riverside WSC	Trinity	Livingston-Wallisville Lake/Reservoir System	77	77	77	77	77	77

*Estimated Historical Water Use and 2022 State Water Plan Dataset:*

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				System					
H	The Consolidated WSC	Trinity	Houston County Lake/Reservoir	5	6	6	6	7	7
H	Trinity Rural WSC	Trinity	Livingston-Wallisville Lake/Reservoir System	28	28	30	32	33	32
<b>Sum of Projected Surface Water Supplies (acre-feet)</b>				<b>22,981</b>	<b>22,981</b>	<b>22,984</b>	<b>22,985</b>	<b>22,987</b>	<b>22,986</b>

**WALLER COUNTY**

*100% (multiplier)*

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
H	Irrigation, Waller	Brazos	Brazos River Authority Main Stem Lake/Reservoir System	50	50	50	50	50	50
H	Irrigation, Waller	Brazos	Brazos Run-of-River	43	43	43	43	43	43
<b>Sum of Projected Surface Water Supplies (acre-feet)</b>				<b>93</b>	<b>93</b>	<b>93</b>	<b>93</b>	<b>93</b>	<b>93</b>

# Projected Water Demands

## TWDB 2022 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.

### AUSTIN COUNTY

*100% (multiplier)*

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
H	Austin County WSC	Brazos	229	257	288	328	374	426
H	Austin County WSC	Brazos-Colorado	19	21	24	27	31	35
H	Bellville	Brazos	1,126	1,191	1,264	1,359	1,470	1,594
H	County-Other, Austin	Brazos	1,617	1,878	2,173	2,540	2,961	3,434
H	County-Other, Austin	Brazos-Colorado	421	489	566	662	772	895
H	County-Other, Austin	Colorado	16	18	21	25	29	34
H	Irrigation, Austin	Brazos	2,222	2,222	2,222	2,222	2,222	2,222
H	Irrigation, Austin	Brazos-Colorado	3,785	3,785	3,785	3,785	3,785	3,785
H	Livestock, Austin	Brazos	852	852	852	852	852	852
H	Livestock, Austin	Brazos-Colorado	239	239	239	239	239	239
H	Livestock, Austin	Colorado	17	17	17	17	17	17
H	Manufacturing, Austin	Brazos	69	74	74	74	74	74
H	Manufacturing, Austin	Brazos-Colorado	37	40	40	40	40	40
H	Mining, Austin	Brazos	97	244	196	148	101	69
H	Mining, Austin	Brazos-Colorado	28	71	57	43	29	20
H	Mining, Austin	Colorado	2	5	4	3	2	1
H	Sealy	Brazos	1,377	1,513	1,667	1,859	2,081	2,329
H	Sealy	Brazos-Colorado	3	3	3	4	4	5
H	Wallis	Brazos-Colorado	160	164	170	180	192	207
H	West End WSC	Brazos	179	196	211	230	252	276
H	West End WSC	Colorado	20	22	24	26	29	32
<b>Sum of Projected Water Demands (acre-feet)</b>			<b>12,515</b>	<b>13,301</b>	<b>13,897</b>	<b>14,663</b>	<b>15,556</b>	<b>16,586</b>

### GRIMES COUNTY

*100% (multiplier)*

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
G	County-Other, Grimes	Brazos	306	302	294	292	286	277
G	County-Other, Grimes	San Jacinto	592	583	568	562	551	535
G	County-Other, Grimes	Trinity	350	345	336	334	327	317
G	Dobbin Plantersville WSC	Brazos	33	37	40	44	47	50
G	Dobbin Plantersville WSC	San Jacinto	105	118	129	140	150	159
G	G & W WSC	Brazos	361	471	554	645	722	789
G	G & W WSC	San Jacinto	48	62	73	85	95	104
G	Irrigation, Grimes	Brazos	513	513	513	513	513	513

*Estimated Historical Water Use and 2022 State Water Plan Dataset:*

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G	Irrigation, Grimes	San Jacinto	155	155	155	155	155	155
G	Livestock, Grimes	Brazos	1,233	1,233	1,233	1,233	1,233	1,233
G	Livestock, Grimes	San Jacinto	523	523	523	523	523	523
G	Livestock, Grimes	Trinity	367	367	367	367	367	367
G	Manufacturing, Grimes	Brazos	327	327	327	327	327	327
G	Mining, Grimes	Brazos	210	392	306	221	136	83
G	Mining, Grimes	San Jacinto	94	175	137	99	61	37
G	Mining, Grimes	Trinity	19	35	28	20	12	8
G	Navasota	Brazos	1,474	1,486	1,493	1,514	1,541	1,567
G	Steam-Electric Power, Grimes	Brazos	10,682	10,682	10,682	10,682	10,682	10,682
G	Steam-Electric Power, Grimes	San Jacinto	4,334	4,334	4,334	4,334	4,334	4,334
G	TDCJ Luther Units	Brazos	289	311	329	348	365	380
G	TDCJ W Pack Unit	Brazos	397	429	453	480	504	524
G	Wickson Creek SUD	Brazos	429	462	501	550	605	665
G	Wickson Creek SUD	Trinity	38	41	44	48	53	58
<b>Sum of Projected Water Demands (acre-feet)</b>			<b>22,879</b>	<b>23,383</b>	<b>23,419</b>	<b>23,516</b>	<b>23,589</b>	<b>23,687</b>

## WALKER COUNTY

100% (multiplier)

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
H	County-Other, Walker	San Jacinto	1,330	1,357	1,372	1,393	1,417	1,437
H	County-Other, Walker	Trinity	1,567	1,535	1,507	1,487	1,477	1,470
H	Dodge Oakhurst WSC	San Jacinto	80	82	85	89	92	96
H	Dodge Oakhurst WSC	Trinity	56	59	60	63	66	68
H	Huntsville	San Jacinto	6,525	6,685	6,787	6,925	7,069	7,194
H	Huntsville	Trinity	1,336	1,369	1,390	1,419	1,448	1,474
H	Irrigation, Walker	San Jacinto	240	240	240	240	240	240
H	Irrigation, Walker	Trinity	320	320	320	320	320	320
H	Lake Livingston WSC	Trinity	13	14	16	17	19	21
H	Livestock, Walker	San Jacinto	353	353	353	353	353	353
H	Livestock, Walker	Trinity	400	400	400	400	400	400
H	Manufacturing, Walker	San Jacinto	29	36	36	36	36	36
H	Manufacturing, Walker	Trinity	220	267	267	267	267	267
H	Mining, Walker	San Jacinto	5	5	5	5	5	5
H	Mining, Walker	Trinity	6	6	6	6	6	6
H	New Waverly	San Jacinto	190	193	194	197	201	204
H	Phelps SUD	San Jacinto	153	152	151	152	154	156
H	Phelps SUD	Trinity	66	66	66	66	67	67
H	Riverside WSC	Trinity	324	356	380	403	420	435
H	The Consolidated WSC	Trinity	11	12	13	13	14	15
H	Trinity Rural WSC	Trinity	37	40	42	44	46	47
H	Walker County Rural SUD	San Jacinto	434	447	456	468	481	491
H	Walker County Rural SUD	Trinity	578	597	609	625	641	656
<b>Sum of Projected Water Demands (acre-feet)</b>			<b>14,273</b>	<b>14,591</b>	<b>14,755</b>	<b>14,988</b>	<b>15,239</b>	<b>15,458</b>



**WALLER COUNTY***100% (multiplier)*

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
H	Brookshire MWD	Brazos	602	710	837	981	1,146	1,326
H	County-Other, Waller	Brazos	1,448	1,693	1,979	2,303	2,673	3,077
H	County-Other, Waller	San Jacinto	1,351	1,579	1,845	2,148	2,493	2,870
H	G & W WSC	Brazos	110	146	186	231	281	335
H	G & W WSC	San Jacinto	339	447	572	708	861	1,028
H	Hempstead	Brazos	1,303	1,489	1,702	1,944	2,218	2,517
H	Irrigation, Waller	Brazos	7,762	7,762	7,762	7,762	7,762	7,762
H	Irrigation, Waller	San Jacinto	14,282	14,282	14,282	14,282	14,282	14,282
H	Katy	San Jacinto	354	434	527	628	742	866
H	Livestock, Waller	Brazos	909	909	909	909	909	909
H	Livestock, Waller	San Jacinto	270	270	270	270	270	270
H	Manufacturing, Waller	Brazos	65	66	66	66	66	66
H	Manufacturing, Waller	San Jacinto	69	70	70	70	70	70
H	Mining, Waller	Brazos	4	4	4	4	4	4
H	Mining, Waller	San Jacinto	3	3	3	3	3	3
H	Oak Hollow Utility	San Jacinto	206	240	282	328	381	439
H	Pattison WSC	Brazos	263	310	365	426	495	570
H	Prairie View	Brazos	751	1,000	1,277	1,582	1,924	2,296
H	Prairie View	San Jacinto	55	73	93	116	141	168
H	Prairie View A&M University	Brazos	195	195	195	195	195	195
H	Prairie View A&M University	San Jacinto	21	21	21	21	21	21
H	Quadvest	Brazos	26	34	43	54	68	82
H	Waller	San Jacinto	356	379	407	440	479	523
H	White Oak Utilities	San Jacinto	6	8	7	7	7	7
<b>Sum of Projected Water Demands (acre-feet)</b>			<b>30,750</b>	<b>32,124</b>	<b>33,704</b>	<b>35,478</b>	<b>37,491</b>	<b>39,686</b>

# Projected Water Supply Needs

## TWDB 2022 State Water Plan Data

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

### AUSTIN COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
H	Austin County WSC	Brazos	0	0	0	0	0	0
H	Austin County WSC	Brazos-Colorado	0	0	0	0	0	0
H	Bellville	Brazos	0	0	0	0	0	0
H	County-Other, Austin	Brazos	0	-210	-505	-872	-1,293	-1,766
H	County-Other, Austin	Brazos-Colorado	0	-2	-79	-175	-285	-408
H	County-Other, Austin	Colorado	0	0	0	0	0	-3
H	Irrigation, Austin	Brazos	0	0	0	0	0	0
H	Irrigation, Austin	Brazos-Colorado	0	0	0	0	0	0
H	Livestock, Austin	Brazos	0	0	0	0	0	0
H	Livestock, Austin	Brazos-Colorado	0	0	0	0	0	0
H	Livestock, Austin	Colorado	0	0	0	0	0	0
H	Manufacturing, Austin	Brazos	0	0	0	0	0	0
H	Manufacturing, Austin	Brazos-Colorado	0	0	0	0	0	0
H	Mining, Austin	Brazos	0	-147	-99	-51	-4	0
H	Mining, Austin	Brazos-Colorado	0	-43	-29	-15	-1	0
H	Mining, Austin	Colorado	0	-3	-2	-1	0	0
H	Sealy	Brazos	0	0	0	0	0	0
H	Sealy	Brazos-Colorado	0	0	0	0	0	0
H	Wallis	Brazos-Colorado	0	0	0	0	0	0
H	West End WSC	Brazos	0	0	0	0	0	0
H	West End WSC	Colorado	0	0	0	0	0	0
<b>Sum of Projected Water Supply Needs (acre-feet)</b>			<b>0</b>	<b>-405</b>	<b>-714</b>	<b>-1,114</b>	<b>-1,583</b>	<b>-2,177</b>

### GRIMES COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
G	County-Other, Grimes	Brazos	1	7	15	15	21	31
G	County-Other, Grimes	San Jacinto	2	9	24	30	41	57
G	County-Other, Grimes	Trinity	0	5	14	18	25	34
G	Dobbin Plantersville WSC	Brazos	11	12	13	14	15	16
G	Dobbin Plantersville WSC	San Jacinto	33	38	41	45	48	51
G	G & W WSC	Brazos	24	30	37	43	47	52
G	G & W WSC	San Jacinto	3	5	5	6	7	7
G	Irrigation, Grimes	Brazos	-115	-115	-115	-115	-115	-115
G	Irrigation, Grimes	San Jacinto	-36	-36	-36	-36	-36	-36

*Estimated Historical Water Use and 2022 State Water Plan Dataset:*

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G	Livestock, Grimes	Brazos	0	0	0	0	0	0
G	Livestock, Grimes	San Jacinto	0	0	0	0	0	0
G	Livestock, Grimes	Trinity	0	0	0	0	0	0
G	Manufacturing, Grimes	Brazos	142	142	142	142	167	213
G	Mining, Grimes	Brazos	-106	-288	-202	-117	-32	20
G	Mining, Grimes	San Jacinto	-17	-98	-60	-22	16	40
G	Mining, Grimes	Trinity	-10	-26	-19	-11	-3	2
G	Navasota	Brazos	565	553	546	525	474	403
G	Steam-Electric Power, Grimes	Brazos	5,046	5,046	5,046	5,046	5,046	5,046
G	Steam-Electric Power, Grimes	San Jacinto	0	0	0	0	0	0
G	TDCJ Luther Units	Brazos	536	514	496	477	460	445
G	TDCJ W Pack Unit	Brazos	234	202	178	151	127	107
G	Wickson Creek SUD	Brazos	425	387	298	204	101	18
G	Wickson Creek SUD	Trinity	38	34	26	18	8	1
<b>Sum of Projected Water Supply Needs (acre-feet)</b>			<b>-284</b>	<b>-563</b>	<b>-432</b>	<b>-301</b>	<b>-186</b>	<b>-151</b>

## WALKER COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
H	County-Other, Walker	San Jacinto	1,600	1,610	1,621	1,625	1,619	1,613
H	County-Other, Walker	Trinity	999	994	996	991	983	976
H	Dodge Oakhurst WSC	San Jacinto	0	0	0	0	0	0
H	Dodge Oakhurst WSC	Trinity	0	0	0	0	0	0
H	Huntsville	San Jacinto	11,977	11,843	11,759	11,643	11,525	11,420
H	Huntsville	Trinity	2,452	2,426	2,408	2,386	2,360	2,340
H	Irrigation, Walker	San Jacinto	0	0	0	0	0	0
H	Irrigation, Walker	Trinity	0	0	0	0	0	0
H	Lake Livingston WSC	Trinity	12	11	12	11	11	11
H	Livestock, Walker	San Jacinto	0	0	0	0	0	0
H	Livestock, Walker	Trinity	0	0	0	0	0	0
H	Manufacturing, Walker	San Jacinto	0	0	0	0	0	0
H	Manufacturing, Walker	Trinity	337	337	337	337	337	337
H	Mining, Walker	San Jacinto	0	0	0	0	0	0
H	Mining, Walker	Trinity	0	0	0	0	0	0
H	New Waverly	San Jacinto	0	0	0	0	0	0
H	Phelps SUD	San Jacinto	0	0	0	0	0	0
H	Phelps SUD	Trinity	0	0	0	0	0	0
H	Riverside WSC	Trinity	10	10	10	10	10	10
H	The Consolidated WSC	Trinity	6	7	8	8	9	9
H	Trinity Rural WSC	Trinity	0	0	0	0	0	0
H	Walker County Rural SUD	San Jacinto	0	0	0	0	0	0
H	Walker County Rural SUD	Trinity	0	0	0	0	0	0
<b>Sum of Projected Water Supply Needs (acre-feet)</b>			<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**WALLER COUNTY**

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
H	Brookshire MWD	Brazos	0	0	0	0	0	0
H	County-Other, Waller	Brazos	-266	-511	-797	-1,121	-1,491	-1,895
H	County-Other, Waller	San Jacinto	-369	-597	-863	-1,166	-1,511	-1,888
H	G & W WSC	Brazos	0	0	0	-9	-59	-113
H	G & W WSC	San Jacinto	0	0	0	-29	-182	-349
H	Hempstead	Brazos	0	0	0	0	0	-225
H	Irrigation, Waller	Brazos	-18	-18	-18	-18	-18	-18
H	Irrigation, Waller	San Jacinto	0	0	0	0	0	0
H	Katy	San Jacinto	0	0	0	0	0	0
H	Livestock, Waller	Brazos	0	0	0	0	0	0
H	Livestock, Waller	San Jacinto	0	0	0	0	0	0
H	Manufacturing, Waller	Brazos	0	0	0	0	0	0
H	Manufacturing, Waller	San Jacinto	16	16	16	16	16	16
H	Mining, Waller	Brazos	0	0	0	0	0	0
H	Mining, Waller	San Jacinto	0	0	0	0	0	0
H	Oak Hollow Utility	San Jacinto	0	0	0	0	0	0
H	Pattison WSC	Brazos	0	0	0	0	0	0
H	Prairie View	Brazos	0	0	0	0	0	0
H	Prairie View	San Jacinto	0	0	0	0	0	0
H	Prairie View A&M University	Brazos	0	0	0	0	0	0
H	Prairie View A&M University	San Jacinto	0	0	0	0	0	0
H	Quadvest	Brazos	0	0	0	0	0	0
H	Waller	San Jacinto	0	0	0	0	0	0
H	White Oak Utilities	San Jacinto	0	0	0	0	0	0
<b>Sum of Projected Water Supply Needs (acre-feet)</b>			<b>-653</b>	<b>-1,126</b>	<b>-1,678</b>	<b>-2,343</b>	<b>-3,261</b>	<b>-4,488</b>

# Projected Water Management Strategies

## TWDB 2022 State Water Plan Data

### AUSTIN COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
<b>Austin County WSC, Brazos (H)</b>							
Municipal Conservation, Austin County WSC	DEMAND REDUCTION [Austin]	9	16	20	26	31	40
Water Loss Reduction, Austin County WSC	DEMAND REDUCTION [Austin]	1	4	5	6	7	8
		<b>10</b>	<b>20</b>	<b>25</b>	<b>32</b>	<b>38</b>	<b>48</b>
<b>Austin County WSC, Brazos-Colorado (H)</b>							
Municipal Conservation, Austin County WSC	DEMAND REDUCTION [Austin]	1	1	2	2	3	3
Water Loss Reduction, Austin County WSC	DEMAND REDUCTION [Austin]	0	0	0	0	1	1
		<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>4</b>
<b>Bellville, Brazos (H)</b>							
Municipal Conservation, Bellville	DEMAND REDUCTION [Austin]	32	56	70	79	86	91
		<b>32</b>	<b>56</b>	<b>70</b>	<b>79</b>	<b>86</b>	<b>91</b>
<b>County-Other, Austin, Brazos (H)</b>							
Expanded Use of Groundwater, Austin County	Gulf Coast Aquifer System [Austin]	0	400	400	1,100	1,100	1,550
Municipal Conservation, County-Other, Austin	DEMAND REDUCTION [Austin]	52	91	116	152	193	260
Water Loss Reduction, County-Other, Austin	DEMAND REDUCTION [Austin]	15	50	92	144	206	279
		<b>67</b>	<b>541</b>	<b>608</b>	<b>1,396</b>	<b>1,499</b>	<b>2,089</b>
<b>County-Other, Austin, Brazos-Colorado (H)</b>							
Expanded Use of Groundwater, Austin County	Gulf Coast Aquifer System [Austin]	0	0	150	150	350	350
Municipal Conservation, County-Other, Austin	DEMAND REDUCTION [Austin]	14	24	30	40	50	68
Water Loss Reduction, County-Other, Austin	DEMAND REDUCTION [Austin]	4	13	24	38	54	73
		<b>18</b>	<b>37</b>	<b>204</b>	<b>228</b>	<b>454</b>	<b>491</b>
<b>County-Other, Austin, Colorado (H)</b>							
Municipal Conservation, County-Other, Austin	DEMAND REDUCTION [Austin]	1	1	1	2	2	3
Water Loss Reduction, County-Other, Austin	DEMAND REDUCTION [Austin]	0	0	1	1	2	3
		<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>6</b>
<b>Irrigation, Austin, Brazos (H)</b>							

Irrigation Conservation, Austin County	DEMAND REDUCTION [Austin]	1,108	1,108	1,108	1,108	1,108	1,108
		<b>1,108</b>	<b>1,108</b>	<b>1,108</b>	<b>1,108</b>	<b>1,108</b>	<b>1,108</b>
<b>Irrigation, Austin, Brazos-Colorado (H)</b>							
Irrigation Conservation, Austin County	DEMAND REDUCTION [Austin]	1,885	1,885	1,885	1,885	1,885	1,885
		<b>1,885</b>	<b>1,885</b>	<b>1,885</b>	<b>1,885</b>	<b>1,885</b>	<b>1,885</b>
<b>Mining, Austin, Brazos (H)</b>							
Expanded Use of Groundwater, Austin County	Gulf Coast Aquifer System [Austin]	0	150	150	150	150	150
		<b>0</b>	<b>150</b>	<b>150</b>	<b>150</b>	<b>150</b>	<b>150</b>
<b>Mining, Austin, Brazos-Colorado (H)</b>							
Expanded Use of Groundwater, Austin County	Gulf Coast Aquifer System [Austin]	0	100	100	100	100	100
		<b>0</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Mining, Austin, Colorado (H)</b>							
Expanded Use of Groundwater, Austin County	Gulf Coast Aquifer System [Austin]	0	100	100	100	100	100
		<b>0</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Sealy, Brazos (H)</b>							
Municipal Conservation, Sealy	DEMAND REDUCTION [Austin]	37	63	79	92	105	117
		<b>37</b>	<b>63</b>	<b>79</b>	<b>92</b>	<b>105</b>	<b>117</b>
<b>Wallis, Brazos-Colorado (H)</b>							
Municipal Conservation, Wallis	DEMAND REDUCTION [Austin]	5	9	10	12	14	18
Water Loss Reduction, Wallis	DEMAND REDUCTION [Austin]	1	4	6	9	11	13
		<b>6</b>	<b>13</b>	<b>16</b>	<b>21</b>	<b>25</b>	<b>31</b>
<b>West End WSC, Brazos (H)</b>							
Municipal Conservation, West End WSC	DEMAND REDUCTION [Austin]	5	9	11	13	15	20
		<b>5</b>	<b>9</b>	<b>11</b>	<b>13</b>	<b>15</b>	<b>20</b>
<b>West End WSC, Colorado (H)</b>							
Municipal Conservation, West End WSC	DEMAND REDUCTION [Austin]	1	1	1	1	2	2
		<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>
<b>Sum of Projected Water Management Strategies (acre-feet)</b>		<b>3,171</b>	<b>4,085</b>	<b>4,361</b>	<b>5,210</b>	<b>5,575</b>	<b>6,242</b>

## GRIMES COUNTY

### WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
<b>Irrigation, Grimes, Brazos (G)</b>							
Gulf Coast Aquifer Development	Gulf Coast Aquifer System [Grimes]	101	101	101	101	101	101
Irrigation Water Conservation	DEMAND REDUCTION [Grimes]	15	25	36	36	36	36
		<b>116</b>	<b>126</b>	<b>137</b>	<b>137</b>	<b>137</b>	<b>137</b>

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**Irrigation, Grimes, San Jacinto (G)**

Gulf Coast Aquifer Development	Gulf Coast Aquifer System [Grimes]	31	30	30	30	30	30
Irrigation Water Conservation	DEMAND REDUCTION [Grimes]	5	8	11	11	11	11
		<b>36</b>	<b>38</b>	<b>41</b>	<b>41</b>	<b>41</b>	<b>41</b>

**Mining, Grimes, Brazos (G)**

Gulf Coast Aquifer Development	Gulf Coast Aquifer System [Grimes]	249	269	248	249	249	248
Industrial Water Conservation	DEMAND REDUCTION [Grimes]	6	19	21	16	10	5
		<b>255</b>	<b>288</b>	<b>269</b>	<b>265</b>	<b>259</b>	<b>253</b>

**Mining, Grimes, San Jacinto (G)**

Gulf Coast Aquifer Development	Gulf Coast Aquifer System [Grimes]	111	89	111	111	111	110
Industrial Water Conservation	DEMAND REDUCTION [Grimes]	3	9	10	7	4	3
		<b>114</b>	<b>98</b>	<b>121</b>	<b>118</b>	<b>115</b>	<b>113</b>

**Mining, Grimes, Trinity (G)**

Gulf Coast Aquifer Development	Gulf Coast Aquifer System [Grimes]	22	24	23	22	22	24
Industrial Water Conservation	DEMAND REDUCTION [Grimes]	1	2	2	1	1	1
		<b>23</b>	<b>26</b>	<b>25</b>	<b>23</b>	<b>23</b>	<b>25</b>

**Navasota, Brazos (G)**

Municipal Water Conservation - Navasota	DEMAND REDUCTION [Grimes]	0	110	219	236	238	242
		<b>0</b>	<b>110</b>	<b>219</b>	<b>236</b>	<b>238</b>	<b>242</b>

**TDCJ Luther Units, Brazos (G)**

Municipal Water Conservation - TDCJ Luther Units	DEMAND REDUCTION [Grimes]	0	25	54	61	64	66
		<b>0</b>	<b>25</b>	<b>54</b>	<b>61</b>	<b>64</b>	<b>66</b>

**TDCJ W Pack Unit, Brazos (G)**

Municipal Water Conservation - TDCJ W Pack Unit	DEMAND REDUCTION [Grimes]	0	36	75	116	159	166
		<b>0</b>	<b>36</b>	<b>75</b>	<b>116</b>	<b>159</b>	<b>166</b>
<b>Sum of Projected Water Management Strategies (acre-feet)</b>		<b>544</b>	<b>747</b>	<b>941</b>	<b>997</b>	<b>1,036</b>	<b>1,043</b>

**WALKER COUNTY****WUG, Basin (RWPG)**

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
<b>County-Other, Walker, San Jacinto (H)</b>							
Municipal Conservation, County-Other, Walker	DEMAND REDUCTION [Walker]	36	51	56	62	68	79
		<b>36</b>	<b>51</b>	<b>56</b>	<b>62</b>	<b>68</b>	<b>79</b>
<b>County-Other, Walker, Trinity (H)</b>							
Municipal Conservation, County-Other, Walker	DEMAND REDUCTION [Walker]	43	58	61	67	71	80

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			<b>43</b>	<b>58</b>	<b>61</b>	<b>67</b>	<b>71</b>	<b>80</b>
<b>Dodge Oakhurst WSC, San Jacinto (H)</b>								
Municipal Conservation, Dodge Oakhurst WSC	DEMAND REDUCTION [Walker]	2	4	5	6	7	7	
		<b>2</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>7</b>	
<b>Dodge Oakhurst WSC, Trinity (H)</b>								
Municipal Conservation, Dodge Oakhurst WSC	DEMAND REDUCTION [Walker]	2	3	3	4	4	6	
		<b>2</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>6</b>	
<b>Huntsville, San Jacinto (H)</b>								
Municipal Conservation, Huntsville	DEMAND REDUCTION [Walker]	174	275	319	361	407	453	
Water Loss Reduction, Huntsville	DEMAND REDUCTION [Walker]	41	120	193	197	201	204	
		<b>215</b>	<b>395</b>	<b>512</b>	<b>558</b>	<b>608</b>	<b>657</b>	
<b>Huntsville, Trinity (H)</b>								
Municipal Conservation, Huntsville	DEMAND REDUCTION [Walker]	36	56	65	74	83	93	
Water Loss Reduction, Huntsville	DEMAND REDUCTION [Walker]	8	25	39	40	41	42	
		<b>44</b>	<b>81</b>	<b>104</b>	<b>114</b>	<b>124</b>	<b>135</b>	
<b>Lake Livingston WSC, Trinity (H)</b>								
Water Loss Reduction, Lake Livingston WSC	DEMAND REDUCTION [Walker]	0	1	2	2	3	4	
		<b>0</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>4</b>	
<b>New Waverly, San Jacinto (H)</b>								
Municipal Conservation, New Waverly	DEMAND REDUCTION [Walker]	6	11	13	14	15	15	
Water Loss Reduction, New Waverly	DEMAND REDUCTION [Walker]	1	3	3	3	3	3	
		<b>7</b>	<b>14</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>18</b>	
<b>Phelps SUD, San Jacinto (H)</b>								
Municipal Conservation, Phelps SUD	DEMAND REDUCTION [Walker]	5	7	8	9	10	12	
		<b>5</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>12</b>	
<b>Phelps SUD, Trinity (H)</b>								
Municipal Conservation, Phelps SUD	DEMAND REDUCTION [Walker]	2	3	3	4	4	5	
		<b>2</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>5</b>	
<b>Trinity Rural WSC, Trinity (H)</b>								
Municipal Conservation, Trinity Rural WSC	DEMAND REDUCTION [Walker]	1	2	2	3	3	3	
Water Loss Reduction, Trinity Rural WSC	DEMAND REDUCTION [Walker]	0	1	1	2	2	2	
		<b>1</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>5</b>	<b>5</b>	
<b>Walker County Rural SUD, San Jacinto (H)</b>								
Municipal Conservation, Walker County Rural SUD	DEMAND REDUCTION [Walker]	13	20	23	26	29	34	
Water Loss Reduction, Walker County Rural SUD	DEMAND REDUCTION [Walker]	6	17	27	37	47	56	



		19	37	50	63	76	90
<b>Walker County Rural SUD, Trinity (H)</b>							
Municipal Conservation, Walker County Rural SUD	DEMAND REDUCTION [Walker]	18	27	30	35	39	46
Water Loss Reduction, Walker County Rural SUD	DEMAND REDUCTION [Walker]	8	22	36	50	62	75
		<b>26</b>	<b>49</b>	<b>66</b>	<b>85</b>	<b>101</b>	<b>121</b>
<b>Sum of Projected Water Management Strategies (acre-feet)</b>		<b>402</b>	<b>706</b>	<b>889</b>	<b>996</b>	<b>1,099</b>	<b>1,219</b>

## WALLER COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
<b>Brookshire MWD, Brazos (H)</b>							
Municipal Conservation, Brookshire MWD	DEMAND REDUCTION [Waller]	17	29	37	48	60	80
Water Loss Reduction, Brookshire MWD	DEMAND REDUCTION [Waller]	7	24	46	71	102	138
		<b>24</b>	<b>53</b>	<b>83</b>	<b>119</b>	<b>162</b>	<b>218</b>
<b>County-Other, Waller, Brazos (H)</b>							
Expanded Use of Groundwater, Waller County	Gulf Coast Aquifer System [Waller]	450	450	1,000	1,000	1,700	1,700
Municipal Conservation, County-Other, Waller	DEMAND REDUCTION [Waller]	46	78	99	129	162	217
Water Loss Reduction, County-Other, Waller	DEMAND REDUCTION [Waller]	8	16	19	22	25	29
		<b>504</b>	<b>544</b>	<b>1,118</b>	<b>1,151</b>	<b>1,887</b>	<b>1,946</b>
<b>County-Other, Waller, San Jacinto (H)</b>							
Expanded Use of Groundwater, Waller County	Gulf Coast Aquifer System [Waller]	525	525	1,050	1,050	1,700	1,700
Municipal Conservation, County-Other, Waller	DEMAND REDUCTION [Waller]	42	72	92	121	152	202
Water Loss Reduction, County-Other, Waller	DEMAND REDUCTION [Waller]	7	15	17	20	24	27
		<b>574</b>	<b>612</b>	<b>1,159</b>	<b>1,191</b>	<b>1,876</b>	<b>1,929</b>
<b>G &amp; W WSC, Brazos (H)</b>							
Expanded Use of Groundwater, Waller County	Gulf Coast Aquifer System [Waller]	0	0	0	0	79	79
Municipal Conservation, G & W WSC	DEMAND REDUCTION [Waller]	3	6	9	13	16	23
Water Loss Reduction, G & W WSC	DEMAND REDUCTION [Waller]	1	3	6	8	10	11
		<b>4</b>	<b>9</b>	<b>15</b>	<b>21</b>	<b>105</b>	<b>113</b>
<b>G &amp; W WSC, San Jacinto (H)</b>							
Expanded Use of Groundwater, Waller County	Gulf Coast Aquifer System [Waller]	0	0	0	0	246	246
Municipal Conservation, G & W WSC	DEMAND REDUCTION [Waller]	11	20	27	38	51	69
Water Loss Reduction, G & W WSC	DEMAND REDUCTION [Waller]	2	8	17	24	29	35
		<b>13</b>	<b>28</b>	<b>44</b>	<b>62</b>	<b>326</b>	<b>350</b>

Estimated Historical Water Use and 2022 State Water Plan Dataset:

Bluebonnet Groundwater Conservation District

April 5, 2023

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**Hempstead, Brazos (H)**

Expanded Use of Groundwater, Waller County	Gulf Coast Aquifer System [Waller]	0	0	0	0	0	150
Municipal Conservation, Hempstead	DEMAND REDUCTION [Waller]	35	57	72	87	102	120
		<b>35</b>	<b>57</b>	<b>72</b>	<b>87</b>	<b>102</b>	<b>270</b>

**Irrigation, Waller, Brazos (H)**

Irrigation Conservation, Waller County	DEMAND REDUCTION [Waller]	3,028	3,028	3,028	3,028	3,028	3,028
Other BRA System Operation Supplies	BRA System Operations Permit Supply [Reservoir]	90	90	90	90	87	84
		<b>3,118</b>	<b>3,118</b>	<b>3,118</b>	<b>3,118</b>	<b>3,115</b>	<b>3,112</b>

**Irrigation, Waller, San Jacinto (H)**

Irrigation Conservation, Waller County	DEMAND REDUCTION [Waller]	5,252	5,252	5,252	5,252	5,252	5,252
		<b>5,252</b>	<b>5,252</b>	<b>5,252</b>	<b>5,252</b>	<b>5,252</b>	<b>5,252</b>

**Katy, San Jacinto (H)**

Municipal Conservation, Katy	DEMAND REDUCTION [Waller]	10	17	25	34	44	56
		<b>10</b>	<b>17</b>	<b>25</b>	<b>34</b>	<b>44</b>	<b>56</b>

**Oak Hollow Utility, San Jacinto (H)**

Municipal Conservation, Oak Hollow Utility	DEMAND REDUCTION [Waller]	7	13	16	22	27	37
		<b>7</b>	<b>13</b>	<b>16</b>	<b>22</b>	<b>27</b>	<b>37</b>

**Pattison WSC, Brazos (H)**

Municipal Conservation, Pattison WSC	DEMAND REDUCTION [Waller]	8	13	16	21	26	32
		<b>8</b>	<b>13</b>	<b>16</b>	<b>21</b>	<b>26</b>	<b>32</b>

**Prairie View, Brazos (H)**

Municipal Conservation, Prairie View	DEMAND REDUCTION [Waller]	20	33	45	60	76	97
		<b>20</b>	<b>33</b>	<b>45</b>	<b>60</b>	<b>76</b>	<b>97</b>

**Prairie View, San Jacinto (H)**

Municipal Conservation, Prairie View	DEMAND REDUCTION [Waller]	1	2	3	4	6	7
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>6</b>	<b>7</b>

**Quadvest, Brazos (H)**

Municipal Conservation, Quadvest	DEMAND REDUCTION [Waller]	1	1	2	3	4	6
		<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>6</b>

**Waller, San Jacinto (H)**

Municipal Conservation, Waller	DEMAND REDUCTION [Waller]	12	24	31	35	38	42
Water Loss Reduction, Waller	DEMAND REDUCTION [Waller]	4	11	18	27	35	45
		<b>16</b>	<b>35</b>	<b>49</b>	<b>62</b>	<b>73</b>	<b>87</b>

**White Oak Utilities, San Jacinto (H)**

Municipal Conservation, White Oak Utilities	DEMAND REDUCTION [Waller]	0	1	1	1	1	1
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	0	1	1	1	1	1
Sum of Projected Water Management Strategies (acre-feet)	9,587	9,788	11,018	11,208	13,082	13,513

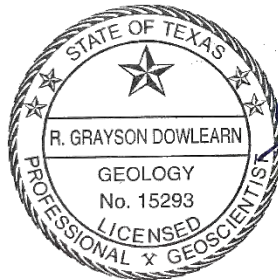
## **Appendix C**

### **GAM Run 23-005: Bluebonnet Groundwater Conservation District Management Plan**

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# GAM RUN 23-005: BLUEBONNET GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

Dwight Zedric Q. Capus, GIT and Grayson Dowlearn, P.G.  
Texas Water Development Board  
Groundwater Division  
Groundwater Modeling Department  
512-936-2404  
June 9, 2023



*Grayson Dowlearn*  
6/9/2023

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# **GAM RUN 23-005: BLUEBONNET GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN**

Dwight Zedric Q. Capus, GIT and Grayson Dowlearn, P.G.  
Texas Water Development Board  
Groundwater Division  
Groundwater Modeling Department  
512-936-2404  
June 9, 2023

## ***EXECUTIVE SUMMARY:***

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

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

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

The groundwater management plan for the Bluebonnet Groundwater Conservation District should be adopted by the district on or before August 2, 2023 and submitted to the TWDB Executive Administrator on or before September 1, 2023. The current management plan for the Bluebonnet Groundwater Conservation District expires on October 31, 2023.

The management plan information for the aquifers within Bluebonnet Groundwater Conservation District was extracted from four groundwater availability models. We used the groundwater availability model for the central portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers (Young and Kushnereit, 2020; Young and others, 2018) to estimate management plan information for the Carrizo-Wilcox, Queen City, and Sparta aquifers. We used the groundwater availability model for the Yegua-Jackson Aquifer (Deeds and others, 2010) to estimate management plan information for the Yegua-Jackson Aquifer. We used the groundwater availability model for the northern portion of the Gulf Coast Aquifer System (Kasmarek, 2013) to estimate the management plan information for the Gulf Coast Aquifer System. We used the groundwater availability for the Brazos River Alluvium Aquifer (Ewing and Jigmond, 2016) to estimate the management plan information for the Brazos River Alluvium Aquifer.

This report replaces the results of GAM Run 17-020 (Wade, 2017) because it includes results from the updated groundwater availability model for the central portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers (Young and Kushnereit, 2020; Young and others, 2018). Values may differ from the previous report as a result of routine updates to the spatial grid file used to define county, groundwater conservation district, and aquifer boundaries, which can impact the calculated water budget values. Additionally, the approach used for analyzing model results is reviewed during each update and may have been refined to better delineate groundwater flows. Tables 1 through 6 summarize the groundwater availability model data required by statute. Figures 1, 3, 5, 7, 9 and 11 show the areas of the respective models from which the values in Tables 1 through 6 were extracted. Figures 2, 4, 6, 8, 10, and 12 provide a generalized diagram of the groundwater flow components provided in Tables 1 through 6. If, after review of the figures, the Bluebonnet Groundwater Conservation District determines that the district boundaries used in the assessment do not reflect current conditions, please notify the TWDB at your earliest convenience.

The flow components presented in this report do not represent the full groundwater budget. If additional inflow and outflow information would be helpful for planning purposes, the district may submit a request in writing to the TWDB Groundwater Modeling Department for the full groundwater budget.



## ***METHODS:***

In accordance with Texas Water Code § 36.1071(h), the groundwater availability models mentioned above were used to estimate information for the Bluebonnet Groundwater Conservation District management plan. Water budgets were extracted for the historical calibration period for the Carrizo-Wilcox, Queen City, and Sparta aquifers (1980 through 2010) and the Brazos River Alluvium Aquifer (1980 through 2012) using ZONEBUDGET for MODFLOW USG Version 1.0 (Panday and others, 2013). Water budgets were extracted for the historical calibration period for the Yegua-Jackson Aquifer (1980 through 1997) and Gulf Coast Aquifer System (1980 through 2009) using ZONEBUDGET Version 3.01 (Harbaugh, 2009). The average annual water budget values for recharge, surface-water outflow, inflow to the district, outflow from the district, and the flow between aquifers within the district are summarized in this report.

## ***PARAMETERS AND ASSUMPTIONS:***

### ***Carrizo-Wilcox, Queen City, and Sparta aquifers***

- We used version 3.02 of the groundwater availability model for the Carrizo-Wilcox, Queen City, and Sparta aquifers (Young and Kushnereit, 2020; Young and others, 2018) to analyze the Sparta, Queen City and Carrizo-Wilcox aquifers. See Young and Kushnereit (2020) and Young and others (2018) for assumptions and limitations of the model.
- The groundwater availability model for the central portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers contains ten layers:
  - Layer 1 represents the Colorado River and Brazos River alluvium
  - Layer 2 represents the shallow flow system of all units in layers 3 through 10
  - Layer 3 represents the Sparta Aquifer and equivalent units
  - Layer 4 represents the Weches Formation
  - Layer 5 represents the Queen City Aquifer and equivalent units
  - Layer 6 represents the Reklaw Formation
  - Layers 7 through 10 represent the Carrizo-Wilcox Aquifer and equivalent units.

- Individual water budgets for the district were determined for the Sparta Aquifer (layers 2 and 3), the Queen City Aquifer (layers 2 and 5), and the Carrizo-Wilcox Aquifer (layers 2 and 7 through 10, collectively).
- The MODFLOW River package was used to simulate the groundwater exchange with major rivers and perennial streams. Outflow from ephemeral streams, intermittent streams, and seeps were simulated using the MODFLOW Drain package. The evapotranspiration package was used to simulate groundwater evapotranspiration from the model.
- The model was run with MODFLOW-USG (Panday and others, 2013).
- Water budget terms were averaged for the period 1980 through 2010 (stress periods 52 through 82).

### ***Yegua-Jackson Aquifer***

- We used version 1.01 of the groundwater availability model for the Yegua-Jackson Aquifer (Deeds and others, 2010) to analyze the Yegua-Jackson Aquifer. See Deeds and others (2010) for assumptions and limitations of the model.
- The groundwater availability model for the Yegua-Jackson Aquifer contains five layers:
  - Layer 1 represents the Yegua-Jackson Aquifer outcrop, the Catahoula Formation, and other younger overlying units
  - Layer 2 represents the upper portion of the Jackson Group
  - Layer 3 represents the lower portion of the Jackson Group
  - Layer 4 represents the upper portion of the Yegua Group
  - Layer 5 represents the lower portion of the Yegua Group
- An overall water budget for the district was determined for the Yegua-Jackson Aquifer (layers 1 through 5, collectively).
- The Catahoula Formation within the Bluebonnet Groundwater Conservation District falls within the Gulf Coast Aquifer System, which allows us to estimate the exchange between the Yegua-Jackson Aquifer and the Gulf Coast Aquifer System in this assessment.
- Water budget terms were averaged for the period 1980 through 1997 (stress periods 10 through 27).
- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).

### ***Gulf Coast Aquifer System***

- We used version 1.01 of the groundwater availability model for the northern portion of the Gulf Coast Aquifer System (Kasmarek, 2013) to analyze the Gulf Coast Aquifer System. See Kasmarek (2013) for assumptions and limitations of the model.
- The groundwater availability model for the Gulf Coast Aquifer System contains four layers:
  - Layer 1 represents the Chicot Aquifer
  - Layer 2 represents the Evangeline Aquifer
  - Layer 3 represents the Burkeville Confining Unit
  - Layer 4 represents the Jasper Aquifer and parts of the Catahoula Formation in direct hydrologic communication with the Jasper Aquifer
- Water budgets for the district were determined for the Gulf Coast Aquifer System (Layers 1 through 4 collectively).
- Water budget terms were averaged for the period 1980 through 2009 (stress periods 16 through 78).
- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).

### ***Brazos River Alluvium Aquifer***

- We used version 1.01 of the groundwater availability model for the Brazos River Alluvium Aquifer (Ewing and Jigmond, 2016) to analyze the Brazos River Alluvium Aquifer. See Ewing and Jigmond (2016) for assumptions and limitations of the model.
- The groundwater availability model for the Brazos River Alluvium Aquifer contains three layers:
  - Layers 1 and 2 represent the Brazos River Alluvium Aquifer.
  - Layer 3 represents the surficial portions of the Gulf Coast Aquifer System as well as older confining geologic units within Bluebonnet Groundwater Conservation District.

- Perennial rivers and streams were simulated using the MODFLOW Streamflow-Routing package and ephemeral streams were simulated using the MODFLOW River package. Springs were simulated using the MODFLOW Drain package.
- Water budget terms were averaged for the period 1980 through 2012 (stress periods 32 through 127).
- The model was run with MODFLOW- USG (Panday and others, 2013).

### ***RESULTS:***

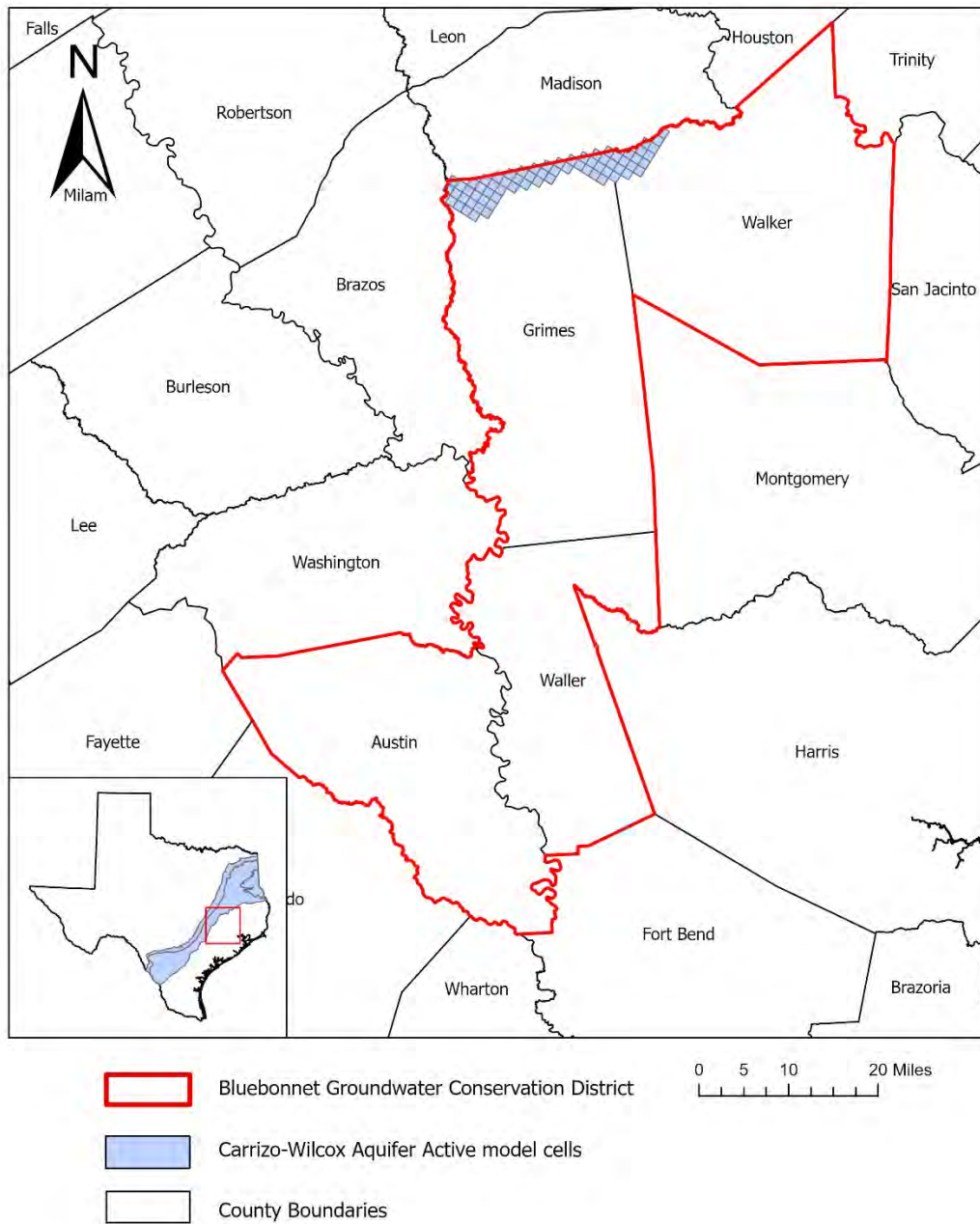
A groundwater budget summarizes the amount of water entering and leaving an aquifer according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the groundwater availability model results for the Carrizo-Wilcox, Queen City, Sparta, Yegua-Jackson, Gulf Coast Aquifer System, and the Brazos River Alluvium aquifers located within Bluebonnet Groundwater Conservation District and averaged over the historical calibration periods, as shown in Tables 1 through 6.

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

The information needed for the district’s management plan is summarized in Tables 1 through 6. Figures 1, 3, 5, 7, 9 and 11 show the areas of the respective models from which the values in Tables 1 through 6 were extracted. Figures 2, 4, 6, 8, 10, and 12 provide a generalized diagram of the groundwater flow components provided in Tables 1 through 6. 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.

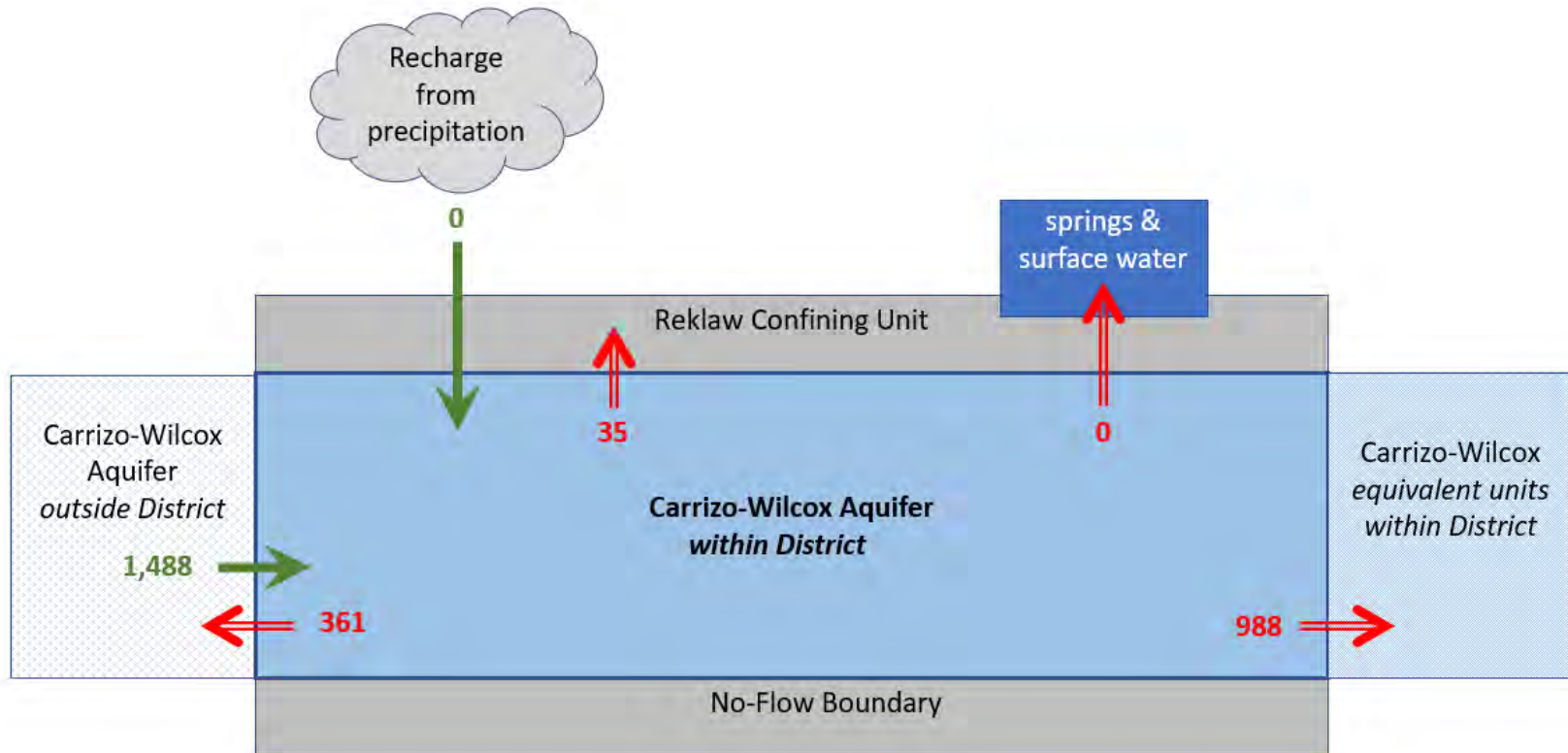
**Table 1: Summarized information for the Carrizo-Wilcox Aquifer for the Bluebonnet Groundwater Conservation District groundwater management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.**

Management plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Carrizo-Wilcox Aquifer	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Carrizo-Wilcox Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Carrizo-Wilcox Aquifer	1,488
Estimated annual volume of flow out of the district within each aquifer in the district	Carrizo-Wilcox Aquifer	361
Estimated net annual volume of flow between each aquifer in the district	From Carrizo-Wilcox Aquifer to Reklaw Confining Unit	35
	From Carrizo-Wilcox Aquifer to Carrizo-Wilcox equivalent units	988



GCD boundary date = 06.26.20. County boundary date = 07.03.19 czwx\_v3\_01\_MFUSG date = 10.09.20

**Figure 1: Area of the groundwater availability model for the central portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers from which the information in Table 1 was extracted (the Carrizo-Wilcox Aquifer extent within the district boundary).**



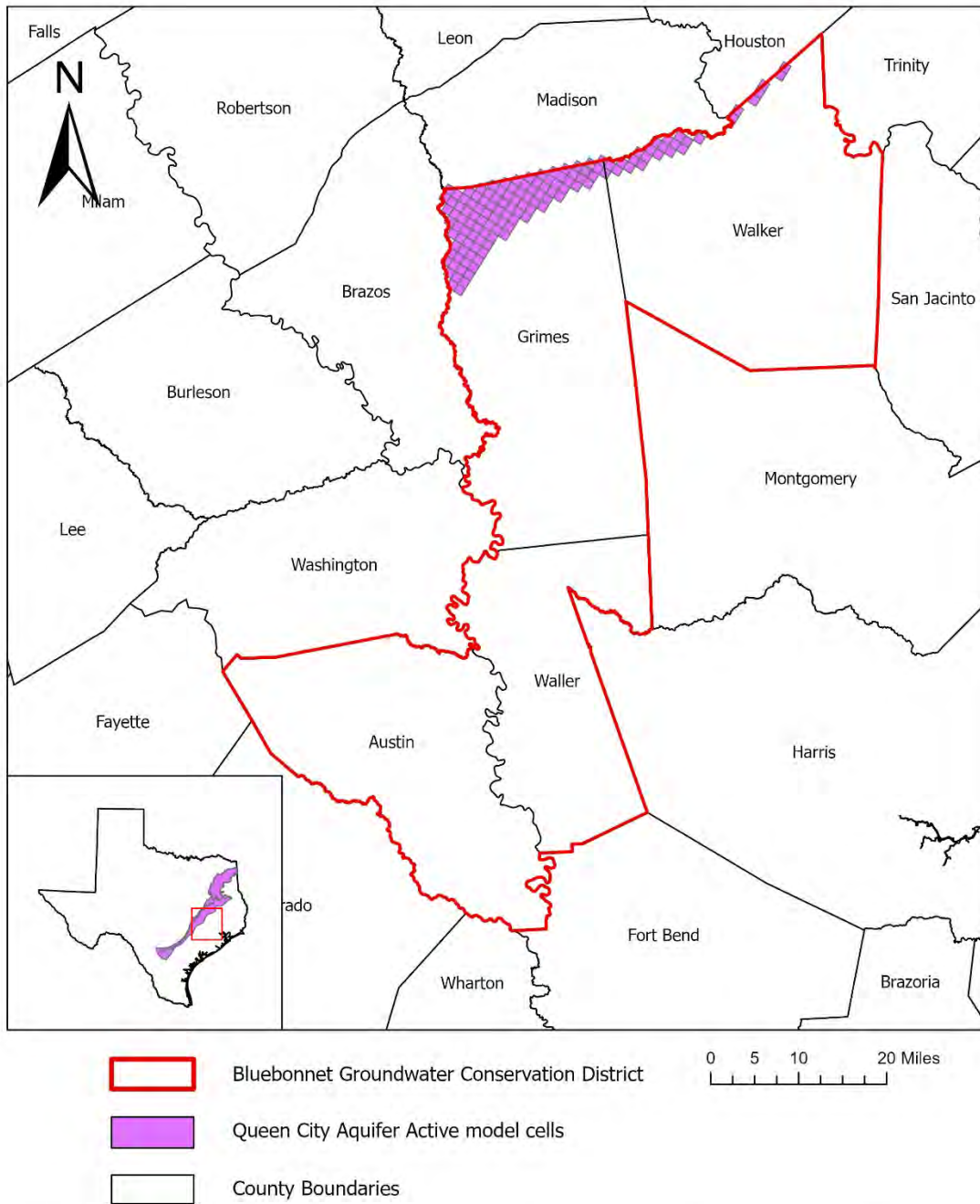
*Caveat: This diagram only includes the water budget items provided in Table 1. A complete water budget would include additional inflows and outflows. For a full groundwater budget, please submit a request in writing to the Groundwater Modeling Department.*

**Figure 2: Generalized diagram of the summarized budget information from Table 1, representing directions of flow for the Carrizo-Wilcox Aquifer within the Bluebonnet Groundwater Conservation District. Flow values are expressed in acre-feet per year.**

**Table 2: Summarized information for the Queen City Aquifer for the Bluebonnet Groundwater Conservation District groundwater management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.**

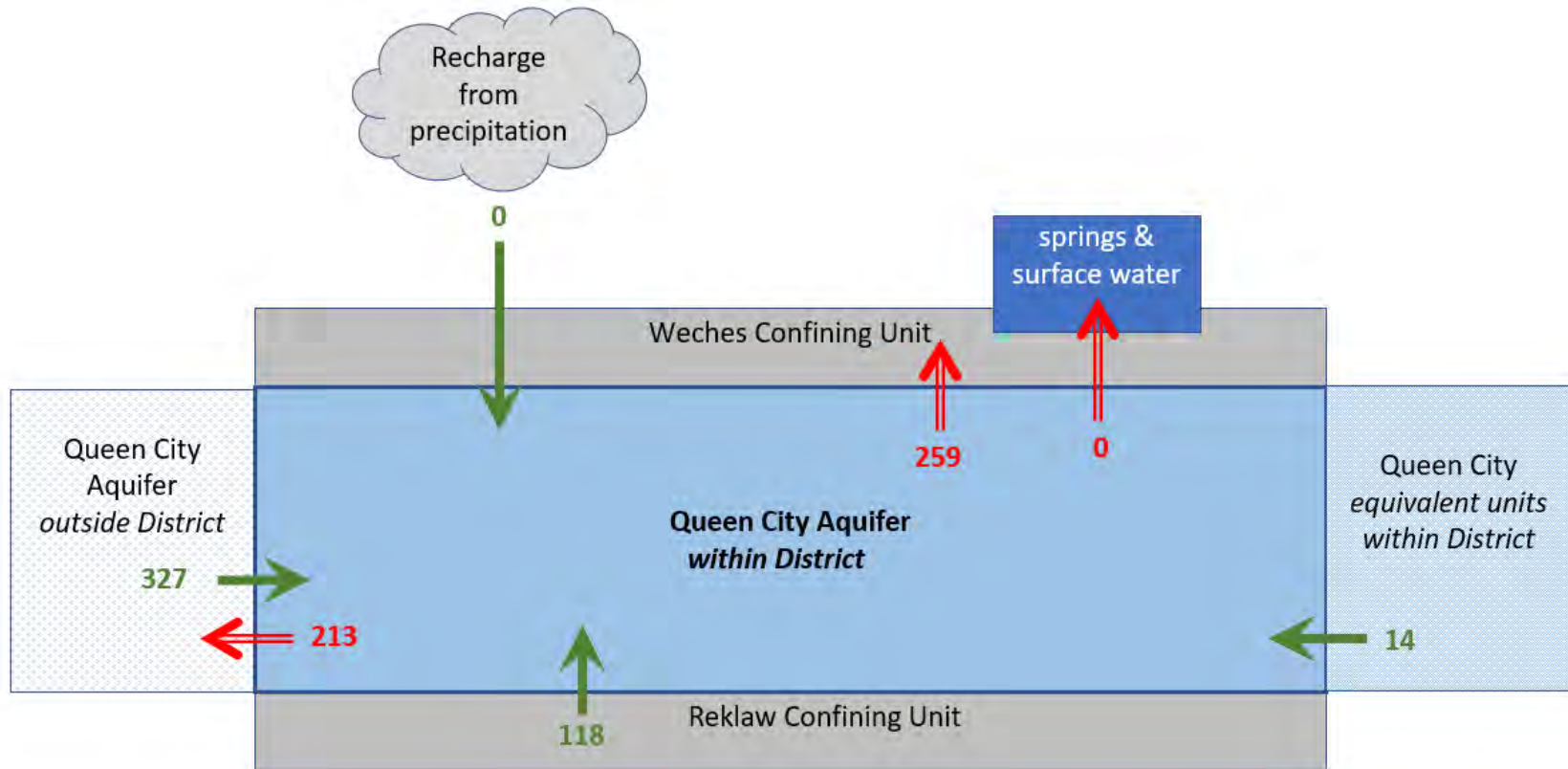
Management plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Queen City Aquifer	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Queen City Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Queen City Aquifer	327
Estimated annual volume of flow out of the district within each aquifer in the district	Queen City Aquifer	213
Estimated net annual volume of flow between each aquifer in the district	To Queen City Aquifer from Reklaw confining unit	118
	From Queen City Aquifer to Weches confining unit	259
	To Queen City Aquifer from Queen City equivalent units	14





GCD boundary date = 06.26.20. County boundary date = 07.03.19 czwx\_v3\_01\_MFUSG date = 10.09.20

**Figure 3: Area of the groundwater availability model for the central portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers from which the information in Table 2 was extracted (the Queen City Aquifer extent within the district boundary).**

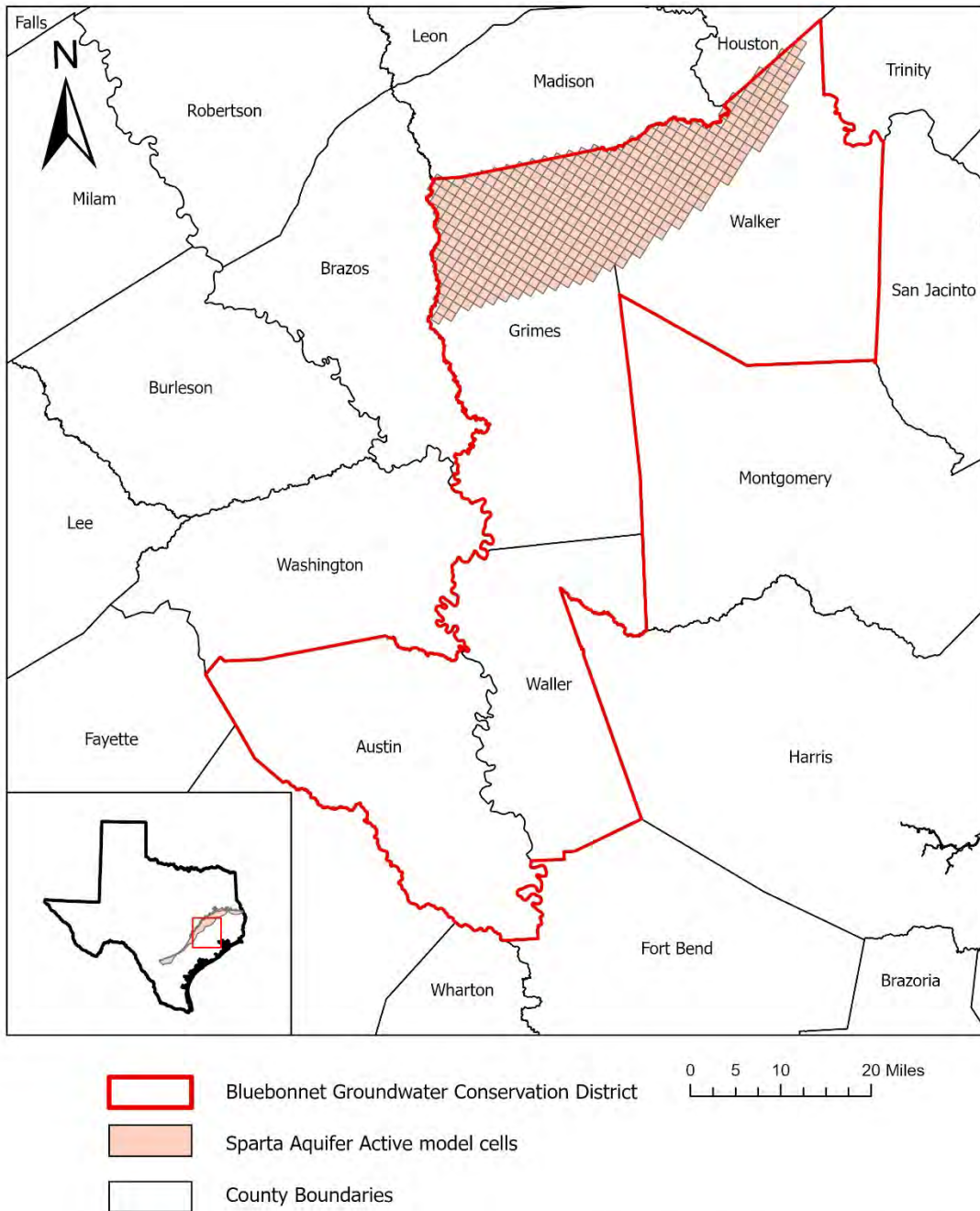


*Caveat: This diagram only includes the water budget items provided in Table 2. A complete water budget would include additional inflows and outflows. For a full groundwater budget, please submit a request in writing to the Groundwater Modeling Department.*

**Figure 4: Generalized diagram of the summarized budget information from Table 2, representing directions of flow for Queen City Aquifer within Bluebonnet Groundwater Conservation District. Flow values are expressed in acre-feet per year.**

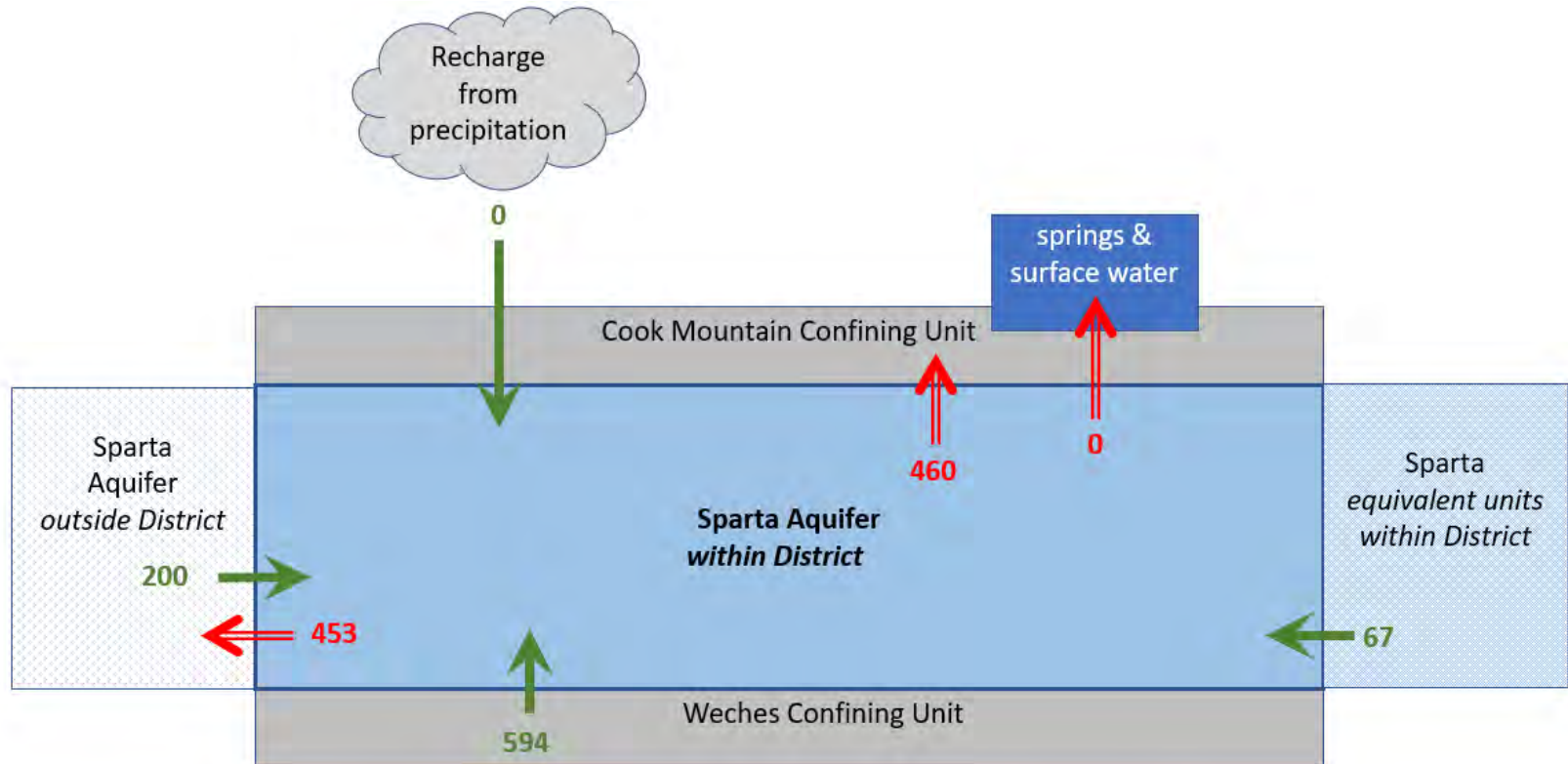
**Table 3: Summarized information for the Sparta Aquifer for the Bluebonnet Groundwater Conservation District groundwater management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.**

Management plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Sparta Aquifer	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Sparta Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Sparta Aquifer	200
Estimated annual volume of flow out of the district within each aquifer in the district	Sparta Aquifer	453
Estimated net annual volume of flow between each aquifer in the district	From Sparta Aquifer to Cook Mountain confining unit	460
	To Sparta Aquifer from Weches confining unit	594
	To Sparta Aquifer from Sparta equivalent units	67



GCD boundary date = 06.26.20. County boundary date = 07.03.19 czwx\_v3\_01\_MFUSG date = 10.09.20

**Figure 5: Area of the groundwater availability model for the central portion of the Carrizo-Wilcox, Queen City, and Sparta aquifers from which the information in Table 3 was extracted (the Sparta Aquifer extent within the district boundary).**

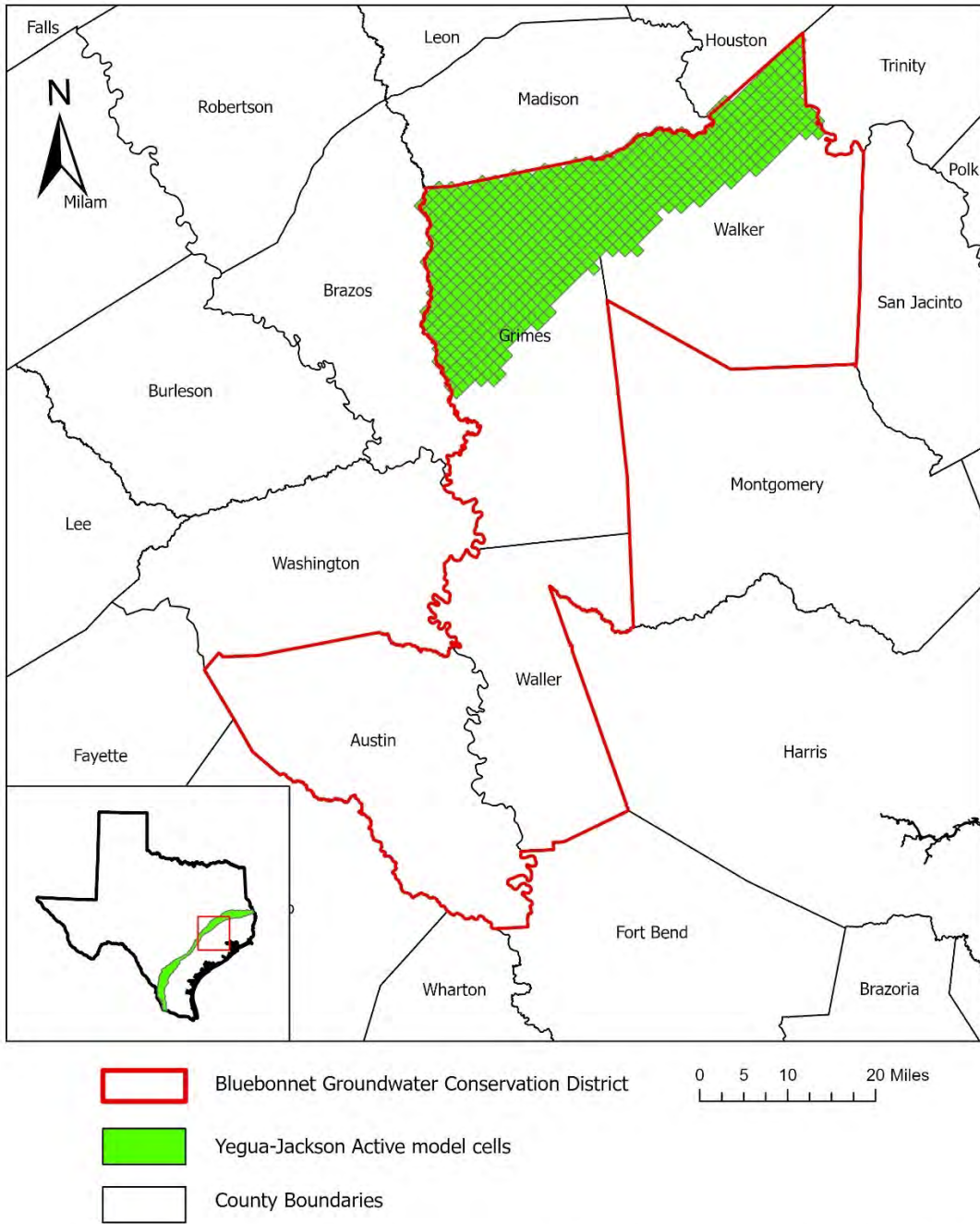


*Caveat: This diagram only includes the water budget items provided in Table 3. A complete water budget would include additional inflows and outflows. For a full groundwater budget, please submit a request in writing to the Groundwater Modeling Department.*

**Figure 6: Generalized diagram of the summarized budget information from Table 3, representing directions of flow for the Sparta Aquifer within the Bluebonnet Groundwater Conservation District. Flow values are expressed in acre-feet per year.**

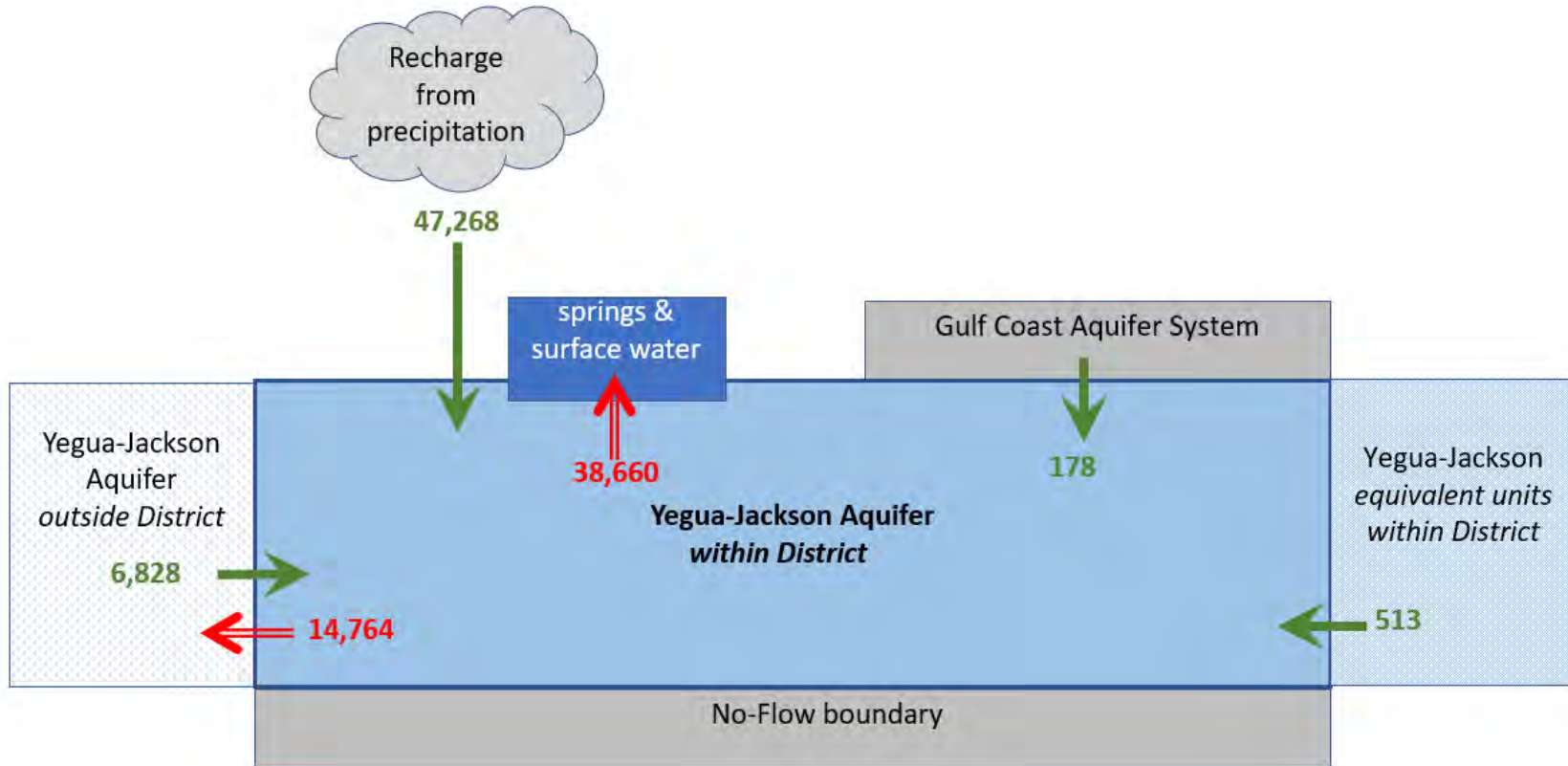
**Table 4: Summarized information for the Yegua-Jackson Aquifer that is needed for the Bluebonnet Groundwater Conservation district groundwater management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.**

Management plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Yegua-Jackson Aquifer	47,268
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Yegua-Jackson Aquifer	38,660
Estimated annual volume of flow into the district within each aquifer in the district	Yegua-Jackson Aquifer	6,828
Estimated annual volume of flow out of the district within each aquifer in the district	Yegua-Jackson Aquifer	14,764
Estimated net annual volume of flow between each aquifer in the district	To Yegua-Jackson Aquifer from Gulf Coast Aquifer System	178
	To Yegua-Jackson Aquifer from Yegua-Jackson equivalent units	513



GCD boundary date = 06.26.20. County boundary date = 07.03.19 ygjk\_grid\_poly date = 7.09.20

**Figure 7: Area of the groundwater availability model for the Yegua-Jackson Aquifer from which the information in Table 4 was extracted (the Yegua-Jackson Aquifer extent within the district boundary).**



*Caveat: This diagram only includes the water budget items provided in Table 4. A complete water budget would include additional inflows and outflows. For a full groundwater budget, please submit a request in writing to the Groundwater Modeling Department.*

**Figure 8: Generalized diagram of the summarized budget information from Table 4, representing directions of flow for the Yegua-Jackson Aquifer within the Bluebonnet Groundwater Conservation District. Flow values are expressed in acre-feet per year.**

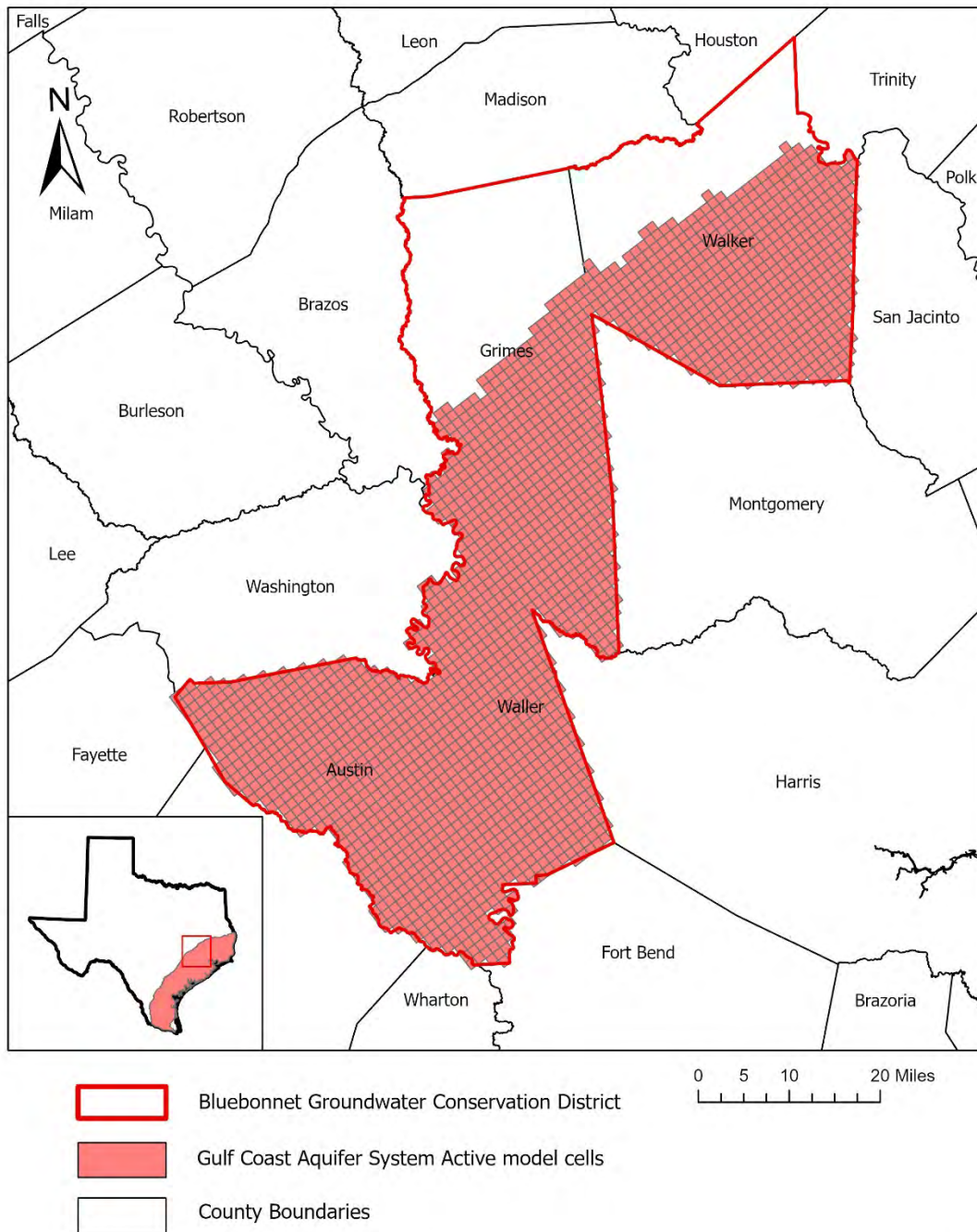


**Table 5: Summarized information for the Gulf Coast Aquifer System for the Bluebonnet Groundwater Conservation District groundwater management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.**

Management plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	46,741
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	5,728
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	12,491
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	49,022
Estimated net annual volume of flow between each aquifer in the district	From Gulf Coast Aquifer System to Yegua-Jackson Aquifer	178*
	From Gulf Coast Aquifer System to Brazos River Alluvium Aquifer	9,533**

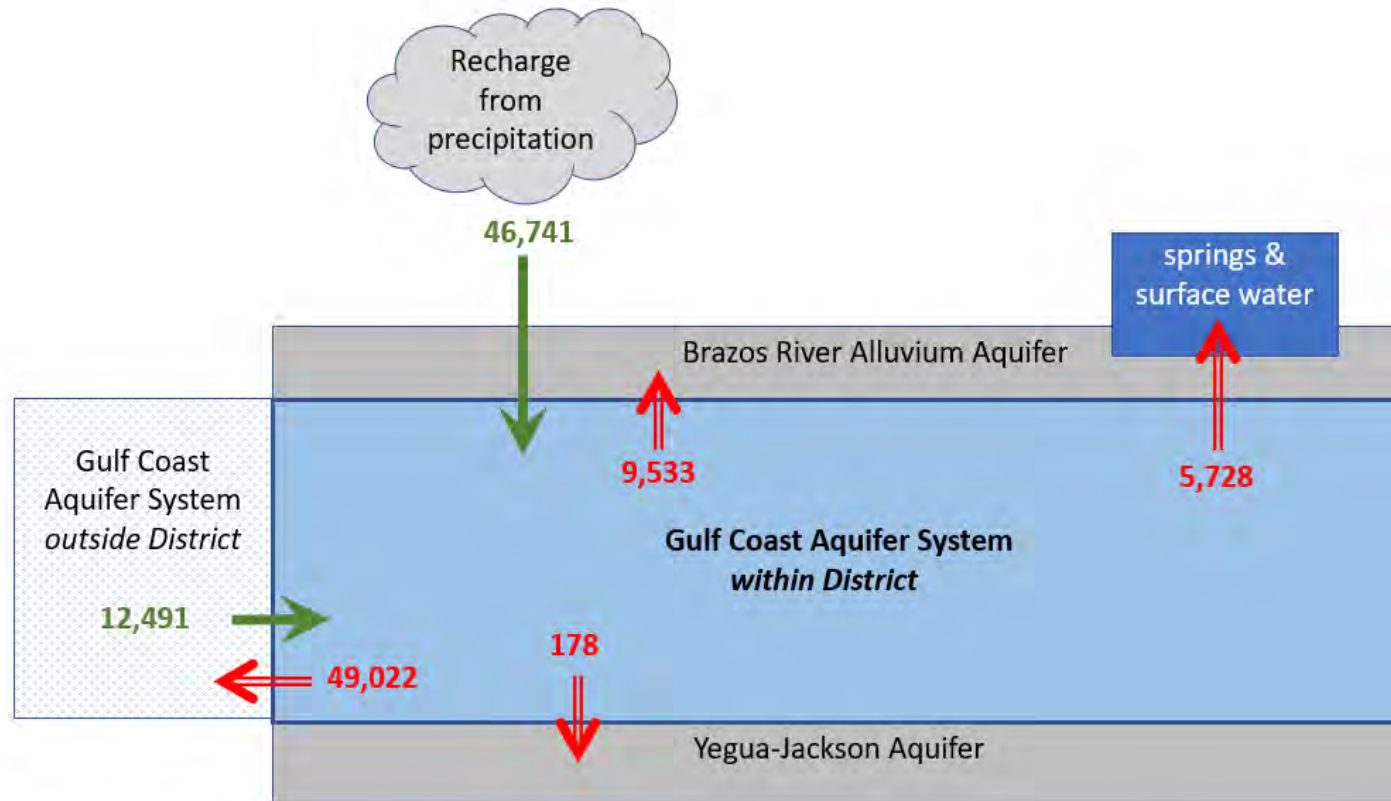
*\*Budget value comes from the groundwater availability model for the Yegua-Jackson Aquifer (Deeds and others, 2010).*

*\*\*Budget value comes from the groundwater availability model for the Brazos River Alluvium Aquifer (Ewing and Jigmond, 2016).*



GCD boundary date = 06.26.20. County boundary date = 07.03.19 glfc\_n\_grid date = 10.09.20

**Figure 9: Area of the groundwater availability model for the northern portion of the Gulf Coast Aquifer System from which the information in Table 5 was extracted (the Gulf Coast Aquifer System extent with the district boundary).**

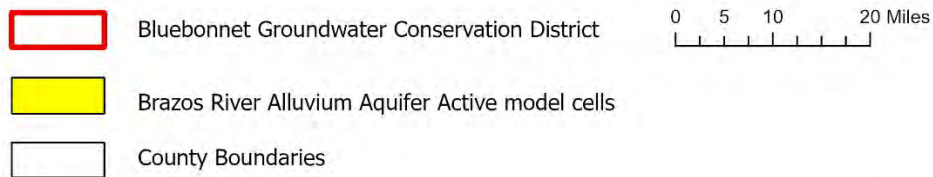
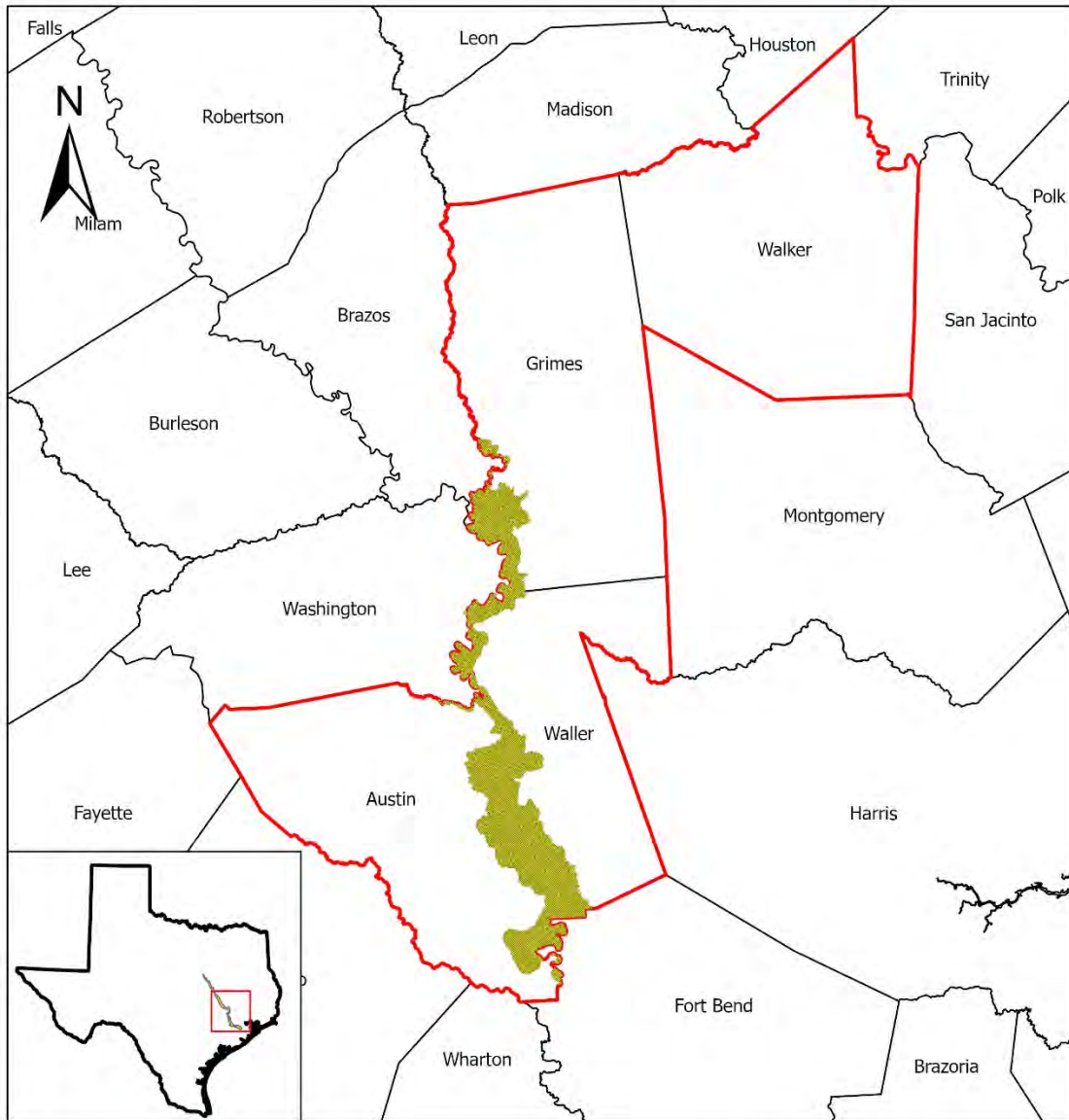


*Caveat: This diagram only includes the water budget items provided in Table 5. A complete water budget would include additional inflows and outflows. For a full groundwater budget, please submit a request in writing to the Groundwater Modeling Department.*

**Figure 10: Generalized diagram of the summarized budget information from Table 5, representing directions of flow for the Gulf Coast Aquifer System within the Bluebonnet Groundwater Conservation District. Flow values are expressed in acre-feet per year.**

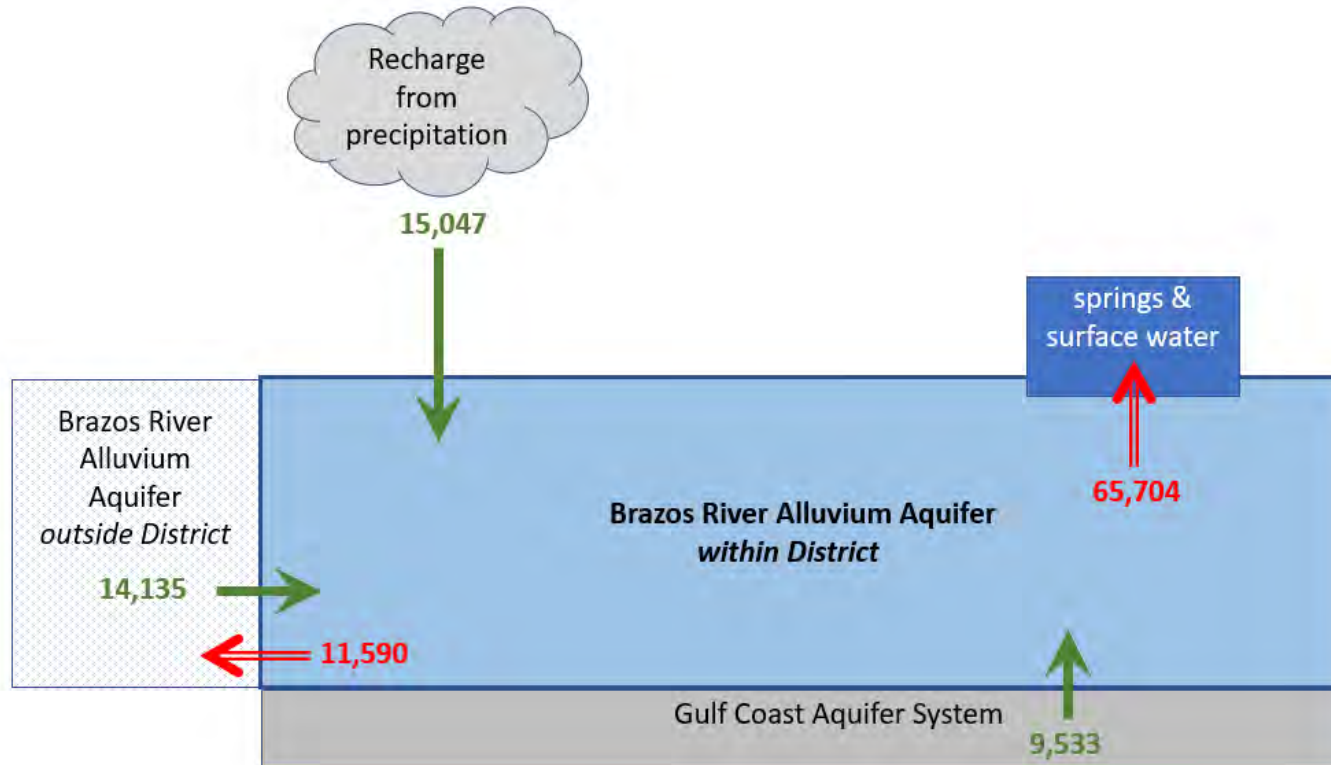
**Table 6: Summarized information for the Brazos River Alluvium Aquifer for the Bluebonnet Groundwater Conservation District groundwater management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.**

Management plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Brazos River Alluvium Aquifer	15,047
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Brazos River Alluvium Aquifer	65,704
Estimated annual volume of flow into the district within each aquifer in the district	Brazos River Alluvium Aquifer	14,135
Estimated annual volume of flow out of the district within each aquifer in the district	Brazos River Alluvium Aquifer	11,590
Estimated net annual volume of flow between each aquifer in the district	To Brazos River Alluvium Aquifer from Gulf Coast Aquifer System	9,533



GCD boundary date = 06.26.20. County boundary date = 07.03.19 braa model grid date = 07.10.20

**Figure 11: Area of the groundwater availability model for the for the Brazos River Alluvium Aquifer from which the information in Table 6 was extracted (the Brazos River Alluvium Aquifer extent within the district boundary).**



*Caveat: This diagram only includes the water budget items provided in Table 6. A complete water budget would include additional inflows and outflows. For a full groundwater budget, please submit a request in writing to the Groundwater Modeling Department.*

**Figure 12:** Generalized diagram of the summarized budget information from Table 6, representing directions of flow for the Brazos River Alluvium Aquifer within the Bluebonnet Groundwater Conservation District. Flow values are expressed in acre-feet per year.

### ***LIMITATIONS:***

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

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

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

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**Appendix D**

**Rules of the Bluebonnet Groundwater Conservation District**

**(September 21, 2023)**



**RULES OF THE  
BLUEBONNET  
GROUNDWATER CONSERVATION  
DISTRICT**

## RULE ADOPTION AND EFFECTIVE DATE HISTORY

Notice Date(s)	Hearing Date(s)	Adopted Date	Effective Date
Nov. 6, 7, 13, 14, 2003	Nov. 18, 19, 2003; Dec. 4, 2003	Jan. 21, 2004	July 1, 2004
Jan. 8, 9, 2004	Jan. 21, 2004	Jan. 21, 2004	July 1, 2004
June 16, 17, 18, 2004	June 23, 2004	June 23, 2004	July 1, 2004
Aug. 10, 11, 12, 2005	Aug. 17, 2005	Aug. 17, 2005	Sept. 1, 2005
Aug. 24, 2012	Sept. 19, 2012	Sept. 19, 2012	Sept. 19, 2012
March 26, 2014	April 17, 2013	April 17, 2013	April 17, 2013
Sept. 25, 2014	Oct. 15, 2014	Oct. 15, 2014	Oct. 15, 2014
Sept. 30, 2015; Oct. 1, 2015	Oct. 21, 2015	Oct. 21, 2015	Oct. 21, 2015
Sept. 28, 29, 2016	Oct. 19, 2016	Oct. 19, 2016	Oct. 19, 2016
Sept. 26, 27, 2018	Oct. 17, 2018	Oct. 17, 2018	Oct. 17, 2018
Dec. 21, 22, 23, 24, 28, 2020	Jan. 20, 2021	Jan. 20, 2021	Jan. 20, 2021
March 23, 25, 29, 30, 2023	April 13, 2023	April 13, 2023	April 13, 2023
August, 22, 23, 26, 30, 31, 2023	September 21, 2023	September 21, 2023	September 21, 2023

In accordance with Section 59 of Article XVI of the Texas Constitution and Act of May 26, 2001, 77<sup>th</sup> Leg., R.S., ch. 36, September 1, 2001 Tex. Gen. Laws (HB 3655) now codified as Chapter 8825 Special District Local Laws Code, and the non-conflicting provisions of Chapter 36, Water Code the following rules are hereby ratified and adopted as the rules of this District by its Board. Each Rule as worded herein has been in effect since the date of passage and as may be hereafter amended.

The Rules, regulations, and modes of procedure herein contained are and have been adopted to simplify procedures, avoid delays, and facilitate the administration of the water laws of the State and the Rules of this District. To the end that these objectives are attained, these Rules will be so construed.

These Rules may be used as guides in the exercise of discretion, where discretion is vested. However, under no circumstances and in no particular case may these Rules be construed as a limitation or restriction upon the exercise of powers, duties, and jurisdiction conferred by law. These Rules will not limit or restrict the amount and accuracy of data or information that may be required for the proper administration of the law.

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# **BLUEBONNET GROUNDWATER CONSERVATION DISTRICT**

## **DISTRICT RULES**

The District's Rules are promulgated under the District's statutory authority (primarily House Bill 3655 and Texas Water Code Chapter 36) to protect private property rights, balance the conservation and development of groundwater to meet the needs of this state, use the best available science in the conservation and development of groundwater and to achieve the following objectives: to provide for conserving, preserving, protecting, and recharging of the groundwater or of a groundwater reservoir or its subdivisions in order to control subsidence, prevent degradation of water quality, or prevent waste of groundwater. The District's Orders, Rules, regulation, requirements, resolutions, policies, guidelines, or similar measures have been implemented to fulfill these objectives.

### **SECTION 1. DEFINITIONS AND CONCEPTS**

#### **RULE 1.1 DEFINITIONS OF TERMS**

In the administration of its duties, the District follows the definitions of terms set forth in the District Act, Chapter 36 of the Texas Water Code, and other definitions as follow:

“Abandoned Well” – a well that has not been used for a beneficial purpose for at least one year and/or a well not registered with the District. A well is considered to be in use in the following cases:

1. A non-deteriorated well which contains the casing, pump and pump column in good condition;
2. A non-deteriorated well which has been capped; or
3. An artesian flowing well with casing in good condition.

“Acre-foot” – means the amount of water necessary to cover one acre of land one foot deep, or 325,851 gallons of water.

“Act” – the District's enabling legislation, H.B. No. 3655 of the 77<sup>th</sup> Texas Legislature, now codified as Chapter 8825 Special District Local Laws Code, in conjunction with Chapter 36, Texas Water Code.

“Actual and Necessary Expenses” – expenses incurred while performing duties associated with District business or representing the District for purposes of the District.

“Administratively Complete” – an application containing the information described in Rule 8.5B

“Aggregate Wells” – a well system comprised of two or more wells that are owned and operated by the same permittee and serve the same subdivision, facility, or area served by a Certificate of Convenience and Necessity (CCN) issued by the Texas Commission on Environmental Quality (TCEQ).

“Aggregate Withdrawal” – the amount of water withdrawn from two or more registered wells in a water system that is permitted under a single permit for a total pumpage volume of all wells in the aggregate system.

“Applicant” – means a person who is applying for a permit or permit amendment.

“Agricultural Well” – means a well used for agricultural activities listed under section 36.001 (19) of the Texas Water Code.

“Aquifer” – a geologic formation that will yield water to a well in sufficient quantities to make the production of water from this formation feasible for beneficial use.

“Beneficial Use” or “Beneficial Purpose” – means use of groundwater for:

1. Agricultural, gardening, domestic (including lawn-watering), stock raising, municipal, mining, manufacturing, industrial, commercial, or recreational purposes;
2. Exploring for, producing, handling, or treating oil, gas, sulfur, lignite, or other minerals; or
3. For any other non-speculative purpose that is useful and beneficial to the users that does not constitute waste.

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

“Board” – means the Board of Directors of the District.

“Capping” – equipping a well with a securely affixed, removable device that will prevent the entrance of surface pollutants into the well.

“Casing” – a tubular structure installed in the excavated or drilled borehole to maintain the well opening.

“Cement Grout” – a mixture of water and cement, which may also include a bentonite clay compound.

“Certificate of Convenience and Necessity” (CCN) – a permit issued by TCEQ which authorizes and obligates a retail utility to furnish, to make available, to render or extend continuous and adequate retail public water or sewer services to a specified geographic area.

“Cistern” – an in-ground storage facility for water. Abandoned or deteriorated facilities will be treated as hand dug wells for sealing, capping, or plugging purposes.

“Closed Loop Well” – a well constructed for circulating water through a continuous length of tubing, generally for earth coupled-heat exchange purposes. See also Earth Coupled Heat Exchange-Closed Loop System. (An exempt well)

“Column Pipe Diameter” – shall refer to the inside diameter of the pump (discharge) column pipe.

“Commercial Use” – the use associated with supplying water to properties or establishments which are in business to build, supply, or sell products; or provide goods, services or repairs and that use water in those processes or use water primarily for employee and customer conveniences (i.e. flushing of toilets, sanitary purposes, and limited landscape watering). This includes use in any other business enterprise for which monetary consideration is given or received, which will typically increase water demand compared to typical, domestic use.

“Commercial Well” – a well producing groundwater for commercial use. (A nonexempt well.)

“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 uses.

“Contested Application” or “Contested Hearing” – means a proceeding where an application has been properly contested and for which a hearing is granted under Section 14 of these Rules.

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

“Deteriorated Well” – means a well, the condition of which will cause or is likely to cause waste of groundwater in the District.

“De-watering Well” – means a well used to remove water from a construction site or excavation, or to relieve hydrostatic uplift on permanent structures.

“Director” – means a person appointed to the Board of Directors of the District.

“Discharge” – means the amount of water that leaves an aquifer by natural or artificial means.

“District” – means the Bluebonnet Groundwater Conservation District.

“District Act” – means the Act of May 26, 2001, 77<sup>th</sup> Leg., R.S., Ch. 1361, September 1, 2001 Tex. Gen. Laws (HB 3655) now codified as Chapter 8825 Tex. Special District Local Law Code and the non-conflicting provisions of Chapter 36, Water Code.

“District Office” – means the office of the District as established by the Board.

“District April 17, 2002 Rules” – means rules adopted by the District April 17, 2002 pursuant to resolution No. 2002-01, as amended by Resolution 2003-04 adopted April 16, 2003 which establish exemptions and user fees. Nonexempt existing wells are subject to fees under the District April 17, 2002 rules as amended April 16, 2003 until fees are assessed pursuant to individual permit under these Rules.

“Domestic Purposes (Use)” – means the use of groundwater by a person or a household to support domestic activity and includes the following: water for drinking, washing or culinary purposes; for residential landscape watering, or watering of a family garden and/or orchard; for watering of domestic animals; and for residential water recreation uses (e.g., swimming pool, hot tub). Domestic use does not include water used to support activities for which consideration is given or received or for which the product of the activity is sold. Domestic use does not include use by or for a public water system.

“Drilling Authorization” – means authorization issued or to be issued by the District allowing a water well to be drilled.

“Drought” – an aquifer-based determination by the Board of Directors represented by conditions of significant declines in groundwater levels over multiple years.

“Earth Coupled Heat Exchange” or “Closed Loop System” – a well system drilled and equipped for the purpose of utilizing the subsurface as a source of energy for heat exchange in heating and cooling systems. These are sealed systems; no water is to be produced or injected. (An exempt well)

“Evidence of historic or existing use” – means the amount of water that an applicant can reasonably demonstrate to the District which was used prior to July 1, 2004.

“Existing Well” – a well completed before the effective date of these Rules.

“Federal Conservation Program” – the Conservation Reserve Program of the United States Department of Agriculture or any successor program.

“Groundwater” – means water located beneath the earth’s surface within the District but does not include water produced with oil in the production of oil and gas.

“Groundwater Reservoir” – a specific subsurface water-bearing reservoir having ascertainable boundaries and containing groundwater.

“Hazardous Conditions” – any groundwater quality condition that may be detrimental to public health or affect the beneficial use of water from the aquifer.

“Hearing” – means a contested hearing when used in the context of a permit or permit amendment application or a show cause proceeding.

“Hearing Body” – means the Board, any committee of the Board, or a Hearing Examiner at any hearing held under the authority of the District Act.

“Hearing Examiner” – means a person appointed by the Board of Directors to conduct a hearing or other proceeding.

“Hydraulic Fracturing” – a process used in the production of oil and gas where water and water mixed with additives injected into the subsurface to hydraulically induce cracks in a target formation through which oil and/or natural gas can be produced.

“Hydrogeological Report” – a report, by a Texas licensed geoscientist or a Texas licensed engineer, that identifies the availability of groundwater in a particular area and formation, addresses the issues of quantity and quality of that water, the impacts of pumping that water on the surrounding environment including impacts to nearby or adjacent wells, and subsidence. The report also will include field data from aquifer testing and geologic samples.

“Inflows” – means the amount of water that leaves an aquifer by natural or artificial means.

“Injection well” – includes:

1. An air conditioning return flow well used to return water used for heating or cooling in a heat pump to the aquifer that supplied the water;
2. A cooling water return flow well used to inject water previously used for cooling;
3. A drainage well used to drain surface fluid into a subsurface formation;
4. A recharge well used to replenish the water in an aquifer;
5. A saltwater intrusion barrier well used to inject water into a freshwater aquifer to prevent the intrusion of salt water into the freshwater;
6. A sand backfill well used to inject a mixture of water and sand, mill tailings, or other solids into subsurface mines;
7. A subsidence control well used to inject fluids into a non-oil or gas producing zone to reduce or eliminate subsidence associated with the overdraft of fresh water.

“Landowner” – means the person who bears ownership of the land surface.

“Landscape Irrigation at Athletic and Recreational Facilities” – means wells producing water for use in landscape and recreational facilities including, but not limited to, golf courses, water parks, campgrounds, athletic fields, and parks. Such wells are not exempt from registration, permitting, and user fees.

“Leachate Well” – means a well used to remove contamination from soil or groundwater.

“Management Zone” – means a geographic or hydrostratigraphic subdivision of the District having common characteristics (i.e. drawdown, subsidence, streamflow, well interference, cumulative effects, use, potential for increased use, potential impact from use outside District, etc.) that are different from those of other subdivisions and that serve as a basis for differentiated groundwater management provisions.

“Modeled Available Groundwater” – means the amount of water that the executive administrator determines may be produced on an average annual basis to achieve a desired future condition established under Section 36.108 of the Texas Water Code.

“Monitoring Well” – means a well installed to measure some property of the groundwater or aquifer it penetrates, and does not produce more than 25,000 gallons of groundwater per year.

“New Well Application” – means an application for a permit for a water well that has not yet been drilled.

“Open Meetings Law” – means Chapter 551, Texas Government Code.

“Operating Permit” – means a permit issued by the District for a water well, allowing groundwater to be withdrawn from a non-exempt water well for a designated period.

“Part of a Manufactured Product” – water used in a process occurring within the District where water is a basic material or ingredient and its form, adaptability, or use is transformed from its original state. Subsequent to the transformation, the product for which water is used is transported outside the District. The term includes, but is not limited to, water used in or as a packaged food product. Examples of the term include canned, bottled or packaged water; soft drinks; alcoholic beverages; medicines; paints; cleaning products; and, concrete. The term does not include unpackaged, raw or treated water transported in bulk out of the District via a water course, pipeline, truck or rail; or, raw or treated water transported and used as a part of a manufactured product created outside the District.

“Potential for Measurable Subsidence” -- a threshold estimate based upon results from local and regional scale model simulations and/or actual field conditions used by the District to determine that subsidence would occur.

“Public Information Act” – means Chapter 552, Texas Government Code.

“Person” – includes corporation, individual, organization, government or governmental subdivision or agency, business trust, estate, trust, partnership, association, or any other legal

entity.

“Presiding Officer” – means the President, Vice-President, Secretary, or other Board member presiding at any hearing or other proceeding or a Hearing Examiner conducting any hearing or other proceeding.

“Recharge” – means the amount of water that infiltrates the water table of an aquifer.

“Recreational Water Use” – wells producing water for recreational use, including but not limited to water parks, golf courses, water hazard ponds, and recreational ponds at parks and campgrounds. Such wells are not exempt from registration, permitting and user fees.

“Rules” – means the standards and rules promulgated by the District.

“Section” – means the number section of a survey or block as shown in “Texas Country Farm Plats”, 1996 Edition, (Smith Publishing Co.).

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

“Texas Commission on Environmental Quality” – TCEQ.

“Texas Rules of Civil Procedure” and “Texas Rules of Civil Evidence” – means the civil procedure and evidence rules as amended and in effect at the time of the action or proceeding. Except as modified by the Rules of the District, the rights, duties, and responsibilities of the presiding officer acting under the Texas Rules of Civil Procedure or the Texas Rules of Evidence are the same as a court, without a jury acting under those rules.

“Total Aquifer Storage” – means the total calculated volume of groundwater that an aquifer is capable of producing.

“Transport” – means pumping, transferring, exporting or moving water outside the District without regard to the manner the water is transferred or moved, including but not limited to discharges into water courses. The terms “transfer” or “export” of groundwater are used interchangeably within Chapter 36, Texas Water Code and these Rules.

“Transport Permit” – means an authorization issued by the District allowing the transfer or transport of a specific quantity of groundwater outside the District for a designated time period. All applicable permit rules apply to transport permits.

“Uncontested Application” – means an application for which a contested hearing is not held before the Board or presiding officer appointed by the Board.

“Variance” – an authorized exception to requirements or provisions of the Rules, granted by the District’s Board of Directors.

“Waste” – means Chapter 36.001 (8) Definitions and Section 13 herein.

“Water Meter” – means a water flow measuring device that can accurately record the amount of water produced during a measured time.

“Water Station Well” – means a well from which water is sold for a use that is not connected with the property where the well is located. It is a non-exempt well requiring an individual permit.

“Well” – means any facility, device, or method used to withdraw groundwater from the groundwater supply within the District.

“Well Abandonment” – leaving a well unused, unattended, and improperly protected from contamination and/or sources of pollution. Abandoned wells must be capped, permanently closed, or plugged in accordance with approved District standards.

“Well Owner” or “Well Operator” – means the person who owns the groundwater where a well is located or is to be located or the person who operates a well or a water distribution system supplied by a well.

“Well System” – means a well or group of wells tied to the same distribution system.

“Withdraw” or “Withdrawal” – means extracting groundwater by pumping or by any other method other than the discharge of natural springs.

“Windmill” – means a wind-driven or hand-driven device that uses a piston pump to remove groundwater.

## **RULE 1.2     PURPOSE OF RULES**

These Rules are adopted to achieve the provisions of the District Act and accomplish its purposes.

## **RULE 1.3     USE AND EFFECT OF RULES**

The District uses these Rules as guides in the exercise of the powers conferred by law and in the accomplishment of the purposes of the District Act. They may not be construed as a limitation or restriction on the exercise of any discretion nor be construed to deprive the District or Board of the exercise of any powers, duties, or jurisdiction conferred by law, nor be construed to limit or restrict the amount and character of data or information that may be required to be collected for the proper administration of the District Act.

## **RULE 1.4     AMENDING OF RULES**

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

## **RULE 1.5     HEADINGS AND CAPTIONS**



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

**RULE 1.6     GENDER**

Use of masculine pronouns for convenience purposes in these Rules and Bylaws shall include references to persons of feminine gender where applicable. Words of any gender used in these Rules and Bylaws shall be held and construed to include any other gender, and words in singular number shall be held to include the plural and vice versa, unless context requires otherwise.

**RULE 1.7     METHODS OF SERVICE UNDER THE RULES**

Except as otherwise expressly provided in these Rules, any notice or documents required by these Rules to be served or delivered may be delivered to the recipient, or the recipient's authorized representative, in person, by agent, by courier receipted delivery, by certified mail sent to the recipient's last known address, or by telephonic document transfer to the recipient's current telecopier number. Service by mail is complete upon deposit in a post office or other official depository of the United States Postal Service. Service by telephonic document transfer is complete upon transfer, except that any transfer occurring after 5:00 p.m. will be deemed complete on the following business day. If service or delivery is by mail, and the recipient has the right, or is required, to do some act within a prescribed time after service, three (3) days will be added to the prescribed period. Where service by one of more methods has been attempted and failed, the service is complete upon notice publication in the designated official newspapers for the District in Austin, Grimes, Walker, and Waller Counties.

**RULE 1.8     SEVERABILITY**

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

**RULE 1.9     SAVINGS CLAUSE**

If any section, sentence, paragraph, clause, or part of these Rules or Bylaws should be held or declared invalid for any reason by a final judgment of the courts of this state or of the United States, such decision or holding shall not affect the validity of the remaining portions of these Rules or Bylaws, and the Board does hereby declare that it would have adopted and promulgated such remaining portions irrespective of the fact that any other sentence, section, paragraph, clause, or part thereof may be declared invalid.

**RULE 1.10    REGULATORY COMPLIANCE**

All wells shall comply with all applicable Rules and regulations of other governmental entities. Where District Rules and regulations are more stringent than those of other governmental entities,

the District Rules and regulations shall control.

**RULE 1.11 COMPUTING TIME**

In computing any period of time prescribed or allowed by these Rules and Bylaws, by order of the Board, or by any applicable statute, the day of the act, event, or default from which the designated period of time begins to run, is not to be included, but the last day of the period so computed is to be included, unless it be a Saturday, Sunday or legal holiday, in which event the period runs until the end of the next day which is neither a Saturday, Sunday nor a legal holiday.

**RULE 1.12 TIME LIMITS**

Applications, requests, or other papers or documents required or permitted to be filed under these Rules, Bylaws, or by law must be received for filing at the District within the time limit, if any, for such filing. The date of receipt and not the date of posting are determinative.

**RULE 1.13 WORD USAGE**

The verbs may, can, might, should, or could are used when an action is optional or may not apply in every case.

The verbs will, shall, or must are used when an action is required.

The verb cannot is used when an action is not allowed or is unachievable.

Words not specifically defined herein shall be defined by their standard usage.

**SECTION 2. BOARD**

**RULE 2.1 PURPOSE OF BOARD**

The Board was created to determine policy and regulate the withdrawal of groundwater within the boundaries of the District for managing, conserving, preserving, protecting, and recharging the groundwater within the District, and to exercise its rights, powers, and duties in a way that will effectively and expeditiously accomplish the purposes of the District Act. The Board's responsibilities include, but are not limited to, the adoption and enforcement of reasonable rules and other orders.

**RULE 2.2 BOARD STRUCTURE, OFFICERS**

The Board consists of the members appointed and qualified as required by the District Act. The Board will elect one of its members to serve as President, to preside over Board meetings and proceedings; two to serve as Vice President to preside in the absence of the President; and one to serve as Secretary to keep a true and complete account of all meetings and proceedings of the Board. The Board may elect officers annually, but must elect officers at the first meeting following

the date upon which Board members assume office. Members and officers serve until their successors are elected or appointed and sworn in accordance with the District Act and these Rules.

**RULE 2.3     MEETINGS**

The Board will hold a regular meeting at least once each quarter as the Board may establish from time to time. At the request of the President, or by written request of at least three members, the Board may hold special meetings. All Board meetings will be held according to the applicable law.

**RULE 2.4     COMMITTEES**

The President may establish committees for formulation of policy recommendations to the Board, and appoint the chair and membership of the committees. Committee members serve at the pleasure of the President.

**SECTION 3.   DISTRICT STAFF**

**RULE 3.1     GENERAL MANAGER**

The Board may employ a person to manage the District, and title this person General Manager. The Board delegates to the General Manager full authority to manage and operate the affairs of the District in accordance with the orders, rules, policies and directives of the Board. The Board will determine the General Manager's salary annually as a part of the budget process and review the position of General Manager each year at the end of the third or beginning of the fourth quarter of every fiscal year. The General Manager, consistent with the budget approved by the Board, may employ all persons necessary for the proper handling of business and operation of the District and their salaries will be set by the Board.

If the Board has not appointed a General Manager, the Board shall act to manage the District and may perform any function of the General Manager identified by these Rules.

**SECTION 4.   DISTRICT**

**RULE 4.1     MINUTES AND RECORDS OF THE DISTRICT**

All documents, reports, records, and minutes of the District are available for public inspection and copying following the Texas Public Information Act. Upon written application of any person, the District will furnish copies of its public records. A copying charge may be required pursuant to policies established by the District. A list of the charges for copies will be furnished by the District.

**RULE 4.2     CERTIFIED COPIES**

Requests for certified copies must be in writing. Certified copies will be made under the direction

of the General Manager. A certification charge and copying charge may be assessed, pursuant to policies established by the Board of directors.

## **SECTION 5. SPACING REQUIREMENTS**

### **RULE 5.1 REQUIRED SPACING**

To minimize as far as practicable the drawdown of the water table, the reduction of artesian pressure, to control subsidence, to prevent interference between wells, to prevent degradation of water quality, or to prevent waste, the District by rule may regulate the spacing of water wells.

- A. All wells drilled prior to the effective date of these Rules, shall be drilled in accordance with state law in effect, if any, on the date such drilling commenced.
- B. All new wells must comply with the spacing and location requirements set forth under the Texas Water Well Drillers and Pump Installers Administration Rules, Title 16, Part 4, Chapter 76, Texas Administrative Code, unless a written variance is granted by the Texas Department of Licensing and Regulation and a copy of the variance is forwarded to the District by the applicant or registrant.
- C. After authorization to drill a well has been granted under a registration or a permit, the well, if drilled, must be drilled within ten (10) yards (30 feet) of the location specified in the permit, and not elsewhere. If the well should be commenced or drilled at a different location, the drilling or operation of such well may be enjoined by the Board pursuant to Chapter 36, Texas Water Code, and these Rules.
- D. In addition to the requirements of Rule 5.1B and C, spacing of nonexempt wells may be required to prevent interference between wells and impacts to neighboring wells and to prevent measurable subsidence and shall be determined based on a hydrogeological reports required under Rule 8.5F. The Board may, among other things, require wells to be spaced a certain distance from property lines or adjoining wells.

### **RULE 5.2 EXCEPTIONS TO SPACING REQUIREMENTS**

- A. If the applicant presents waivers signed by the adjoining landowner(s) stating that they have no objection to the proposed location of the well site, the spacing requirements may be waived for the new proposed well location.
- B. Providing an applicant can show, by clear and convincing evidence, good cause why a new well should be allowed to be drilled closer than the required spacing of Rule 5.1, the issue of spacing requirements will be considered during the contested case process. If the Board chooses to grant a permit to drill a well that does not meet the spacing requirements, the Board must limit the production of the well to ensure no injury is done to adjoining landowners or the aquifer.

- C. The Board or General Manager if authorized by the Board, may, if good cause is shown by clear and convincing evidence, enter special orders or add special permit conditions increasing or decreasing spacing requirements.

## **SECTION 6. PRODUCTION LIMITATIONS**

### **RULE 6.1 MAXIMUM ALLOWABLE PRODUCTION**

To minimize as far as practicable the drawdown of the water table or the reduction of artesian pressure, to prevent or control subsidence, to prevent interference between wells, to prevent degradation of water quality, or to prevent waste, the District by rule may regulate the production of groundwater.

- A. Before granting or denying a permit for a new well, the District shall consider whether to regulate the production of groundwater by:
  - 1. Setting production limits on wells;
  - 2. Limiting the amount of water produced based on acreage or tract size;
  - 3. Limiting the amount of water that may be produced from a defined number of acres assigned to an authorized well site;
  - 4. Limiting the maximum amount of water that may be produced on the basis of acre-feet per acre or gallons per minute per well site per acre;
  - 5. Managed depletion;
  - 6. Controlling and preventing measurable subsidence; or,
  - 7. Any combination of the methods listed above in paragraphs (1) through (6).
- B. The District may impose more restrictive permit conditions on new permit applications and permit amendment applications to increase use by historic or existing users, provided that:
  - 1. Such limitations apply to all subsequent new permit applications and increased use by historic or existing users, regardless of type or location of use;
  - 2. Such limitations bear a reasonable relationship to the existing District management plan; and
  - 3. Such limitations are reasonably necessary to protect existing use.

- C. In regulating the production of groundwater based on tract size or acreage, the District may consider the service needs of a retail public water utility as defined in these Rules.
- D. To the extent possible, the District shall issue permits up to the point that the total volume of exempt and permitted groundwater production will achieve an applicable desired future condition. In issuing permits, the District shall manage total groundwater production on a long-term basis to achieve an applicable desired future condition and consider;
  - 1. The modeled available groundwater determined by the executive administrator;
  - 2. The executive administrator's estimate of the current and projected amount of groundwater produced under exemptions granted by District Rules and Section 36.117;
  - 3. The amount of groundwater authorized under permits previously issued by the District;
  - 4. A reasonable estimate of the amount of groundwater that is actually produced under permits issued by the District; and
  - 5. Yearly precipitation and production patterns.
- E. In issuing a permit for a production volume based upon existing or historic use, the District will not discriminate between volume associated with land or wells on land irrigated for production and land or wells on land that was irrigated for production or participating in a federal conservation program.

## **SECTION 7. OTHER DISTRICT ACTIONS AND DUTIES**

### **RULE 7.1 DISTRICT MANAGEMENT PLAN**

- A. Following notice and hearing, the District adopted a comprehensive management plan which was submitted and certified by the Texas Water Development Board on November 18, 2004 and April 7, 2010. The Management Plan was amended and approved by the Texas Water Development Board in October 2013. The management plan was adopted and addresses:
  - 1. Providing the most efficient use of groundwater;
  - 2. Controlling and preventing waste of groundwater;

3. Controlling and preventing subsidence;
4. Addressing conjunctive surface water management issues;
5. Addressing natural resource issues;
6. Addressing drought conditions;
7. Addressing conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost-effective; and.
8. Addressing the desired future conditions adopted by the District under Section 36.108.

The District will review the plan at least every fifth year and shall adopt amendments as necessary, after notice and hearing, that address, among other things:

1. Recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost effective; and,
  2. The desired future conditions of groundwater resources after desired future conditions of the relevant aquifers within the District are adopted during joint planning in the management area as described in Rule 7.2.
- B. The District Management Plan, and any amendments thereto, shall be developed using the District's best available data and forwarded to the regional water planning group for use in their planning process. The District Management Plan must also use the groundwater availability modeling information provided by the Texas Water Development Board together with any available site-specific information that has been provided by the District to the Executive Administrator of the Texas Water Development Board for review and comment before being used in the plan. The District shall use the Rules of the District to implement the Management Plan.

**RULE 7.2 JOINT PLANNING IN MANAGEMENT AREA**

- A. Upon completion and approval of the District's comprehensive management plan, as required by §§36.1071 and 36.1072, Texas Water Code, the District shall forward a copy of the new or revised management plan to the other groundwater districts in its Texas Commission on Environmental Quality designated management area. The Board shall consider the plans of the other districts individually and shall compare them to other management plans then in force in the management area.

- B. The Board President, or in his absence, the General Manager, or in his absence, the third-party consultant retained by the District (District's Consultant), along with the other districts in the management area, shall meet at least annually to conduct joint planning with the other districts in the management area and to review the management plans and accomplishments for the management area.
- C. The requirements of joint planning are governed by Texas Water Code Section 36.108.

**RULE 7.3     MANAGEMENT ZONES**

- A. Management zones are established in accordance with Texas Water Code Section 36.116(d) and defined in District Rules. Using the best hydrogeologic and other relevant scientific data readily available, including but not limited to the approved groundwater availability model, the Board by rule may create certain management zones within the District based on geographically or hydrogeologically defined areas, aquifers, or aquifer subdivisions, in whole or in part, that serve as a basis for differentiated groundwater management provisions. The District may:
  - 1. Assess water availability;
  - 2. Authorize total production and make proportional adjustment to permitted withdrawals;
  - 3. Identify impact areas to standardize/centralize hydrogeologic report and application assessment and data gathering from proposed well(s) projects;
  - 4. Otherwise undertake efforts to manage the groundwater resources in a manner that is consistent with the District Act or Texas Water Code Chapter 36.
- B. In creating zones pursuant to Subsection (A), the Board shall attempt to delineate zone boundaries that will promote fairness and efficiency by the District in its management of groundwater, while considering hydrogeologic conditions.
- C. Where practicable, the Board may consider the ability of the public to readily identify the boundaries of designated zones based on features on the land surface.

**RULE 7.4     CUMULATIVE IMPACT OF SUBDIVISIONS WITH EXEMPT WELLS; MUNICIPAL AND COUNTY AUTHORITY ASSISTANCE FROM DISTRICT**

- A. Municipal and county platted subdivisions create a unique issue where the cumulative impact should be considered and evaluated prior to plat approval. When the cumulative impact is not considered, the probability of localized impacts to an area increase substantially. Cumulative impacts such as drawdown, well interference, and subsidence diminish well production and damage the aquifer.



Once these impacts are realized, the only solution available is tying into an existing water supplier or constructing a new water supply for the area. Afforded this information and acknowledging the issue allows a proactive, preventative action pre-development compared to a costly and reactionary response. The District has no oversight or authority in the subdivision platting process. Instead, the District offers resources and expertise to the municipal and county authorities in their review process as requested.

- B. Under Texas Local Government Code Sections 212.0101 and 232.0032, a municipal or county authority must require a person who submits a plat application for a subdivision for which the source of the water supply intended for the subdivision is groundwater (under the subdivision tract) to have attached to the application a statement from a Texas Professional Engineer or Professional Geoscientist certifying adequate groundwater is available for that subdivision. This platting requirement may be waived by the municipality or county under certain circumstances. That is, the requirements may be waived if, based on credible evidence of groundwater availability in the vicinity of the proposed subdivision, the platting authority determines that sufficient groundwater is available and will continue to be available to the subdivided tract of land; and either: (1) the entire tract proposed to be subdivided by the plat will be supplied with groundwater from the Gulf Coast Aquifer or the Carrizo-Wilcox Aquifer; or (2) the proposed subdivision divides the tract into not more than 10 parts. If the municipality or county does not waive the requirement and exercises this authority, it must use the certification form and follow the content of TCEQ rule 30 Texas Administrative Code Sections 230.1 - 230.11. The subdivision plat applicant also must submit the certification information to the Texas Water Development Board (TWDB) and any groundwater conservation district (GCD) whose boundaries include all or part of the subdivision. According to the Local Government Code, the information supplied to the TWDB and GCD would be useful in performing GCD activities, conducting regional water planning, maintaining the state's groundwater database, or conducting studies for the state related to groundwater. The TWDB and GCDs have no oversight in the subdivision process under the Local Government Code or TCEQ rule. Providing the certification in the design and development phase stand to greatly benefit and protect private property rights, balance the conservation and development of groundwater to meet the needs of this state, use the best available science in the conservation and development of groundwater and to provide for conserving, preserving, protecting, and recharging of the groundwater or of a groundwater reservoir of it subdivisions in order to control subsidence, prevent degradation of water quality, or prevent waste of groundwater.
  
- C. Criteria of interest to consider related to subdivision planning
  - 1. TCEQ rule 30 TAC Sections 230.1 – 230.11 consist of two pre-printed forms (a transmittal form and the groundwater availability certification form) and the instructions for completing the forms and certification. The substantive requirements of the certification under the rule include requirements for

projected water demand estimates, general groundwater information, and for subdivision relying on individual well on individual lots, site specific groundwater data including the results of aquifer tests and water quality analysis. A detailed availability analysis is required for a thirty-year period including a description of aquifer parameters and drawdown and well interference analyses. A Professional Engineer or Professional Geoscientists must certify, based upon the information developed, adequate groundwater is available from the underlying aquifer(s) to supply the estimated demand of the proposed subdivision. In cooperation and coordination with municipal and county government's implementation for the groundwater availability certification requirement, the District encourages assessment of potential impacts, individually and cumulatively, of wells in a proposed plat. Review of general susceptibility of various impacts including, but not limited to, drawdown, subsidence, spring flow, and cumulative impacts are pertinent to the governing body's policy development, decision-making, and the groundwater availability certification content requirements. Specific references include:

- a. Section 230.7(b)(1-4) – Geologic and groundwater information gathered and considered in planning and designing the aquifer test should address potential impacts such as drawdown (individually and cumulatively), subsidence, spring flow where applicable. A recommended source of this information and impact analysis can be found in the District *Guidelines for Submitting Data and Information and the Preparation of Hydrogeologic Reports in Support of Applications for the Permitted Use Of Groundwater*. The Phase I report is intended to evaluate the impacts of pumping using existing data and the existing regional groundwater flow model of the area for the aquifer in which the well(s) is to be completed.
- b. Section 230.8(c) – “The aquifer test must provide sufficient information to allow evaluation of each aquifer that is being considered as a source of residential and non-residential water supply for the proposed subdivision.” Emphasis and focus on the evaluation of potential impacts such as drawdown (individually and cumulatively), subsidence, and spring flow are encouraged. The collection and review of this information in the planning state should provide clarity on the best practice to implement, individual wells or centralized distribution system, and minimize costly alternative supply installation after the fact.
- c. Section 230.8(c)(8) – To adequately demonstrate groundwater availability, review and analysis for potential impacts of the proposed subdivision is critical. A recommended source of this information and impact analysis can be found in the District *Guidelines for Submitting Data and Information and the Preparation of Hydrogeologic Reports in Support of Applications for the Permitted Use Of Groundwater*. This guideline document is intended to set standards and expectations for the investigations and reports to further inform review and analysis.
- d. Section 230.8(d) – With consideration of additional information related to potential impacts related to proposed subdivisions as part of the plat

application, the District will provide expertise to the review and assessment of potential impacts as requested by the municipal or county authority.

- e. Section 230.10(b) – A critical consideration in groundwater availability determinations is the cumulative impact of wells over time and after full build out. Referencing and considering the cumulative impact will minimize likelihood of well interference, localized drawdown, subsidence, and the necessity of a centralized distribution system to resolve these impacts in the future. Addressing pumping concentration prior to construction will significantly alleviate stress and pressure to the property owner in the long run.
- f. Section 230.10(c) & (d) – Defining aquifer parameters are vital to understanding the susceptibility to impacts in the project area. These parameters will assist the municipal or county authority to fully understand availability. A recommended source and approach to this information is the *District Guidelines for Submitting Data and Information and the Preparation of Hydrogeologic Reports in Support of Applications for the Permitted Use Of Groundwater*. Such an analysis will provide the extent drawdown will affect all wells. It can also provide direct feedback to compare impact options between individual wells and a centralized distribution system.
- g. Section 230.11(b) – Groundwater availability determination conditions cannot be understated. Reviewing criteria to understand the potential impacts at the plat design phase can significantly reduce time, effort, and costs for construction and application. Prudent project development and best management practices ensure these considerations are at the forefront of discussion and evaluation. Further standardizing the review, data collected, and analyzed referencing or utilize the *District Guidelines for Submitting Data and Information and the Preparation of Hydrogeologic Reports in Support of Applications for the Permitted Use Of Groundwater* criteria may be of great benefit for both the authority and developer alike.

- D. The District, as a resource in service to and full support of municipal and county authorities, is willing to offer any assistance to municipal or county authorities in the development, review, or assessment of subdivision plats and groundwater availability certifications as requested.

## **SECTION 8. REGISTRATION AND PERMITTING**

### **RULE 8.1 REGISTRATION, AUTHORIZATION AND PERMITS**

- A. All wells within the District are required to be registered with or permitted by the District on Forms approved by the General Manager.

- B. All water wells exempt under these Rules from the requirement to obtain a permit must be registered with the District by either the well owner or the well operator.
- C. Information on the registration form shall include the owner's name, mailing address, well location, well size, use and any other information the General Manager may determine to be of need. Registration forms for exempt wells need not be sworn.
- D. If the exempt well is in existence before July 1, 2004, the well owner or operator shall file with the District on form(s) prescribed by the General Manager an application for certificate of registration. After review and the determination by the General Manager that the well is exempt, the owner or operator shall be issued a certificate of registration. All registrations for existing exempt wells shall be filed with the District on or before July 1, 2005.
- E. For all new exempt wells (not in existence before July 1, 2004) the owner shall apply for a drilling authorization and request that the well be registered. The General Manager shall review the drilling application and make a preliminary determination on whether the well meets the exemptions provided in these Rules. If it is concluded that the applicant seeks a drilling authorization for a well that will be exempt, the General Manager shall issue the drilling authorization to the applicant. After the exempt well is drilled, the drillers log and completion report shall be filed with the District.
- F. No fee will be charged for the registration of exempt wells.
- G. A District well registration identification (ID) number will be issued to each well registered with or permitted by the District.

**RULE 8.2 AUTHORIZATION TO DRILL, INSTALL PUMPS AND EQUIPMENT**

**A. DISTRICT AUTHORIZATION REQUIRED**

No person shall construct, drill, modify, complete, change type of use, perform dye-tracing operations, plug, abandon, or alter the size of a well in the District without District authorization. Maintenance or repair of a well which does not increase production capability of the well to more than its authorized or permitted production rate does not require District authorization.

**B. DISTRICT APPROVAL REQUIREMENTS**

A District-approved well drilling authorization, application to construct, drill, or modify a well must be obtained prior to drilling, removing casing, boring, altering the size of the bore, re-boring the existing hole, or performing other modification activities. A person who requests authorization to construct, drill, or modify a well that will be used for nonexempt purposes or to transport groundwater out of the

District must also obtain a production permit or a transport permit. No drilling or modification activities authorized by the District shall commence until the District has been provided with twenty-four (24) hour advance notification. Upon approval of the application, the General Manager or the General Manager's designated representative shall advise the applicant of the well use classification and whether a permit is necessary. If the well does not have an existing state well number, a temporary well number will be issued along with authorization to drill, plug or modify.

C. DRILLING AUTHORIZATION TERM

Unless the Board specifies otherwise, an approved well drilling authorization for an exempt well is effective for one (1) year from date of issuance provided no change in ownership or proposed use occurs prior to drilling. Authorizations may be extended by action of the General Manager upon request of the applicant but not for a period to extend beyond three (3) years total time.

Unless the Board specifies otherwise, an approved well drilling authorization for a non-exempt well is effective for two (2) years from date of issuance provided no change in ownership or proposed use occurs prior to drilling. Authorizations may be extended by action of the General Manager upon request of the applicant but not for a period to extend beyond three (3) additional years.

D. DRILLING RECORDS

Complete records shall be kept and reports thereof made to the District concerning the drilling, equipping, and completion of all wells drilled in the District. Such records shall include an accurate driller's log, depth to water, any electric log that shall have been made, and such additional data concerning the description of the well, its discharge, and its equipment as may be required by the Board. Such records shall be filed with the District within sixty (60) days after drilling and/or completion of the well.

No person shall operate any well drilled and equipped within the District, except operations necessary to the drilling and testing of such well and equipment, unless or until the District has been furnished an accurate driller's log, any special purpose log or data which have been generated during well development, and a registration of the well correctly furnishing all available information required on the forms furnished by the District.

E. DRILLING AND COMPLETION OF WELLS

Drilling and completion of wells must satisfy applicable requirements of the TCEQ, the Texas Department of Licensing and Regulation's Water Well Drillers and Pump Installers Program, and the District Well Construction Standards. The Board of Directors shall adopt, and may periodically amend, Well Construction Standards

for wells drilled within the District. Approved Well Construction Standards will be made available to the public at the District office.

F. INSTALLATION OF WELL PUMPS AND EQUIPMENT

Well pumps and equipment shall only be installed or serviced in wells registered with the District.

G. SUSPENSION

The General Manager may suspend an authorization for a well permit, a permit amendment, or a transport permit for failure to comply with the requirements of Rule 8.2

H. APPLICABILITY TO EXEMPT WELLS

The requirements of Rule 8.2 are applicable to all wells drilled in the District, including exempt wells.

I. GROUNDWATER TRACING OPERATIONS PLAN

Prior to performing any type of dye tracing or other form of groundwater tracing operations within the District's jurisdictional boundary where materials are introduced into surface water or groundwater, the person proposing such operations must submit an operations plan for the proposed tracer study to the District for approval at least 30 days before the proposed starting date of the study. This plan must describe the entire proposal including: the responsible party; type of tracer and any visual, taste, chemical, or health considerations; rationale or need for the proposed study; injection and recovery points; methods to be employed; expected flow paths; expected project term; method of notification of affected well, spring, and property owners; any contingency plans; and any other information involving the proposed study. These studies must not conflict with any part of Rule 13 concerning pollution. District approval of any tracing plan may be denied if the District determines that the proposed plan is in conflict with other ongoing tracing studies.

J. AQUIFER STORAGE AND RECOVER WELLS

ASR recovery wells that are associated with an aquifer storage and recovery project require an operating permit if the amount of groundwater recovered from the wells exceed the volume authorized by TCEQ to be recovered under the project.

**RULE 8.3 PERMITS AND EXEMPTIONS**

A. No person shall drill, pump, or operate a well without first submitting and obtaining approval of a well development/registration application, pumpage permit, or

transport permit from the District. A violation occurs on the first day the drilling, alteration, or operation begins and continues each day thereafter until the appropriate authorization or permits are approved.

B. The following wells are required to be registered and to obtain approval for drilling, but are not required to have a pumpage or transport permit from the District:

1. A well or wells used for domestic use on a single tract of land.
2. Agricultural wells.
3. A water well used solely to supply water for a rig that is actively engaged in drilling or exploration operations for an oil or gas well permitted by the Railroad Commission of Texas, provided that the person holding the permit is responsible for drilling and operating the water well and the well is located on the same lease or field associated with the drilling rig. Note, if the sole purpose of the well is no longer to supply water for a rig that is actively engaged in drilling or exploration operations, the well is no longer exempt and must be permitted by the District.
4. The drilling of a water well authorized under a permit issued by the Railroad Commission of Texas under Chapter 134, Natural Resources Code, or for production from any such well to the extent the withdrawals are required for mining activities regardless of any subsequent use of the water. An entity holding a permit issued by the Railroad Commission of Texas under Chapter 134, Natural Resources Code that authorizes the drilling of a water well shall report monthly to the District:
  - a. The total amount of water withdrawn during the month;
  - b. The quantity of water necessary for mining activities; and,
  - c. The quantity of water withdrawn for other purposes.

Note, if the withdrawals from the well are no longer necessary for mining activities or are a greater amount than necessary for mining activities, then the well is no longer exempt and must be permitted by the District. Such well remains exempt from District spacing requirements.

5. Monitoring wells.
6. Aquifer storage and recovery injection wells and recovery wells (unless the well recovers more than authorized by the TCEQ, which then requires a permit from the District).
7. A well for temporary use to supply water for a rig that is actively engaged in drilling a groundwater production well permitted by the District. An exemption for such a well may not exceed 180 days without an extension granted by the District.

- C. The District may not restrict the production of any well that is exempt from permitting under Subsection (B).
- D. The District may not deny an application for an authorization to drill and a permit to produce water for hydrocarbon production activities if the application meets all applicable Rules as promulgated by the District.
- E. A water well exempted under Subsection B shall:
  - 1. Be registered in accordance with Rules promulgated by the District; and
  - 2. Be equipped and maintained so as to conform to the District's Rules requiring installation of casing, pipe, and fittings to prevent the escape of groundwater from a groundwater reservoir to any reservoir not containing groundwater and to prevent the pollution or harmful alteration of the character of the water in any groundwater reservoir
- F. The driller of a well exempted under Subsection B shall file the drilling log with the District.
- G. A well to supply water for a subdivision of land for which a plat approval is required by Chapter 232, Local Government Code, is not exempted under Subsection C.
- H. Groundwater withdrawn from a well exempt from permitting or regulation under this section and subsequently transported outside the boundaries of the District is subject to any applicable District production and export fees. When groundwater is transported outside the District from an exempt well, the owner is responsible for paying production and transport fees under Rule 9 and must provide monthly water use to the District to be used in calculating fees.
- I. This Rule applies to water wells, including water wells used to supply water for activities related to the exploration or production of hydrocarbons or minerals. This Rule does not apply to production or injection wells drilled for oil, gas, sulfur, uranium, or brine, or for core tests, or for injection of gas, saltwater, or other fluids, under permits issued by the Railroad Commission of Texas.

**RULE 8.4     TRANSFER OF GROUNDWATER OUT OF THE DISTRICT**

- A. Transport Permit Required
  - 1. Before any person transports any water out of the District from a well that is located within the District, the person must obtain a transport permit from the District. Application for and the granting of a transport permit shall be in accordance with Section 10 of these Rules.



**RULE 8.5     APPLICATION FOR REGISTRATION, PERMITS, WELL PLUGGING, WELL DRILLING, OR WELL MODIFICATION AUTHORIZATION**

A.     Application Requirements for Non-Exempt Wells

1.     Each original application for well registration, pumpage permits, transport permits, well plugging, well drilling, amendments, or well modification authorization requires a separate application. Application forms will be provided by the District and provided to the applicant by request. An application for a pumpage permit and transport permit shall be in writing and sworn. Applications shall contain:
  - a.     The name and mailing address of the applicant and the name and address of the owner of the land, if different from the applicant, on which the well is to be located;
  - b.     If the applicant is not the owner of the property, documentation establishing the applicable authority to construct and operate a well on the owner's property for the proposed use;
  - c.     A statement of the nature, purpose, and location of the proposed use and the amount of water to be used for each purpose.
  - d.     Availability of feasible and practicable alternative supplies to the applicant.
  - e.     A statement of the projected effect of the proposed withdrawal on the aquifer or aquifer conditions, depletion, subsidence, and effects on existing permit holders or other groundwater users in the District; if required under Rule 8.5F an applicant shall submit Phase I and Phase II hydrogeological reports prepared by a Texas licensed geoscientist or Texas licensed engineer to evaluate these factors in accordance with Rule 8.5F;
  - f.     The applicant's water conservation plan and, if any subsequent user of the water is a municipality or entity providing retail public water services, the water conservation plan of that municipality or entity shall also be provided. In lieu of a water conservation plan, a declaration that the applicant and/or a subsequent user if any subsequent user is a municipality or entity providing retail public water services will comply with the District's management plan, when one is adopted;
  - g.     Applicants must provide:
    - 1) Coordinates of proposed location of the well or wells (in latitude/longitude or other appropriate identified coordinate system).
    - 2) A proposed well construction diagram.
    - 3) A map showing the location of the proposed well or wells, all existing wells, hydrologic features, and geologic features located within half (1/2) mile radius of the proposed well or wells site.
    - 4) Proposed production of the well or wells.
    - 5) Proposed production rate for the well or wells.

- h. A well closure plan or a declaration that the applicant will comply with well plugging guidelines and report closure to the applicable authorities, including the District;
- i. The identity of the well driller, including the well driller's license number;
- j. The names and addresses of the property owners, and the location of water wells within a half-mile radius of the location of the well(s) from which water is to be produced;
- k. To the extent required under Rule 8.5D, proof of notification of the application to all property owners and well owners within a half (1/2) mile radius of the well subject that is subject of the application and political subdivisions within a half (1/2) mile radius of any of the property where the well or wells are located, along with the publisher's affidavit and tear sheet showing publication of the notice;
- l. For wells requiring hydrogeological reports under Rule 8.5F, an analysis explaining how the groundwater production proposed in the application will impact the desired future conditions applicable to the District; and,
- m. Any other information required by the General Manager or Board that is included in District rules in effect on the date the application is submitted that specifies what information must be included in the application for a determination of administrative completeness and reasonably relates to an issues that the District is by law authorized to consider.

- 2. Applications for well registration, pumpage permits, transport permits, well plugging, well drilling, amendments, or well modification authorization shall be made in the name of the well owner or property owner on a form or forms provided by the District. The sworn, original application must be submitted and signed by the owner or an authorized agent of the owner, who may be required to provide the District with a notarized authorization from the owner. This agent may be the well driller, lessee or renter of the property or well, power of attorney, trustee, or other appropriate agent. District staff will determine if an application is administratively complete.

**B. Completeness of Applications for Non-Exempt Wells**

- 1. An administratively complete application will consist of the submission to the District of an original, completed, signed, and notarized application, payment of all applicable application fees, inspection fees, water use fees, and other District-imposed fees, submission of any required maps, documents, ownership information, or supplementary information required by the District, the Board, the General Manager, or the General Manager's designated representative, the completion of any 20-day public response period initiated through a public notice requirement, mailed notice to the

extent required under Rule 8.5D below, and the submission of a hydrogeological report if required by Rule 8.5F, and any other documentation required by the District as part of the application. The District will not take action on an application which is not administratively complete or which has preceded in a manner not consistent with District Rules. Applicants submitting incomplete applications will be notified by the District in writing. Moreover, as described under Rule 8.5B3 the General Manager will continue a technical review of the application even after it is declared administratively complete.

2. An application for a permit will not be complete until the applicant has provided the District with proof of notice by publication and mail to the extent required by Rule 8.5D below and a twenty (20) day public response period has passed (a) since the first day of publication in a newspaper, designated by the District for the publication of legal notices, in the county where the permit is requested or (b) since the date individual notice is mailed to property and well owners as required under Rule 8.5D, whichever is later.
3. After an application has been determined to be administratively complete, the General Manager will conduct a technical review of the application to determine whether the application satisfies state and District regulatory requirements. If the General Manager determines that additional materials are necessary to complete technical review, the General Manager will notify the applicant by mail of any such deficiencies. Within 10 days of receipt of the letter, the applicant shall submit the additional information. For good cause shown, the General Manager may grant an extension of time for submission of additional information if a request is made within 5 days of the receipt of the General Manager's request. If the additional information is not timely received, and without the information the General Manager is unable to form a recommendation on the application, the General Manager will recommend application denial. If additional information is not required to complete the technical review, the General Manager will provide a statement of position and draft permit including any special conditions for the Board's consideration prior to or at the time the Board acts on an application.

C. Fees Included with Application for Non-Exempt Wells

1. The application must be accompanied by all applicable fees described under Rule 9. The application must be submitted and all applicable fees must be paid to the District before notice is published and mailed, to the extent required by Rule 8.5D below. Payment of all fees, including water use fees, remain the responsibility of the property owner.

D. Notice for Non-Exempt Wells

1. Notice is required for any application to permit new wells or modify existing wells to increase production capacity when the well will be completed with an inside casing diameter of eight (8) inches or greater and will be used for public water supply, municipal, commercial, industrial, or other non-exempt purposes. Such notices shall be published by the Applicant in a newspaper designated by the District for the publication of legal notices in the county where the permit is issued in a form approved by the District. All permit applications described above must provide notice by certified mail, return receipt requested, to all property owners and well owners within a half (1/2) mile radius of the well that is the subject of the application and to all political subdivisions within a half (1/2) mile radius of the property where the well or wells are located. Notification of any property owner served by a retail public water utility is not required of any applicant if notice is provided to the retail public water utility.

2. Prior to providing public notice, an applicant must submit the permit application and any District required documents to the District and pay all appropriate fees. All public notice requirements must be completed at least 185 days prior to the applicants anticipated need for groundwater production to allow for public response, scheduling and holding a public hearing, and Board consideration and action.

3. All public notices covered by this section must contain at least the following information:

- a. The name and address of the applicant,
- b. The date the application was filed,
- c. The location and a description of the well that is the subject of the application, and,
- d. A brief summary of the information in the application.

4. The District must be provided with:

- a. Proof of publication of public notice,
- b. Proof of public notice to property and well owners and political subdivisions by certified mail; and
- c. A list of the names and addresses of the property and well owners notified by certified mail.

E. Decision to Hold Contested Hearing in Connection with Non-Exempt Wells

1. On any application for well permits, the General Manager will schedule a contested hearing if the General Manager determines that a contested hearing will be beneficial to the District's consideration of the application, if the Applicant request a hearing, or if directed by the Presiding Officer following the receipt of timely requests for a contested hearing from any affected person in accordance with Section 14 of these Rules. The General Manager shall make a determination whether to schedule a preliminary hearing on an application within

sixty (60) days of the date the application is complete or, if required, the expiration of the twenty (20) day public response period. A preliminary hearing on an application will be held within thirty-five (35) days of the date the determination to schedule a hearing is made. Under no circumstances will any public hearing be held prior to the termination of the 20 day public response period. The District shall act on the application within sixty (60) days after the conclusion of the final hearing. Except for hearings referred to the State Office of Administrative Hearings, the final hearing may occur at the same time and immediately following the preliminary hearing. The failure of the District to comply with these deadlines shall not affect the District's jurisdiction over or the merits of an application. Action by the District Board may be taken at a regular, special or called Board meeting.

2. The District's Board or the General Manager may consolidate any hearings or actions on an application for a transport permit with any hearings or actions on applications for other permits filed by the same applicant or property owner.

F. Data, Information, and Hydrogeological Reports Required for Non-Exempt Wells

1. Applicants seeking to (a) permit a nonexempt well completed with an inside casing diameter of eight (8) inches or greater, (b) permit wells to be completed as an aggregate well system or (c) increase production or production capacity of a Public Water Supply, Municipal, Commercial, or Industrial, well with an inside casing diameter of eight (8) inches or greater, shall be subject to the District requirements to submit data, information, and reports that address the area of influence, drawdown, subsidence, and other pertinent information in accordance with the guidelines developed and required by the District.
2. The data and information required of the applicant, and the scope and requirements of Phase I reports, and Phase II reports are detailed in *Guidelines for Submitting Data and Information and the Preparation of Hydrogeologic Reports in Support of Applications for the Permitted Use Of Groundwater*, originally adopted April 13, 2023, as amended.
3. Phase I reports are classified as either (a) Phase I-a reports for annual production rates equal to or less than 200 million gallons per year, or (b) Phase I-b reports for annual production rates greater than 200 million gallons per year. The scope of Phase II reports is independent of production rate.
4. Phase I-a reports and Phase I-b reports will be completed by the District with the submitted data and information as described in the guidance document. The applicant has the option to submit a Phase I-a report or Phase I-b report that meets all requirements of the guidance document at the time of application submission.

5. All hydrogeologic reports (whether submitted by the applicant or prepared by the District) must be prepared and sealed by a Texas licensed professional geoscientist or a Texas licensed engineer.
6. Applicants may supplement the requirements with data and information such as test-hole, monitor well, and aquifer testing data. An applicant, who incurs the cost to include such supplemental data and information or prepare and submit reports summarizing and interpreting the submitted data, bears the risk that the Board may deny the permit application even with the supplemental data and information and submitted reports.
7. Phase II hydrogeological reports, if required, must be submitted after permit issuance and must address permitted well(s) equipped and tested for ultimate permitted volume and use. Phase II hydrogeological reports must be submitted within 180 days of well construction. Data and analysis from the Phase II testing will be used to update and refine the analysis of permitted pumpage impacts from the Phase I report. These Phase II data and analyses will also be used to address production parameters and permit conditions.
8. Except as provided for in Rule 8.7E, after notice to the applicant and affected persons and an opportunity for a hearing, the Board will consider the results of the Phase II hydrogeological report may modify a permit with special conditions and changes to the permitted volume of groundwater. A Phase II hydrogeological report must address any special conditions in a permit.

G. Registration of Exempt Wells

Owners of wells exempted under the Rules from obtaining a permit must still submit a District-approved form for District well registration and well drilling and pay applicable fees. Such exempted wells are still subject to District Well Construction Standards. The form shall be in writing, may be unsworn, and shall contain:

1. The name and mailing address of the applicant and the name and address of the owner of the land, if different from the applicant, on which the well is to be located;
2. If the applicant is not the owner of the property, documentation establishing the applicable authority to construct and operate a well on the owner's property for the proposed use;
3. A statement regarding the basis for asserting that the well will be exempt under Rule 8.3.
4. A statement of the nature and purpose of the proposed use and the amount of water to be used for each purpose.

5. The location of the well(s), the estimated rate at which water will be withdrawn, the production capacity of the well(s), and where the water is proposed to be used;
6. A well closure plan or a declaration that the applicant will comply with well plugging guidelines and report closure to the applicable authorities, including the District;
7. The identity of the well driller, including the well driller's license number; and
8. Any other information required by the General Manager or Board.

**RULE 8.6 PERMITS FOR EXISTING WELLS**

- A. Any well existing on or before July 1, 2004, which has not been permitted and which is not exempted from permitting under Rule 8.3 (B), is entitled to obtain a permit from the District in the manner provided by this Rule.
- B. Applications for permits for existing nonexempt wells must be filed with the District. For the administrative convenience of the District, and to aid the District in the performance of its duties, the filing and District acceptance of an application for existing nonexempt well permits should be scheduled with the General Manager in accordance with due dates set by the Board. Failure of the District to provide notice of the requirements imposed by District Rules shall not be grounds for existing wells failing to meet the requirements. Any owner of an existing nonexempt well that was not scheduled for permitting by the District and who failed to apply for a permit by one year after the effective date of these Rules, may make application for a permit pursuant to Rule 8.6; provided, however, if the well was in operation during the period from the effective date of these Rules, until the application was made, in addition to the normal requirements, past water use fees shall be paid for each year of operation.
- C. Upon completion of a sworn application under Rule 8.5 containing the information required under Subsection 8.5A.(1), and such other information as may be required by the District, and upon payment of the applicable processing fee, and any required past water use fees, the District will issue a permit to the applicant in accordance with the applicable provisions of these Rules.

**RULE 8.7 ACTION ON PERMITS**

- A. Permits. Before approving, modifying, delaying, or denying a permit, the District shall, at a minimum, consider whether:
  1. The application conforms to the requirements of these Rules and is

accompanied by the appropriate fees;

2. The proposed use of water is dedicated to non-speculative, beneficial use at all times;
  3. The proposed use of water would not cause or contribute to waste and the applicant has agreed to avoid waste and achieve water conservation;
  4. The proposed use of water would not present the possibility of unreasonable interference with the production of water from exempt, existing, or previously permitted wells or other surface water resources;
  5. The application satisfies District Rule 8.18 regarding prevention and control of subsidence
  6. The proposed use of water would not be otherwise contrary to the public welfare;
  7. The proposed use of water is consistent with the District's approved Management Plan or an approved regional water supply plan; and
  8. The applicant has agreed that reasonable diligence will be used to protect groundwater quality and that the applicant will follow well plugging guidelines at the time of well closure and report closure to the District and the TCEQ.
  9. The water is used within the term of the permit.
- B. In order to protect the public health and welfare and to conserve and manage the groundwater resources in the District during times of District-declared drought, the District may, place special requirements on, modify, delay, or deny a pumpage permit for a new well during a District-declared drought.
- C. The District may impose more restrictive permit conditions on new permit applications and permit amendment applications to increase use by historic users if the limitations:
1. Apply to all subsequent new permit applications and permit amendment applications to increase use by historic users, regardless of type or location of use;
  2. Bear a reasonable relationship to the existing District Management Plan; and
  3. Are reasonably necessary to protect existing use.



D. Time for Action

After the application is administratively complete the District shall promptly consider and act on each administratively complete application (see Rule 8.5B.). If a hearing is called to consider any of the foregoing applications, the District will conduct a preliminary hearing within thirty-five (35) days after the General Manager determines that a hearing is necessary, and the District's Board will act to approve, modify, delay, or deny the application within sixty (60) days after the date of the final hearing. Except for hearings referred to the State Office of Administrative Hearings, the final hearing may occur at the same time and immediately following the preliminary hearing. The failure of the District to act within this time period shall not affect the District's jurisdiction over or the merits of an application. An administratively complete application requires submission of all information set forth within these Rules. If any applications for nonexempt wells are administratively incomplete 90 days after receipt of the application by the District, the District, by certified mail, return receipt requested, will notify the applicant of the missing documentation and the need to complete the application. Applications that remain administratively incomplete will expire 90 days following the above-mentioned notice to the applicant. Well development/registration applications for exempt wells expire one year from the date of approval (see Rule 8.2C). The General Manger may extend the review period in this paragraph for a reasonable period upon written notice to the applicant if the General Manager determines that some specific aspect of the application requires a review of more than the two ninety-day periods. Upon expiration of the application, the applicant may request reconsideration by the Board within ten (10) days of receiving notice of an expired application.

E. Action by General Manager

The Board or District's General Manager shall act for the District in approving any application for which a contested hearing is not required. The General Manager will schedule a hearing for permit applications if the General Manager determines that a contested case hearing will be beneficial to the District's consideration of the application or if the General Manager receives timely requests for a contested hearing from any affected person in accordance with Section 14 of these Rules.

F. Action by the District Board

For all applications for which a contested hearing is required, the Board shall act on a permit or permit amendment application no later than the 60<sup>th</sup> day after the date the final hearing on the application is concluded. For a hearing conducted by the State Office of Administrative Hearings, the final hearing on the application concludes on the date the State Office of Administrative Hearings proposal for decision, any exceptions to the proposal for decision, and any replies to exceptions to the proposal for decision are presented to the Board of Directors. Hearings will be conducted in accordance with Section 14 of these Rules.

**RULE 8.8     TERM OF PERMITS**

- A.     Except as provided for in Rule 8.8C below, all permits are effective for a period of thirty years (30 years) from the date of issuance, unless otherwise stated on the permit. A permit may be issued for a term longer than thirty (30) years, except as provided for in Rule 8.8C below, when to do so aids the District in the performance of its duties and accomplishing the goals of the Act. The District may stagger permit terms. Permits are subject to modification during the permit term as provided by permit conditions.
  
- B.     A transport permit shall specify the period for which water may be exported. The period specified by the transport permit shall be:
  - 1.     At least three years if construction of a conveyance system has not been initiated prior to the issuance of the permit; or
  
  - 2.     At least 30 years if construction of a conveyance system has been initiated prior to the issuance of the permit.

C.     Notwithstanding the period specified in Rule 8.8B during which water may be exported under a permit, the District may periodically review the amount of water that may be exported under the permit and may limit the amount if additional factors considered in Rule 10.4E warrant the limitation, subject to Rule 10.4C. The review described by this subsection may take place not more frequently than the period provided for the review or renewal of regular permits issued by the District. In its determination of whether to renew a permit issued under this section, the District shall consider relevant and current data for the conservation of groundwater resources and shall consider the permit in the same manner it would consider any other permit in the District.

**RULE 8.9     PERMIT REVIEW AND RENEWAL**

The General Manager without hearing may renew a permit for wells if the terms and conditions of the permit (including maximum authorized withdrawal) are not changed in accordance with Section 36.1145 of the Water Code. The General Manager will review all permits on an annual basis.

**RULE 8.10    PERMIT AMENDMENTS**

- A.     Minor amendments include:
  - 1.     Transfers of ownership without any change in use;
  
  - 2.     Reductions in use or changing use of a well from nonexempt to exempt;
  
  - 3.     Increases in use of 10% or less of permitted pumpage for users permitted for more than 12,000,000 gallons annually;

4. Increases of up to 2,000,000 gallons annually for users permitted for 12,000,000 gallons or less; and
5. Converting two or more wells individually permitted by the same permittee into an aggregate system under one permit.

All other amendments, including all amendments pertaining to transport permits, are major amendments.

- B. The General Manager (or the General Manager's designated representative) may grant minor amendments without public notice and hearing. If two or more minor amendments are requested during any fiscal year for an increase in pumpage, and the combined increase in volume requested in the amendments exceeds the limits described in Section 8.10A, then the amendment which results in a pumpage increase in excess of the limits specified in Rule 8.10A will be considered a major amendment subject to Rule 8.10C.
- C. Major amendments shall be subject to all the requirements and procedures applicable to issuance of a pumpage permit for a new well or, if applicable, a transport permit.
- D. Application for a permit amendment shall be made upon forms supplied by the District and must be accompanied by an application processing fee established by the Board. No application-processing fee will be required from permittees requesting a decrease in permitted pumpage or changing use of a well from nonexempt to exempt.
- E. Permittees requesting an increase in pumpage volume must have a District approved User Conservation Plan and a District approved User Drought Contingency Plan (UDCP) on file at the District office, and must be in compliance with District Rules and policies regarding conservation-oriented rate structures. Permittees will be required to update their UDCP to reflect their new permitted pumpage amount and/or new ownership within ninety (90) days of permit approval.
- F. Amendments to Operating Permits at Time of Renewal.
  1. If a permittee, in connection with the renewal of a permit or otherwise, requests a change that requires an amendment to the permit under District rules, the permit as it existed before the permit amendment process remains in effect until the later of:
    - a. The conclusion of the permit amendment or renewal process, as applicable; or
    - b. Final settlement or adjudication on the matter of whether the change to the permit requires a permit amendment.

2. If the permit amendment process results in the denial of an amendment, the permit as it existed before the permit amendment process shall be renewed under Rule 8.9 above without penalty, unless the applicant is delinquent in paying a fee or civil penalty or is subject to a pending enforcement action for a substantive violation of a District permit, order, or rule that has not been settled by agreement with the District or a final adjudication.
3. The District may initiate an amendment to an operating permit, in connection with the renewal of a permit or otherwise, in accordance with the District rules. If the District initiates an amendment to an operating permit, the permit as it existed before the permit amendment process shall remain in effect until the conclusion of the permit amendment or renewal process, as applicable.

**RULE 8.11 PERMITS: ISSUANCE AND FORMAT**

- A. Permits. The permit shall include the following information in a format approved by the General Manager: the name and address of the person to whom the permit is issued; the state well number and/or District-assigned ID number of the well(s); the date the permit is to expire; the maximum withdrawal authorized; and any other terms and conditions necessary to accomplish the purposes of the Act.
- B. Transport Permits. A transport permit may be issued as a consolidated permit, including consolidation with an aggregate permit under Rule 8.15 that authorizes drilling, production, and transporting of water from the District. The application for and the granting of a transport permit shall be considered and granted in accordance with the provisions of Section 10 of these Rules.

**RULE 8.12 PERMIT CONDITIONS AND REQUIREMENTS**

All permits are granted subject to the Rules, regulations, orders, special provisions, and other requirements of the Board, and the laws of the State of Texas. In addition, each permit issued shall be subject to the following conditions and requirements:

- A. The permit is granted in accordance with the provisions of the District Act in conjunction with Chapter 36, Texas Water Code, and the Rules, regulations and orders of the District as may be in effect from time to time, and acceptance of the permit constitutes an acknowledgment and agreement that the permittee will comply with all the terms, provisions, conditions, requirements, limitations, and restrictions embodied in the permit and with the Rules, regulations, and orders of the District.
- B. The permit confers no vested rights in the holder and the permit is non-transferable. Written notice must be given to the District by the permittee prior to any sale or lease of the well covered by the permit. The permit may be revoked or suspended for failure to comply with its terms, which may be modified or amended pursuant

to the requirements of the Act and any applicable Rules, regulations and orders of the District.

- C. The drilling and operation of the well for the authorized use shall be conducted in such a manner as to avoid waste, pollution, or harm to the aquifer.
- D. The permittee shall keep accurate records, on a monthly basis, of the amount of groundwater withdrawn, the purpose of the withdrawal, and, for any transporting of water outside the District, the amount of water transported and the identity and location of the recipients, and such records shall be submitted to the District office on a monthly basis, and shall also be available for inspection at the permittee's principal place of business by District representatives. Immediate written notice shall be given to the District in the event a withdrawal or transporting of water exceeds the quantity authorized by the permit or rules. Unless the permittee can present evidence that the pumpage or transport which exceeded the permitted amount is due to an isolated incident that is not likely to be repeated and/or would not result in continued higher demands, the permittee must immediately submit an application to increase the permitted pumpage or transport volume based on the amount of pumpage or transport which exceeded the permitted amount projected for the remainder of the fiscal year.
- E. The well site or transport facilities shall be accessible to District representatives for inspection during normal business hours and during emergencies. The permittee agrees to cooperate fully in any reasonable inspection of the well site or transport facilities and related monitoring or sampling by District representatives. The well owner shall provide a twenty-four (24) hour emergency contact to the District.
- F. The application pursuant to which a permit has been issued is incorporated therein, and the permit is granted on the basis of and contingent upon the accuracy of the information supplied in that application and in any amendments thereof. A finding that false information has been supplied shall be grounds for immediate revocation of a permit. In the event of conflict between the provisions of the permit and the contents of the application, the provisions of the permit shall prevail.
- G. Driller's logs must be submitted within sixty (60) days of the drilling of a well. Monitoring of groundwater pumpage is to be accomplished in the manner specified by the District.
- H. Violation of the permit's terms, conditions, requirements, or special provisions, including pumping amounts in excess of authorized withdrawal or transporting amounts outside of the District in excess of the amount authorized for transport, shall be punishable by civil penalties as provided by the Act and these Rules.
- I. If special provisions are inconsistent with other provisions or regulations of the District, the Special Provisions shall prevail.

- J. Permittees with annual permitted pumpage volumes greater than 12,000,000 gallons requesting multiple minor amendment pumpage increases that total more than 20% of the permitted pumpage volume for the three years prior to the most recent amendment may be required to submit a current hydrogeological report to the District office. (Example: Permittee A is permitted for 50,000,000 gallons in 2004. He files three minor amendments between 2004 and 2006, one for 5,000,000 gallons, another for 3,000,000 gallons, and another for 4,000,000 gallons, a total of 12,000,000 gallons increase since 2004. The District may require a hydrogeological test as a special condition of the new amendment application.) A current hydrogeological report is one that has been completed within the three years preceding the date of the applications. Reports may be required at the General Manager's discretion based on aquifer condition, type of modification, status of adjacent wells, local water use trends, and other aquifer management considerations.
- K. A permit may contain any term, condition, or limitation determined to be warranted by the District's Board.
- L. Permittees will notify the District upon filing an application with the TCEQ to obtain or modify CCN to provide water or wastewater service in a service area that lies wholly or partly within the District or for which water shall be supplied from a well located inside the District.
- M. If at any time the District receives competent evidence that a non-exempt well or aggregate well system is causing unreasonable interference with the production of water from exempt, existing, or previously permitted wells or other surface water resources, is causing or contributing to waste, or could cause the potential for measurable subsidence, the Board may, on its own motion, reopen the permit for additional consideration. After notice and opportunity for hearing, the Board may revoke, suspend, terminate, cancel, modify or amend the permit, in whole or in part, as needed. After notice and opportunity for hearing, the permit may be reduced or curtailed for failure to achieve the applicable DFC of the aquifer.

**RULE 8.13 REVOCATION, TERMINATION, CANCELLATION, OR MODIFICATION OF PERMITS**

A permit is not a vested right of the holder. After notice and an opportunity for hearing, a permit may be revoked, suspended, terminated, canceled, modified, or amended in whole or in part for cause, including, but not limited to:

- A. Violation of any terms or conditions of the permit,
- B. Obtaining the permit by misrepresentation or failure to disclose relevant facts, or
- C. Failure to comply with any applicable Rules, regulations, Fee Schedule, special provisions, requirements, or orders of the District.

- D. After notice and an opportunity for hearing, the permit may be reduced or curtailed if the authorized withdrawal is causing unreasonable interference with the production of water from exempt, existing, or previously permitted wells or other surface water resources, is causing or contributing to waste, or could cause the potential for measurable subsidence or failure to achieve the applicable DFC of the aquifer.

The permittee shall furnish to the District upon request, and within a reasonable time, any information to determine whether cause exists for revoking, suspending, terminating, canceling, modifying, or amending a permit.

#### **RULE 8.14 AGGREGATION**

Multiple wells that are part of an aggregate system that are owned and operated by the same permittee and serve the same end user, subdivision, facility, or area served by a TCEQ issued CCN may be authorized under a single permit. Separate applications and registrations may be authorized under a single permit. Separate applications shall be submitted for each well and the District will maintain separate records of each well's location and characteristics. Geographic location of wells and integrated distribution systems will be considered in determining whether or not to allow aggregation.

For the purpose of categorizing wells by the amount of groundwater production, when wells are permitted with an aggregate withdrawal, the aggregate value shall be assigned to the group, rather than allocating to each well its prorated share or estimated production.

#### **RULE 8.15 REPORTS**

- A. Pumpage and Transport Reports. Permittees shall submit monthly records of meter readings and information on transporting groundwater outside the District, including all information recorded as required by Rule 8.12(D), to the District on forms approved by the District on or before the 15<sup>th</sup> day of the following month, even if there is zero pumpage or transport for the time period. Reports received after the 30<sup>th</sup> day of the month will be considered late.
- B. Water Quality Reports
  - 1. All permittees required by statute or regulation to conduct water quality analyses (including retail public water utilities) shall, at the time of obtaining results of the analyses, submit a duplicate copy to the District.
  - 2. If a retail public water utility is required by the TCEQ to notify its customers that water fails to meet TCEQ standards, the permittee shall immediately notify the District and submit a copy of the TCEQ notice to the District.

**RULE 8.16 EMERGENCY APPROVALS**

- A. Emergency Transfer of a Permit to another well. Upon application to the District, the General Manager shall authorize a permit, including a permit associated or consolidated with a transport permit, to be transferred to another well, or a replacement well, in the immediate vicinity of the permitted well upon a satisfactory demonstration by the applicant that:
1. The action is necessary in order to alleviate an immediate and serious threat to human life or health, or to prevent extensive or severe property damage to economic loss to the person proposing or requesting to make the transfer, and
  2. The replacement or transfer well will not endanger human life or health, and will not cause what would, under the particular circumstance, be unreasonable property damages or economic loss to others.

The General Manager may issue a temporary order authorizing the withdrawal of water without notice and hearing, or with such notice and hearing as the General Manager, in his judgment, deems practical under the circumstances.

- B. Emergency Withdrawals. Upon application to the District, the General Manager shall authorize withdrawal of water not covered by a permit upon a satisfactory demonstration by the applicant that:
1. An emergency exists due to acts of God or nature or other disaster,
  2. The withdrawal of water not covered by a permit is necessary in order to alleviate an immediate and serious threat to human life or health or to prevent extensive and severe property damage or economic loss to the person requesting the withdrawals, and
  3. The withdrawal will not endanger human life or health and will not cause what would under the particular circumstances be unreasonable property damage or economic loss to others.

The General Manager may issue a temporary order authorizing the withdrawal of water without notice and hearing, or with such notice and hearing as the General Manager, in his judgment, deems practical under the circumstances.

- C. Procedural Requirements. A copy of every order entered by the General Manager under this Rule shall be sent by certified mail to the person or persons to whom it is directed. However, when the time factor is critical, the order may be delivered in person, transmitted by telephone or telegram, or delivered by any other satisfactory method; but it shall be promptly followed by the written order sent by certified mail. If the order authorizes a new, transfer, or replacement well, the



person to whom the order is issued may not cause or undertake drilling of the well under the order except in strict compliance with its terms and conditions.

Any such emergency ruling by the General Manager shall be approved or disapproved by the Board at its next meeting. Pending the Board's action, the General Manager's order shall be given full effect.

Any applicant receiving a temporary order under this Rule shall make timely application for permit or permit amendment and pay all applicable fees. The application shall be processed in the manner provided in these Rules.

## **RULE 8.17 ABANDONED, OPEN, OR UNCOVERED WELLS**

### **A. REGISTRATION**

Any owner or lessee of land on which an abandoned, open, or uncovered well is located must register the well with the District. Any well not registered with the District shall be classified as abandoned.

### **B. ABANDONED WELL CAPPING**

At a minimum, open or uncovered wells must be capped in accordance with the requirements of the TCEQ, the Texas Department of Licensing and Regulation's Water Well Drillers and Pump Installers Program, and the District Rules and Well Construction Standards. The owner or lessee shall keep the well permanently plugged or capped with a water tight covering capable of sustaining weight of at least 400 pounds, except when the well is in actual use. The covering for a capped well must be constructed with a water tight seal to prevent entrance of surface pollutants into the well itself, either through the well bore or well casing.

### **C. ABANDONED WELL PLUGGING**

Unless granted an exception by the General Manager or Board, all abandoned wells that are not capped in accordance with Rule 8.17B must be plugged in accordance with the requirements of the TCEQ, the Texas Department of Licensing and Regulation's Water Well Drillers and Pump Installers Program, District Rule 8.17, and other applicable Rules and Well Construction Standards adopted by the Board of Directors. Prior to plugging a well, the District Well Construction Standards require as a minimum, registration of the well with the District, a site inspection by District staff, submission to the District for review and approval a Plug and Abandonment Plan by the owner or the well driller, and payment of the Well Abandonment Fee. The General Manager may require a water sample to be taken and have a water quality analysis conducted, at the District's expense, as part of or prior to the plugging operation.

### **D. REPORTING**

In accordance with Section 76.700, Texas Water Well Drillers Rules, within 60 days of completing the plugging of a well located within the District, the well driller shall provide the District a copy of the Plugging Report.

E. ENFORCEMENT

If the owner or lessee fails or refuses to plug or cap the well in compliance with this Rule and District standards within ten (10) days after being requested to do so in writing by an officer, agent, or employee of the District, then, upon Board approval, any person, firm, or corporation employed by the District may go on the land (pursuant to Texas Water Code Chapter 36.118) and plug or cap the well safely and securely.

F. LIEN FOR RECOVERY OF EXPENSES INCURRED BY DISTRICT

1. Reasonable expenses incurred by the District in plugging or capping a well constitute a lien on the land on which the well is located.
2. The District shall perfect the lien by filing in the deed records of the county where the well is located an affidavit, executed by any person conversant with the facts, stating the following:
  - i. The existence of the well;
  - ii. The legal description of the property on which the well is located;
  - iii. The approximate location of the well on the property;
  - iv. The failure or refusal of the owner or lessee, after notification, to close the well within ten (10) days after the notification;
  - v. The closing of the well by the District, or by an authorized agent, representative, or employee of the District; and
  - vi. The expense incurred by the District in closing the well.

G. PENALTIES

Rule 15.6 penalties shall be applicable in cases of failure or refusal to plug abandoned wells or cap wells not currently in use.

**RULE 8.18 SUBSIDENCE**

Production of groundwater in any manner, including volumes, rate, frequency, duration, or within a concentrated area, that causes the potential for measurable subsidence is prohibited.

Controlling and preventing measurable subsidence will be addressed during review and processing of new, renewed, and amended permit applications. The potential for measurable subsidence must be addressed by applicants and permittees in Phase I and Phase II hydrogeological reports required under Rule 8.5F.

If numerical modeling, local hydrogeological conditions including subsurface clay content,

aquifer testing, or other reliable data demonstrate the potential for measurable subsidence, the District will implement actions to address subsidence that may include (a) permit denial, revocation, suspension, cancellation, modification or amendment, (b) production limits, (c) spacing requirements, (d) permit conditions requiring extensometer installation, subsidence monitoring and reporting, (e) the establishment of threshold limits that trigger reduced production based on monitoring results and (f) any other action reasonable necessary to control and prevent measurable subsidence.

If the District has reason to believe that a non-exempt well has the potential to cause measurable subsidence, the District may, after notice and the opportunity for hearing, take all actions it deems necessary, in accordance with this Rule 8.18, to address the potential subsidence.

### **RULE 8.19 GENERAL PERMITS BY RULE**

For wells of certain characteristics and in certain prescribed situations, the District may issue several different types of permits by rule, generally with abbreviated application documentation and timelines. General permits by rule do not require notice and public hearings and are used for administrative convenience when their use is not inconsistent with the District's overall mission. The District may issue a general permit by rule as an administrative action, provided the requirements of the permit are met.

#### **A. General Requirements and Conditions for General Permits by Rule.**

1. Unless otherwise prohibited by the District and subject to the conditions and eligibility requirements specified for each general permit, wells are authorized to operate pursuant to this Section without an individual permit from the District.
2. Wells authorized by this Section shall be registered and complete Well Registration form submitted with the appropriate fees in accordance with Rule 8.1.
3. A well authorized pursuant to this Rule is subject to Water Use fees.
4. In lieu of authorization pursuant to this Rule, the Board at its sole discretion may require authorization by obtaining an individual permit.
5. Wells authorized pursuant to this Rule are subject to the Rules, regulations, Orders, special provisions, and other requirements of the Board, and laws of the State of Texas.

#### **B. Water Well for Hydraulic Fracturing of an Oil or Gas Well.**

1. **Conditions and Requirements.** A general permit is authorized for a well used in connection with hydraulic fracturing. The water well must be located on the same lease or field associated with the oil and gas well that

is subject to the hydraulic fracturing. This general permit authorization does not include a water station well, which would require an individual permit. Each authorization under this general permit shall be subject to the following conditions and requirements:

- a. The well shall be completed in accordance with the District completion standards Rule 12 and, at a minimum, shall not be open at the surface or allow water zones of different chemical quality to commingle;
  - b. The well permittee shall keep accurate records and meter readings, on a monthly basis of the amount of groundwater withdrawn, the purpose of the withdrawal, and such records shall be submitted to the District office on a monthly basis;
  - c. The District may require other conditions on the basis of site-specific or use specific circumstances;
  - d. Authorization under the general permit shall be for one year and shall be renewed annually by submission of a letter of renewal in a form approved by the General Manager;
  - e. Any other conditions that the District may require.
2. Wells authorized by this permit are subject to the permit conditions and requirements of Rule 8.12, the well spacing requirements of Rule 5, and the waste prohibitions of Rule 13.

## **SECTION 9. FEES AND DEPOSITS**

### **RULE 9.1 WATER USE FEES**

Water use fees authorized under the District Act shall be paid to the District for water developed from non-exempt wells and exempt wells used to transport water outside the District. The water use fee rate shall be established by Board resolution annually. Following issuance of operating permits, the rate shall be applied to the total actual annual pumpage for each permit (and amendments if appropriate) issued during the fiscal year the rate is in effect. The District will review the account of any permittee changing the use of a well from non-exempt to exempt to determine if additional water use fees are due or if a reimbursement of water use fees is warranted. Reimbursements exceeding \$250 must receive Board approval. Water use fees may be waived by the General Manager in instances where the administrative cost of the District to process the fee exceeds the fees received.

- A. Pursuant to the District Act, the initial water use fee may not exceed:
  1. \$1.00 per acre-foot for water for agricultural use; or
  2. \$0.17 per thousand gallon for water used for any other purpose
- B. The District may impose a reasonable fee or surcharge for an export fee using one

of the following methods:

1. A fee negotiated between the District and the transporter; or
  2. a rate not to exceed the greater of 20 cents for each thousand gallons or a 50 percent surcharge, in addition to the district's production fee, for water exported from the district.
  3. the maximum allowable rate the District may impose for an export fee or surcharge under Subsection B.2 or B.3 may be increased by three percent each calendar year.
- C. The District may use export fees as provided under sections 36.122 and 36.207 of the Texas Water Code.

## **RULE 9.2 APPLICATION, REGISTRATION, AND OTHER FEES**

The Board, by resolution, shall establish a schedule of fees. The Board will attempt to set fees that do not unreasonably exceed the costs incurred by the District of performing the administrative function which the fee is charged. District Monitor Wells are exempt from application, registration, and well log deposits. The General Manager shall exempt District Monitor Wells from any other fee if he determines that the assessment of the fee would result in the District charging itself a fee.

## **RULE 9.3 PAYMENT OF FEES**

All fees are due at the time of application, registration, or permitting. Landowners are primarily responsible for payment of fees associated with wells on their property unless it is shown that the landowner has no interest in the well. The water use fee for a permit shall be paid monthly unless the General Manager determines it is in the best interest of the District for fees to be paid quarterly or annually. Following submission of monthly reports to the District as required under Rule 8.15A, the District will invoice permittees for payment based upon actual water use. Payments of fees are due as described below.

- A. Monthly water use fee payments are based on actual water use in the previous month and are due within thirty (30) days of the invoice date.
- B. Payments received within the ten (10) days following the due date will not be subject to a late payment fee. Thereafter, the late payment fees set forth in Rule 15.8 shall be imposed.
- C. All fees other than water use fees are due at the time of assessment and are late after ten (10) days.

- D. Fee payment procedures and schedules in effect at the time of the adoption of these Rules shall remain in effect until permits are issued and become effective in accordance with the procedures and schedules contained herein.

**RULE 9.4 PERMIT APPLICATION PROCESSING**

The Board, by resolution, may adopt a processing fee for aggregate, transport and permits requiring a Phase I or II hydrogeological report under Rule 8.5F to cover all reasonable and necessary costs to the District of processing the application, including, but not limited to, all costs to the District for application review. The District, in its sole discretion, may require full, up-front payment of the permit application processing fee or may provide for partial payments in installments over the period of application review. The permit processing fee for an application to transport groundwater out of the District may not exceed the fees that the District imposes for processing applications for the use of groundwater within the District.

**RULE 9.5 MINIMUM WATER USE FEES**

The Board may, by resolution, establish a minimum water use fee.

**RULE 9.6 INSPECTION AND PLAN REVIEW FEES**

The Board may, by resolution, establish fees for: the inspection of wells, meters, or other inspection activities; plan reviews; special inspection services requested by other entities; or other similar services that require significant involvement of District personnel or its agents. Fees may be based on the amount of the District's time and involvement, number of wells, well production, well bore, casing size, size of transporting facilities, or amounts of water transported.

**RULE 9.7 SPECIAL FEES**

Wells drilled in aggregate, such as closed loop heat exchange wells, may qualify for reduced fees for review, registration, and inspection. The fee rate will be based on review and inspection time on a case by case basis.

**RULE 9.8 EXCEPTIONS**

If a regulated water utility is unable to pass through pumpage fees due to delay in obtaining regulatory approval, or in other unusual instances of hardship, the General Manager may grant exceptions and establish a payment schedule. Such exceptions shall be applied consistently.

**RULE 9.9 EXCESS PUMPAGE FEES**

To the extent permitted by the District Act, the Board may, by resolution, establish additional water use fees for any pumpage exceeding the permitted pumpage volume.

**RULE 9.10 RETURNED CHECK FEE**

The Board may, by resolution, establish a fee for checks returned to the District for insufficient funds, account closed, signature missing, or any other problem causing a check to be returned by the District's depository.

**RULE 9.11    ACCOUNTING FEE**

The Board may, by resolution, establish a fee for permittee requested accounting of pumpage reports, water use fee payments, or other accounting matters pertaining to the permittee's account which the District does not routinely maintain in its accounting of a permittee's records. Should a District error be discovered, the accounting fee, if any, will be fully refunded. Permittee's may request one review of their account per fiscal year without charge.

**RULE 9.12    WELL LOG DEPOSIT**

The Board may, by resolution, establish a Well Log Deposit to be held by the District for return to the depositor if well logs are submitted to the District within sixty (60) days following surface completion of the well. The depositor will receive one-half the Well Log Deposit for well logs received by the District after the sixty (60) day period. The District will not refund a Well Log Deposit for well logs submitted after 120 days following completion of the well.

**RULE 9.13 STATE OFFICE OF ADMINISTRATIVE HEARINGS HEARING DEPOSIT**

A party requesting a hearing before the State Office of Administrative Hearings shall pay all costs associated with the contract for a State Office of Administrative Hearings hearing and shall deposit with the District an amount determined by the District to pay the contract amount on a date determined by the District before the hearing begins. At the conclusion of the hearing, the District shall refund any excess money to the paying party.

**RULE 9.14 PERMIT REVIEW FEE**

The Board may, by resolution, establish a fee to cover all the costs of the General Manager's annual permit review. The fee will be an annual fee that is divided by twelve and assessed monthly.

**RULE 9.15 NON-EXEMPT UNPERMITTED WELL FEE**

Any non-exempt well that is operating without a permit will be assessed a water use fee that is double the amount of the water use fee for a permitted well, not to exceed the amount authorized by law.

**SECTION 10. TRANSFER OF GROUNDWATER OUT OF THE DISTRICT**

**RULE 10.1 PERMIT REQUIRED**

Groundwater produced from within the District may not be transported outside the District's boundaries unless the Board has issued the well owner an operating permit. The requirements of this Rule are applicable without regard to the manner the water is exported out of the District and specifically includes discharges into watercourses to convey water as well as pipelines and aqueducts.

**RULE 10.2 APPLICABILITY**

A permit for the transport of water outside the District is not required for the transportation of groundwater that is part of a manufactured product, or if the groundwater is to be used on property that straddles the District boundary line, or if the groundwater is to be used within the service area of an existing retail public utility provided that such service area is contiguous to the boundaries of the District. Transportation of groundwater into an area created by the expansion of an existing public utility into non-contiguous counties would require a permit. Also transportation of groundwater into an area that is separated from the utility's service area and not contiguous to the District would require a permit.



### **RULE 10.3 APPLICATION**

An application for a transportation permit must be filed in the District office and must include the information required under Rule 8.3 for a drilling or operating permit , as well as information required by the District to evaluate the proposed transport under the standards of Texas Water Code § 36.122. Except as permitted by the District Act, the application for a transportation permit is considered and processed by the District under the same procedure as a permit for in-District water and is combined with applications filed to obtain a permit for in-District water from the same applicant. The required information for an application include:

- A. A separate application shall be filed for each permit. Applications shall be filed on the form or in the format approved by the District. Each application shall be in written form, sworn to by the applicant and contain:
  - 1. The name and mailing address of the applicant and the name and address of the owner of the land, if different from the applicant, on which the well is to be located.
  - 2. If the applicant is not the owner of the property, documentation owner's property for the proposed use.
  - 3. A statement of the nature and purpose of the proposed use and the amount of water to be used for each purpose.
  - 4. A statement of the availability of feasible and practicable alternative water supplies to the applicant.
  - 5. The availability of water in the District and in the proposed receiving area during the period for which the water supply is requested for the District to consider under Texas Water Code § 36.122(f)(1).
  - 6. A statement of the projected effect of the proposed withdrawal on the aquifer or aquifer conditions, depletion, subsidence, or effects on existing permit holders or other groundwater users in the District. For non-exempt wells to be completed as aggregate wells or an individual well completed with an inside casing diameter of eight (8) inches or greater, a Phase I and Phase II hydrogeological report by a Texas licensed geoscientist or Texas licensed engineer assessing the impact of the proposed well and transport of water on the existing wells, subsidence, and the aquifer shall be submitted as required under Rule 8.5F.
  - 7. The applicant's water conservation plan and, if any subsequent user of the water is a municipality or entity providing retail public water services, the water conservation plan of that municipality or entity shall also be provided or a declaration shall be made that the applicant will comply with the District's management plan, when one is adopted.

8. The location of the well(s), the estimated rate at which water will be withdrawn, the production capacity of the well(s), and where the water is proposed to be used.
9. The names and addresses of the property owners, and the location of their wells, within a half mile radius of the location of the well(s) from which water is to be produced that is to be transported out of the District.
10. A well closure plan or a declaration that the applicant will comply with well plugging guidelines and report closure to the applicable authorities, including the District.
11. Proof of notification of the application to all landowners within one-half mile radius of the property where the well or wells are located and to all well owners, along with the publisher's affidavit showing publication of the notice of intent to make application for a permit to transport water outside the District.
12. A description of how the proposed transport is addressed in any approved regional water plan(s) and when adopted, the District management plan for the District to consider under Texas Water Code § 36.122(f)(3).
13. A technical description of the facilities to be used for transportation of water and a time schedule for any construction thereof, so that the District may determine the permit term as authorized under Texas Water Code § 36.122(h)(2) and (i).
14. The identity of the well driller, including the well driller's license number or any other information required by the General Manager of Board.

**RULE 10.4 HEARING AND PERMIT ISSUANCE**

- A. Applications for transportation permits are subject to the hearing procedures provided by these Rules
- B. In determining whether to issue a permit to transfer groundwater out of the District, the Board must be fair, impartial, and nondiscriminatory and shall consider the factors considered when deciding whether to issue a drilling or operating permit under Rule 8 and the following:
  1. The availability of water in the District and in the proposed receiving area during the period for which the water supply is requested;

2. The projected effect of the proposed transfer on aquifer conditions, depletion, subsidence, or effects on existing permit holders or other groundwater users within the District; and
  3. The approved regional water plan and approved District Management Plan.
- C. The District may not deny a permit based on the fact that the applicant seeks to transfer groundwater outside of the District and may not impose more restrictive permit condition on transporters than the District imposes on existing in-District users, unless:
1. Such limitations apply to all subsequent new permit applications and increased use by historic users, regardless of type or location of use;
  2. Such limitations bear a reasonable relationship to the existing District management plan; and
  3. Such limitations are reasonably necessary to protect existing use.
- D. In addition to conditions specified for in-District permits, the operating permit for transporting water out of the District shall specify:
1. The amount of water that may be transferred out of the District; and
  2. The period for which the water may be transferred, which shall be:
    - a. At least three years if construction of a conveyance system has not been initiated prior to the issuance of the permit, and shall be automatically extended to the terms 30 years if construction of a conveyance system is begun before the expiration of the initial term; or
    - b. At least 30 years if construction of a conveyance system has been initiated prior to the issuance of the permit.
- E. The District may periodically review the amount of water that may be transferred under an operating permit to transport water out of the District and may limit the amount after considering factors related to:
1. The availability of water in the District and in the proposed receiving area during the period for which the water supply is requested;
  2. The projected effect of the proposed transfer on aquifer conditions, depletion, subsidence, or effects on existing permit holders or other groundwater users within the District; and

3. The approved regional water plan and the approved District Management Plan.
- F. Such a review may not take place more frequently than once every five (5) years. After the review, more restrictive permit conditions may only be imposed if:
1. Such limitations apply to all subsequent new permit applications and increased use by historic users, regardless of type or location of use;
  2. Such limitations bear a reasonable relationship to the existing District management plan; and
  3. Such limitations are reasonably necessary to protect existing use.
- G. In its determination of whether to renew a transport operating permit, the District shall consider the permit in the same manner it would consider any other permit in the District.

**RULE 10.5 FEES INCLUDED WITH APPLICATION**

The application must be accompanied by the application processing fee, inspection fee, or other fees as appropriate. Such fees must be paid before notice is published and mailed. Payment of all fees including water use fees remains the responsibility of the landowner.

**SECTION 11. REWORKING AND REPLACING A WELL**

**RULE 11.1 PROCEDURES**

- A. An existing well may be reworked, re-drilled, or re-equipped in a manner that will not change the existing well status. The District does not require a permit amendment for maintenance or repair of a well if the maintenance or repair does not increase the production capabilities of the well to more than its authorized or permitted production rate.
- B. A permit must be applied for and consideration given to approving the permit in accordance with Section 8 of these Rules, if a person wishes to increase the rate of production of an existing well to the point of increasing the size of the column pipe or g.p.m. rate by reworking, re-equipping, or re-drilling such well as described in this section.
- C. A permit must be applied for and granted in accordance with Section 8 of these Rules if a person wishes to replace an existing well with a replacement well.
- D. A replacement well must be completed in the same aquifer as the well it replaces, and shall not be drilled, equipped, or completed so as to increase the rate of

production of water from the well it replaces. A replacement well must not be located closer to any other well or authorized well site unless the new location complies with the minimum the spacing requirements of Section 5; otherwise, the well shall be considered a new well for which an application must be made.

- E. In the event the application meets spacing and production requirements, and satisfies all requirements of these Rules, the General Manager may grant such application without further notice.

## **SECTION 12. WELL LOCATION AND COMPLETION**

### **RULE 12.1 RESPONSIBILITY**

After an application for a well permit has been granted, the well, if drilled, must be drilled within ten (10) yards (30 feet) of the location specified in the permit, and not elsewhere. If the well should be commenced or drilled at a different location, the drilling or operation of such well may be enjoined by the Board pursuant to Chapter 36, Texas Water Code. As described in the Texas Water Well Drillers Rules, all well drillers and persons having a well drilled, deepened, or otherwise altered shall adhere to the provisions of the District Rule prescribing the location of wells and proper completion.

### **RULE 12.2 LOCATION OF DOMESTIC, INDUSTRIAL, INJECTION, AND IRRIGATION WELLS**

With regard to potential sources of contamination, wells shall be located in conformity with the rules and regulations promulgated by the TCEQ and the Texas Department of Licensing and Regulation, as applicable.

### **RULE 12.3 STANDARDS OF COMPLETION FOR DOMESTIC, INDUSTRIAL, INJECTION, AND IRRIGATION WELLS**

Water well drillers must indicate the method of completion performed on the Well Report (TCEQ-0199) Section 10 Surface Completion. Unless otherwise ordered by the Board, domestic, industrial, injection, and irrigation wells must be completed in accordance with all applicable State and local standards, including but not limited to 30 Texas Administrative Code Chapter 290 (TCEQ Water Hygiene Rules for Public Water Supply Systems) and 16 Texas Administrative Code Chapter 76 (Rules for Water Well Drillers and Water Well Pump Installers).

### **RULE 12.4 RE-COMPLETIONS**

- A. The landowner shall have the continuing responsibility of insuring that a well does not allow commingling of undesirable water and fresh water or the unwanted loss of water through the well bore to other porous strata.
- B. If a well is allowing the commingling of undesirable water and fresh water or the

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

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

### **SECTION 13. WASTE AND BENEFICIAL USE**

#### **RULE 13.1 WASTE MEANS ANY ONE OR MORE OF THE FOLLOWING**

- A. Withdrawal of groundwater from a groundwater reservoir at a rate in an amount that causes or threatens to cause intrusion into the reservoir of water unsuitable for agricultural, gardening, domestic, or stock raising purposes.
- B. The flowing or producing of wells from a groundwater reservoir if the water produced is not used for a beneficial purpose.
- C. Escape of groundwater from a groundwater reservoir to any other reservoir or geologic strata.
- D. Pollution or harmful alteration of groundwater in a groundwater reservoir by saltwater or by other deleterious matter admitted from another stratum or from the surface of the ground.
- E. Willfully or negligently causing, suffering, or allowing groundwater to escape into any river, creek, natural watercourse, depression, lake, reservoir, drain, sewer, street, highway, road, or 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 11 or 26.
- F. Groundwater pumped for irrigation that escapes as irrigation tailwater onto land other than that of the owner of the well unless permission has been granted by the occupant of the land receiving the discharge.
- G. For water produced from an artesian well, waste has the meaning assigned by Section 11.205 Texas Water Code.
- H. Groundwater that is discharged into a watercourse for transit to another location when the losses in transit exceed 20%.
- I. Potable groundwater shall not be used for secondary recovery of hydrocarbons.

**RULE 13.2 WASTE PREVENTION**

- A. Groundwater shall not be produced within, or used within or outside of the District, in such a manner as to constitute waste as defined in these Rules.
- B. No person shall pollute or harmfully alter the character of the underground water reservoir of the District by means of salt water or other deleterious matter admitted from some other stratum or strata from the surface of the ground.
- C. No person shall commit waste as that term is defined in Section 13.

**RULE 13.3 USE FOR A BENEFICIAL PURPOSE**

- A. Agricultural, gardening, domestic, stock raising, municipal, mining, manufacturing, industrial, commercial, recreational, or pleasure purposes;
- B. Exploring for, producing, handling, or treating oil, gas, sulphur, or other minerals;  
or
- C. Any other purpose that is useful and beneficial to the user.

**RULE 13.4 ORDERS TO PREVENT WASTE/POLLUTION**

After providing notice to affected parties and opportunity for a hearing, the Board may adopt orders to prohibit or prevent waste or pollution. If the factual basis for the order is disputed, the Board shall direct that an evidentiary hearing be conducted prior to entry of the order. If the General Manager determines that an emergency exists, requiring the immediate entry of an order to prohibit waste or pollution and protect the public health, safety, and welfare, the General Manager may enter a temporary order without notice and hearing provided, however, the temporary order shall continue in effect for the lesser of fifteen (15) days or until a hearing can be conducted.

**SECTION 14. HEARINGS**

**RULE 14.1 APPLICABILITY**

Except as provided by Rule 14.15, Section 14 of the Rules applies to the notice and hearing process used by the District for permit and permit amendment applications and show cause proceedings.

**RULE 14.2 SCHEDULING OF HEARING**

- A. The General Manager or Board may schedule a hearing on permit or permit amendment applications received by the District as necessary, as provided by Rule 8.5.E.
- B. The General Manager or Board may schedule more than one application for consideration at a hearing.
- C. The location of any hearing held will be at the District office unless the Board or General Manager provides for hearings to be held at a different location. For a hearing conducted by the State Office of Administrative Hearings, the District may hold the hearing in Travis County.
- D. A hearing may be held in conjunction with a regularly scheduled Board meeting.

**RULE 14.3 NOTICE**

- A. If the General Manager or Board schedules a hearing on an application for a permit or permit amendment, the General Manager shall give notice of the hearing as provided by this section.
- B. The notice must include:
  - 1. The name of the applicant;
  - 2. The address or approximate location of the well or proposed well;
  - 3. A brief explanation of the proposed permit or permit amendment, including any requested amount of groundwater, the purpose of the proposed use, and any change in use;
  - 4. The time, date, and location of the hearing; and
  - 5. Any other information the General Manager or Board considers relevant and appropriate.
- C. Not later than the 10th day before the date of a hearing, the General Manager shall:
  - 1. Post notice in a place readily accessible to the public at the District office;
  - 2. Provide notice to the county clerk of each county in the District; and
  - 3. Provide notice by:
    - a. Regular mail to the applicant;
    - b. Regular mail, facsimile, or electronic mail to any person who has



requested notice under Subsection (D).

- D. A person may request notice from the District of a hearing on a permit or a permit amendment application. The request must be in writing and is effective for the remainder of the calendar year in which the request is received by the District. To receive notice of a hearing in a later year, a person must submit a new request. An affidavit of an officer or employee of the District establishing attempted service by first class mail, facsimile, or e-mail to the person in accordance with the information provided by the person is proof that notice was provided by the District.
- E. Failure to provide notice under Subsection C.3.(b) does not invalidate an action taken by the District at the hearing.

**RULE 14.4 HEARING REGISTRATION**

The District requires each person who participates in a hearing to submit a hearing registration form stating:

- A. The person's name;
- B. The person's address; and
- C. Whom the person represents, if the person is not there in the person's individual capacity.

**RULE 14.5 HEARING PROCEDURES**

- A. A hearing must be conducted by:
  - 1. A quorum of the Board;
  - 2. The Presiding Officer who is the Board President or an individual to whom the Board has delegated in writing the responsibility to preside as a hearings examiner over the hearing or matters related to the hearing; or,
  - 3. The State Office of Administrative Hearings if requested and paid for by the requesting party.
- B. Except as provided by Subsection C, the Board president or the hearings examiner shall serve as the presiding officer at the hearing.
- C. If the hearing is conducted by a quorum of the Board and the Board president is not present, the directors conducting the hearing may select a director to serve as the presiding officer.
- D. The presiding officer may:

1. Convene the hearing at the time and place specified in the notice;
  2. Set any necessary additional hearing dates;
  3. Designate the parties regarding a contested application;
  4. Permit the receipt of and rule on the admissibility of evidence consistent with Subchapter D, Chapter 2001, Texas Government Code;
  5. Establish the order for presentation of evidence;
  6. Administer oaths to all persons presenting testimony;
  7. Examine and allow cross examination of persons presenting testimony;
  8. Ensure that information and testimony are introduced as conveniently and expeditiously as possible without prejudicing the rights of any party;
  9. Prescribe reasonable time limits for testimony and the presentation of evidence;
  10. Recess any hearing from time to time and place to place;
  11. Issue subpoenas, require depositions, or order other discovery consistent with Subchapter D, Chapter 2001, Texas Government Code;
  12. Determine how to apportion among the parties costs related to a contract for the services of a presiding officer and the preparation of the official hearing record; and
  13. Exercise any other appropriate powers necessary or convenient to effectively carry out the responsibilities of the Presiding Officer.
- E. Except as provided by Rule 14.14, the District may allow any person, including the General Manager or a District employee, to provide comments at a hearing on an uncontested application.
- F. The presiding officer may allow testimony to be submitted in writing and may require that written testimony be sworn to. On the motion of a party to the hearing, the presiding officer may exclude written testimony if the person who submits the testimony is not available for cross-examination by phone, a deposition before the hearing, or other reasonable means.
- G. If the Board has not acted on the application, the presiding officer may allow a person who testifies at the hearing to supplement the testimony given at the hearing

by filing additional written materials with the presiding officer not later than the 10th day after the date of the hearing. A person who files additional written material with the presiding officer under this subsection must also provide the material, not later than the 10th day after the date of the hearing, to any person who provided comments on an uncontested application or any party to a contested hearing. A person who receives additional written material under this subsection may file a response to the material with the presiding officer not later than the 10th day after the date the material was received.

- H. The presiding officer, at the presiding officer's discretion, may issue an order at any time before Board action under Rule 14.10 that:
  - 1. Refers parties to a contested hearing to an alternative dispute resolution procedure on any matter at issue in the hearing;
  - 2. Determines how the costs of the procedure shall be apportioned among the parties; and
  - 3. Appoints an impartial third party as provided by Section 2009.053, Government Code, to facilitate that procedure.
- I. In general, the burden of proof is on the moving party by a preponderance of the evidence, except in an enforcement proceeding, the General Manager has the burden of proving by a preponderance of the evidence the occurrence of any violation and the appropriateness of any proposed technical ordering provisions. The respondent in an enforcement proceeding has the burden of proving by a preponderance of the evidence all elements of any affirmative defense asserted. The permit applicant bears the burden of proof by a preponderance of the evidence in an application proceeding.

**RULE 14.6 EVIDENCE**

- A. The presiding officer shall admit evidence that is relevant to an issue at the hearing. Evidence may be admitted if it is of that quality upon which reasonable persons are accustomed to rely in the conduct of serious affairs. It is intended that needful and proper evidence shall be conveniently, inexpensively, and speedily provided while preserving the substantial rights of the parties to the proceeding.
- B. The presiding officer may exclude evidence that is irrelevant, immaterial, or unduly repetitious.

**RULE 14.7 RECORDING**

- A. Except as provided by Subsection B, the presiding officer shall prepare and keep a record of each hearing in the form of an audio or video recording or a court reporter transcription. On the request of a party to a contested hearing, the presiding officer shall have the hearing transcribed by a court reporter. The presiding officer may assess any court reporter transcription costs against the party that requested the transcription or among the parties to the hearing. Except as provided by this subsection, the presiding officer may exclude a party from further participation in a hearing for failure to pay in a timely manner costs assessed against that party under this subsection. The presiding officer may not exclude a party from further participation in a hearing as provided by this subsection if the parties have agreed that the costs assessed against that party will be paid by another party.
- B. If a hearing is uncontested, the presiding officer may substitute minutes or the proposal for decision required under Rule 14.9 for a method of recording the hearing provided by Subsection (a).

**RULE 14.8 CONTINUANCE**

The presiding officer may continue a hearing from time to time and from place to place without providing notice under Rule 14.3. If the presiding officer continues a hearing without announcing at the hearing the time, date, and location of the continued hearing, the presiding officer must provide notice of the continued hearing by regular mail to the parties. A continuance may not exceed the time limit for a final decision under Rule 14.12.1B.

**RULE 14.9 PROPOSAL FOR DECISION**

- A. Except as provided by Subsection E, the presiding officer shall submit a report to the Board not later than the 30th day after the date the evidentiary hearing is concluded.
- B. The proposal for decision must include:
  - 1. A summary of the subject matter of the hearing;
  - 2. A summary of the evidence or public comments received; and
  - 3. The presiding officer's recommendations for Board action on the subject matter of the hearing.
- C. The presiding officer or General Manager shall provide a copy of the proposal for decision to:
  - 1. The applicant; and

2. Each designated party.
- D. A party may submit to the Board written exceptions to the proposal for decision.
  - E. If the hearing was conducted by a quorum of the Board and if the presiding officer prepared a record of the hearing as provided by Subsection A above, the presiding officer shall determine whether to prepare and submit a proposal for decision to the Board under this section.
  - F. The board shall consider the proposal for decision at a final hearing. Additional evidence may not be presented during a final hearing. For a hearing conducted by the State Office of Administrative Hearings (SOAH), the final hearing on the application concludes on the date the SOAH proposal for decision, exceptions and replies to exceptions to the proposal for decision are presented the Board of Directors. The parties may present oral argument at a final hearing to summarize the evidence, present legal argument, or argue an exception to the proposal for decision. A final hearing may be continued as provided by Rule 14.8.
  - G. In a proceeding for a permit application or amendment in which a district has contracted with the SOAH for a contested case hearing, the board has the authority to make a final decision on consideration of a proposal for decision issued by an administrative law judge consistent with Section 2001.058, Government Code. The board may change a finding of fact or conclusion of law made by the administrative law judge, or may vacate or modify an order issued by the administrative judge, only if the board determines:
    1. That the administrative law judge did not properly apply or interpret applicable law, district rules, written policies provided under District Bylaw 14-15., or prior administrative decisions;
    2. That a prior administrative decision on which the administrative law judge relied is incorrect or should be changed; or
    3. That a technical error in a finding of fact should be changed.

#### **RULE 14.10 BOARD ACTION**

The Board shall act on a permit or permit amendment application not later than the 60th day after the date the final hearing on the application is concluded.

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

application.

Following an uncontested hearing, an applicant may, not later than the 20<sup>th</sup> day after the date the board issues an order granting the application, demand in writing a contested case hearing if the order:

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

For the purposes of making a final decision on a permit or permit amendment application by the board, a concurrence of a majority of the directors eligible to vote is sufficient for taking an action on the application.

**RULE 14.11 REQUEST FOR REHEARING OR FINDINGS OF FACT AND CONCLUSIONS OF LAW**

- A. An applicant in a contested or uncontested hearing on an application or a party to a contested hearing may administratively appeal a decision of the Board on a permit or permit amendment application by requesting written findings of fact and conclusions of law not later than the 20<sup>th</sup> day after the date of the Board's decision unless the Board issued findings of fact and conclusions of law as part of the final decision.
- B. On receipt of a timely written request, the Board shall make written findings of fact and conclusions of law regarding a decision of the Board on a permit or permit amendment application. The Board shall provide certified copies of the findings of fact and conclusions of law to the person who requested them, and to each designated party, not later than the 35<sup>th</sup> day after the date the Board receives the request. A party to a contested hearing may request a rehearing before the Board not later than the 20<sup>th</sup> day after the date the Board issues the findings of fact and conclusions of law.
- C. A request for rehearing must be filed in the District office and must state the grounds for the request. If the original hearing was a contested hearing, the person requesting a rehearing must provide copies of the request to all parties to the hearing.
- D. The Board shall consolidate requests for rehearing filed by multiple parties to the contested case hearing, but only one rehearing may be considered per matter.
- E. If the Board grants a request for rehearing, the Board shall schedule the rehearing not later than the 45<sup>th</sup> day after the date the request is granted.

- F. If a motion for rehearing is filed and granted by the Board, the Board shall make a final decision on the application not later than the 90<sup>th</sup> day after the date of the decision by the Board that was subject to the motion for rehearing.
- G. The failure of the Board to grant or deny a request for rehearing before the 91st day after the date the request is submitted is a denial of the request.

**RULE 14.12 DECISION; WHEN FINAL**

- A. A decision by the Board on a permit or permit amendment application is final:
  - 1. If a request for rehearing is not filed on time, on the expiration of the period for filing a request for rehearing; or
  - 2. If a request for rehearing is filed on time, on the date:
    - a. The Board denies the request for rehearing; or
    - b. The Board renders a written decision after rehearing.
- B. Except as provided by Subsection C, an applicant or a party to a contested hearing may file a suit against the District under Texas Water Code Section 36.251 to appeal a decision on a permit or permit amendment application not later than the 60th day after the date on which the decision becomes final.
- C. An applicant or a party to a contested hearing may not file suit against the District under Texas Water Code Section 36.251 if a request for rehearing was not filed on time.

**RULE 14.12.1 DECISION; WHEN FINAL AFTER A CONTESTED CASE BEFORE SOAH**

- A. A final decision of the Board after a contested case before SOAH must be in writing and must either adopt the proposed findings of fact and conclusions of law as proposed by the Administrative Law Judge (ALJ) or include revised findings of fact and conclusions of law consistent with Subsection 14.9 G.
- B. Notwithstanding any other provision of these rules, the Board shall issue a final decision after a contested case before SOAH not later than the 180th day after the date of receipt of the final proposal for decision from SOAH. The deadline may be extended if all parties agree to the extension.
- C. The Board is considered to have adopted a final proposal for decision of the ALJ as a final order on the 181st day after the date the ALJ issued the final proposal for decision if the Board has not issued a final decision by:

- (1) adopting the findings of fact and conclusions of law as proposed by the ALJ;  
or
  - (2) issuing revised findings of fact and conclusions of law as provided by Subsection 14.9 G.
- D. A proposal for decision adopted under Subsection C is final, immediately appealable, and not subject to a request for rehearing.

**RULE 14.13 CONSOLIDATED HEARING ON APPLICATIONS**

- A. Except as provided by Subsection B, the District may process applications from a single applicant under consolidated notice and hearing procedures on written request by the applicant for:
1. Drilling, equipping, operating, or completing a well or substantially altering the size of a well or well pump under Section 8;
  2. The spacing of water wells or the production of groundwater under Section 5 and 6; or
  3. Transferring groundwater out of the District under Section 10.
- B. The District is not required to use consolidated notice and hearing procedures to process separate permit or permit amendment applications from a single applicant if the Board or General Manager determines it cannot adequately evaluate one application until it has acted on another application.

**RULE 14.14 HEARING REQUEST AND AFFECTED PERSON DETERMINATION**

- A. Hearing Requests. The following may request a contested case hearing under these Rules:
1. The Board;
  2. The General Manager;
  3. The applicant; and
  4. Affected persons (as determined in F. below).



- B. Form of Request. A request for a contested case hearing by an affected person (as determined in F. below) must be in writing and be filed by United States mail, facsimile, e-mail, or hand delivery with the District within the time provided by subsection D. of this section.
- C. Requirements for Request. A contested case hearing request by an affected person (as determined in F. below) must be in writing with a duplicate copy to the opposing party or parties and substantially comply with the following:
1. Give the name, address, and daytime telephone number of the person who files the request. If the request is made by a group or association, the request must identify one person by name, address, daytime telephone number, and, where possible, fax number, who shall be responsible for receiving all official communications and documents for the group;
  2. Identify the person's personal justiciable interest affected by the application, or District action including a brief, but specific, written statement explaining in plain language the requestor's location and distance relative to the activity that is the subject of the application or District action and how and why the requestor believes he or she will be affected by the activity in a manner not common to members of the general public;
  3. Request a contested case hearing;
  4. If the party requesting a contested case hearing desires for the hearing to be referred to and conducted by the State Office of Administrative Hearings, then the hearing request must include a statement "I/we request that the State Office of Administrative Hearings conduct the contested case hearing."; [Please note that a party requesting a contested case hearing before SOAH shall pay all costs associated with the contract for a SOAH hearing in accordance with Rule 14.15] and,
  5. If applicable, provide any other information specified in the public notice of application.
- D. Deadline for hearing requests. A contested case hearing request by an affected person (as determined in F. below) must be filed with the District within 20 days after the last publication of the notice of application.
- E. A request for a contested case hearing shall be granted
1. By the General Manager if the request is made by the applicant or the General Manager; or
  2. By the Presiding Officer at a preliminary hearing if the request is made by an affected person (as determined using the standards in F. below) other

than the applicant or the General Manager and the request:

- a. Is based solely on concerns within the jurisdiction and authority of the District;
- b. Is supported by competent showing that the person requesting a hearing is likely to be impacted by the proposed regulated activity;
- c. Complies with all of the requirements of A through D above; and,
- d. Is timely filed with the District.

F. Determination of Affected Person and a Party's Right to participate in a Hearing to be made by the Presiding Officer. At a preliminary hearing conducted before the commencement of an evidentiary hearing, the Presiding Officer shall determine whether any person requesting a contested case hearing has standing to make the request, whether a personal justiciable issue related to an application has been raised, and a party's right to participate in a hearing. The preliminary hearing may be conducted as specified in accordance with Rule 14.5. Any "affected person", as determined under this section, may participate in a hearing.

1. For any application, an affected person is one who has a personal justiciable interest related to a legal right, duty, privilege, power, or economic interest affected by the application that is within the District's regulatory authority. An interest common to members of the general public does not qualify as a personal justiciable interest.
2. Governmental entities, including local governments and public agencies, with authority under state law over issues contemplated by the application may be considered affected persons.
3. Relevant factors shall be considered, including, but not limited to, the following:
  - a. Whether the interest claimed is one protected by the Act or Texas Water Code Chapter 36;
  - b. Distance between the regulated activity and the affected interest;
  - c. Whether a reasonable relationship exists between the interest claimed and the activity regulated;
  - d. Likely impact of the regulated activity on the use of groundwater interests of the person; and
  - e. For governmental entities, their statutory authority over or interest in the issues relevant to the application.
4. An applicant is an affected person.

G. If it is determined at the preliminary hearing that no person who requested a contested case hearing had standing or that no justiciable issues were raised, the board may treat the matter as uncontested as described by Rule 14.10.

**RULE 14.15 HEARINGS CONDUCTED BY STATE OFFICE OF ADMINISTRATIVE HEARINGS**

- A. If requested by an applicant or other party to a contested case, the District shall contract with the State Office of Administrative Hearings to conduct a contested case hearing. A person opposing an application who requests a hearing under Rule 14.14C must include in a timely hearing request the statement “I/we request that the State Office of Administrative Hearings conduct the hearing” in order for the hearing to be referred to and conducted by the State Office of Administrative Hearings.
- B. An applicant desiring that the District refer a contested case to the State Office of Administrative Hearings must make a written request for the State Office of Administrative Hearings referral at the time the applicant requests a contested case or, when a contested case has been requested by a person other than an applicant and the applicant desires for the District to contract with SOAH to conduct the contested case, the applicant must request a SOAH hearing no later than 5 business days after the determination that the District will grant a hearing under rule 14.14E.2.
- C. A party requesting a hearing before the State Office of Administrative Hearings shall pay all costs as provided in Rule 9.13. The cost of the SOAH hearing may be apportioned if multiple parties request a SOAH hearing.
- D. If the District contracts with the State Office of Administrative Hearings to conduct a hearing, the hearing shall be conducted as provided by Subchapters C, D, and F, Chapter 2001, Government Code.
- E. An administrative law judge who conducts a contested case hearing shall consider applicable district rules or policies in conducting the hearing, but the district deciding the case may not supervise the administrative law judge. The District shall provide the SOAH administrative law judge with a written statement of applicable rules and policies. The district may not attempt to influence the findings of fact or the administrative law judge’s application of the law in a contested case except by proper evidence and legal argument.

**RULE 14.16 DISCOVERY**

The presiding officer may issue subpoenas, require deposition and order other discovery consistent with the authority granted to a state agency under Subchapters C, D, and F, Chapter 2001, Texas Government Code.

**RULE 14.17. NOTICE AND HEARING IN AN APPEAL OF DESIRED FUTURE CONDITIONS; JUDICIAL APPEAL OF DESIRED FUTURE CONDITIONS.**

- A. An affected person may file a petition with the District requiring that the District contract with the SOAH to conduct a hearing appealing the reasonableness of the desired future condition. The petition must be filed not later than the 120<sup>th</sup> day after the date on which the District adopts a desired future condition under Water Code Section 36.108(d-4). The petition must provide evidence that the District did not establish a reasonable desired future condition of the groundwater resources in the management area.
- B. In this Rule, “affected person” means:
1. An owner of land in Ground Water Management Area 14;
  2. A groundwater conservation district or subsidence district in or adjacent to Ground Water Management Area 14;
  3. A regional water planning group with a water management strategy in Ground Water Management Area 14;
  4. A person who holds or is applying for a permit from a district in Ground Water Management Area 14;
  5. A person with a legally defined interest in groundwater in Ground Water Management Area 14; or
  6. Any other person defined as affected by Texas Commission on Environmental Quality rule.
- C. Not later than the 10<sup>th</sup> day after receiving a petition, the District shall submit a copy of the petition to the Texas Water Development Board. The Texas Water Development Board shall conduct an administrative review and study required by Water Code section 36.1083(e), which must be completed and delivered to SOAH not later than 120 days after the date the Texas Water Development Board receives the petition. SOAH shall consider the study described and the desired future conditions explanatory report submitted to the development board under Water Code section 36.108(dd)(3) to be part of the administrative record in the SOAH hearing; and the Texas Water Development Board shall make available relevant staff as expert witnesses if requested by SOAH or a party to the hearing.
- D. Not later than 60 days after receiving a petition appealing the reasonableness of the desired future conditions filed under Water Code section 36.1083(b), the District will submit to SOAH a copy of the petition and contract with SOAH to conduct a contested case hearing.

- E. The petitioner shall pay the costs associated with the contract with SOAH and shall deposit with the District an amount determined by the District, after consultation with SOAH, that is sufficient to pay the contract amount. The deposit must be received within 15 days of written notification by the District to the petitioner specifying the amount of the deposit. Failure to timely pay the deposit may result in dismissal of the petition. After the hearing is completed and all costs paid to SOAH, the district shall refund any excess money to the petitioner.
- F. Unless provided by SOAH, the District shall provide notice of a hearing appealing the reasonableness of the desired future conditions. Not later than the 10th day before the date of a hearing the general manager or board shall provide notice as follows (unless notice provide by SOAH):
1. General Notice:
    - a. Post notice in a place readily accessible to the public at the District office;
    - b. Provide notice to the county clerk of each county in the District; and
  2. Individual notice by regular mail, facsimile, or electronic mail to:
    - a. The petitioner;
    - b. Any person who has requested notice;
    - c. Each nonparty district and regional water planning group located in Groundwater Management Area 14;
    - d. The Texas Water Development Board; and
    - e. The Texas Commission on Environmental Quality.
- G. After the hearing and within 60 days of receipt of the administrative law judge's findings of fact and conclusions of law in a proposal for decision, including a dismissal of a petition, the District shall issue a final order stating the District's decision on the contested matter and the District's findings of fact and conclusions of law. The District may change a finding of fact or conclusion of law made by the administrative law judge, or may vacate or modify an order issued by the administrative law judge, as provided by Section 2001.058(e), Government Code.
- H. If the District vacates or modifies the proposal for decision, the District shall issue a report describing in detail the District's reasons for disagreement with the administrative law judge's findings of fact and conclusions of law. The report shall provide the policy, scientific, and technical justifications for the District's decision.
- I. If the District in its final order finds that a desired future condition is unreasonable, not later than the 60<sup>th</sup> day after the date of the final order, the District shall reconvene in a joint planning meeting with the other districts in Groundwater Management Area 14 for the purpose of revising the desired future condition. The District and other districts in Groundwater Management Area 14 shall follow the procedures in Section 36.108 to adopt new desired future conditions applicable to

the District.

- J. A final order by the District finding that desired future condition is unreasonable does not invalidate the adoption of a desired future condition by a district that did not participate as a party in the hearing conducted under this Rule.
  
- L. A final District order issued under this Rule may be appealed to a district court with jurisdiction over any part of the territory of the District. An appeal under this subsection must be filed with the district court not later than the 45<sup>th</sup> day after the date the District issues the final order. The case shall be decided under the substantial evidence standard of review as provided by Section 2001.174, Government Code. If the court finds that a desired future condition is unreasonable, the court shall strike the desired future condition and order the districts in the Groundwater Management Area 14 to reconvene not later than the 60<sup>th</sup> day after the date of the court order in a joint planning meeting for the purpose of revising the desired future condition. The District and other districts in the management area shall follow the procedures in Water Code Section 36.108 to adopt new desired future conditions applicable to the District. A court's finding under this Rule does not apply to a desired future condition that is not a matter before the court.

## **SECTION 15. INVESTIGATIONS AND ENFORCEMENT**

### **RULE 15.1 NOTICE AND ACCESS TO PROPERTY**

Pursuant to Texas Water Code Section 36.123, any authorized officer, agent, employee, or representative of the District, when carrying out technical and other investigations necessary to the implementation of the Rules or the Act, and after reasonable notice to the owner or operator, may enter upon private property for the purpose of inspecting and investigating conditions relating to the withdrawal, waste, water quality, pollution, or contamination of groundwater or other acts covered by the these Rules or Texas Water Code.

Prior to entering upon property for the purpose of conducting an investigation, the person seeking access must give notice in writing or in person or by telephone to the owner, lessee, or operator, agent, or employee of the well owner or lessee, as determined by information contained in the application or other information on file with the District. Notice is not required if prior permission is granted to enter without notice.

Inhibiting or prohibiting access to any Board Member or District agents or employees who are attempting to conduct an investigation under the District Rules constitutes a violation and subjects the person who is inhibiting or prohibiting access, as well as any other person who authorizes or allows such action, to the penalties set forth in the Texas Water Code Chapter 36.102.

### **RULE 15.2 SHOW CAUSE ORDERS AND COMPLAINTS**

The Board, either on its own motion or upon receipt of sufficient written protest or complaint, may

at any time, after due notice to all interested parties, cite any person owning or operating a well within the District, or any person in the District violating the Act, these Rules, or an Order of the Board. Under the citation, that person is ordered to appear before the Board in a public hearing and require him to show cause why an enforcement action should not be initiated or why his operating authority or permit should not be suspended, cancelled, or otherwise restricted and limited, for failure to abide by the terms and provisions of the permit, these Rules, or the Act. The Board or General Manager may conduct a show cause hearing under the Rules applicable to a contested application.

### **RULE 15.3 CONDUCT OF INVESTIGATION**

When investigations or inspections require entrance upon private property, such investigations and such inspections shall be conducted at reasonable times, and shall be consistent with all applicable rules and regulations concerning safety, internal security, and fire protection. The persons conducting such investigations shall identify themselves and present District identification upon request by the owner, operator, lessee, management in-residence, or person in charge.

### **RULE 15.4 REQUEST FOR INJUNCTIVE RELIEF AND ASSESSMENT OF PENALTIES**

If it appears that a person has violated, is violating, or is threatening to violate any provision of the Act or any Rule, regulation, permit, Board order, or other order of the District, the Board may institute and conduct a suit in the name of the District for injunctive relief, for recovery of a civil penalty, or for both injunctive relief and penalty.

### **RULE 15.5 SEALING OF WELLS**

Following due-process, the District may, upon orders from the judge of the courts, seal wells that are prohibited from withdrawing groundwater within the District by the District Rules to ensure that a well is not operated in violation of the District Rules. A well may be sealed when: (1) no application has been made for a permit to drill a new water well which is not excluded or exempted; or (2) no application has been made for an operating permit to withdraw groundwater from an existing well that is not excluded or exempted from the requirement that a permit be obtained in order to lawfully withdraw groundwater; or (3) the Board has denied, canceled, or revoked a drilling permit or an operating permit.

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

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

**RULE 15.6 CIVIL PENALTIES**

- A. If a person violates any District Rule or Order, the District may assess a civil penalty against that person as provided by this section.
- B. Any person who violates any District Rule is subject to a civil penalty of not less than \$50.00 or more than \$10,000 for each act of violation, as a court of competent jurisdiction may deem proper
- C. Nothing in this Rule shall be construed as a waiver of the District’s right to seek other remedies as allowed by law, including, but not limited to the following:
  - 1. Injunctive relief to prevent specific conduct that violates these Rules of to require specific conduct that is necessary for compliance with these Rules;
  - 2. Mandatory injunctive relief; and
  - 3. Any other appropriate remedy or penalty as provided by law.
- D. All civil penalties recovered by the District shall be paid to the Bluebonnet Groundwater Conservation District.
- E. The District may enforce this section by filing a complaint in the appropriate court of jurisdiction in the county where the District Offices are located.
- F. If the District prevails in any suit to enforce its Rules, the District may seek and the court shall grant, in the same action, recovery for attorney’s fees, costs for expert witnesses, and other costs incurred by the District before the court in accordance with Section 36.066 Texas Water Code.

**RULE 15.7 FAILURE TO REPORT PUMPAGE AND/OR TRANSPORTED VOLUMES**

The accurate reporting and timely submission of pumpage and/or transported volumes is necessary for the proper management of water resources. Failure of the permittee to submit complete, accurate, and timely pumpage, transport and water quality reports as required by District Rule may result in late payment fees, forfeiture of the permit, or payment of increased meter reading and inspection fees as a result of District inspections to obtain current and accurate pumpage and/or transported volumes and water quality reports.

**RULE 15.8 LATE PAYMENT FEES FOR FAILURE TO PAY WATER USE FEES**

Failure to make complete and timely payments of a fee within 30 days of the invoice date for the fee shall automatically result in a late payment fee of 1.5% (18% per annum) monthly service charge until paid in full. The fee payment plus the late payment fee must be made within thirty (30) days following the date the payment is due, otherwise the permit may be declared void by the Board.



**RULE 15.9 EMERGENCY ORDERS**

The District will develop Emergency Contingency Plans to deal with water quality or water quantity emergencies. Public hearings on Emergency Contingency Plans shall be conducted by the Board prior to adoption. To implement Emergency Contingency Plans, the Board, or the General Manager if specifically authorized by an Emergency Contingency Plan, may adopt emergency orders of either a mandatory or prohibitory nature, requiring remedial action by a permittee or other party responsible for the emergency condition.

**SECTION 16. RULEMAKING**

**RULE 16.1 POLICY**

Rulemaking hearings shall be conducted in the manner the Board deems most suitable to obtain all relevant information and testimony on proposed rules as conveniently, inexpensively, and expeditiously as possible without prejudicing the rights of any person.

**RULE 16.2 NOTICE**

- A. Not later than the 20th day before the date of a rulemaking hearing, the general manager or Board shall:
  - 1. Post notice in a place readily accessible to the public at the District office;
  - 2. Provide notice to the county clerk of each county in the District;
  - 3. Publish notice in one or more newspapers of general circulation in the county or counties in which the District is located;
  - 4. Provide notice by mail, facsimile, or electronic mail to any person who has requested notice under Subsection G; and
  - 5. Make available a copy of all proposed rules at a place accessible to the public during normal business hours and, if the District has a website, post an electronic copy on a generally accessible Internet site.
  
- B. The notice provided must include:
  - 1. The time, date, and location of the rulemaking hearing;
  - 2. A brief explanation of the subject of the rulemaking hearing; and
  - 3. A location or Internet site at which a copy of the proposed rules may be reviewed or copied.

**RULE 16.3 CONDUCT OF RULEMAKING PROCEEDING**

- A. The presiding officer shall conduct a rulemaking hearing in the manner the presiding officer determines to be most appropriate to obtain information and comments relating to the proposed rule as conveniently and expeditiously as possible. Comments may be submitted orally at the hearing or in writing within any deadline established by the District. The presiding officer may hold the record open for a specified period after the conclusion of the hearing to receive additional written comments.
- B. The District requires each person who participates in a rulemaking hearing to submit a hearing registration form stating:
  - 1. The person's name;
  - 2. The person's address; and
  - 3. Whom the person represents, if the person is not at the hearing in the person's individual capacity.
- C. The presiding officer shall prepare and keep a record of each rulemaking hearing in the form of an audio or video recording or a court reporter transcription.
- D. A person may submit to the District a written request for notice of a rulemaking hearing. A request is effective for the remainder of the calendar year in which the request is received by the District. To receive notice of a rulemaking hearing in a later year, a person must submit a new request. An affidavit of an officer or employee of the District establishing attempted service by first class mail, facsimile, or e-mail to the person in accordance with the information provided by the person is proof that notice was provided by the District.
- E. The District may use an informal conference or consultation to obtain the opinions and advice of interested persons about contemplated rules and may appoint advisory committees of experts, interested persons, or public representatives to advise the District about contemplated rules.
- F. Failure to provide notice under Subsection A.4 does not invalidate an action taken by the District at a rulemaking hearing.
- G. A person who participates in a rulemaking hearing and who is affected by the rule adopted by the Board may administratively appeal a rulemaking decision of the Board by requesting a rehearing before the Board not later than the 20<sup>th</sup> day after the date of the Board's decision. A request for rehearing must be written, filed in the District office, and must state the grounds for the request. If the Board grants a request for rehearing, the Board shall schedule the rehearing not later than the 45<sup>th</sup>

day after the date the request is granted. The failure of the Board to grant or deny a request for rehearing before the 91<sup>st</sup> day after the date the request is submitted is a denial of the request.

A decision by the Board on a rulemaking is final:

1. If a request for rehearing is not filed on time, on the expiration of the period for filing a request for rehearing, or
2. If a request for rehearing is filed on time, on the date:
  - a. The Board denies the request for rehearing, or
  - b. The Board renders a written decision after rehearing.

Except as provided below, a person who participates in a rulemaking hearing and who is affected by the rule adopted by the Board may file a suit against the District under Section 36.251, Texas Water Code, to appeal a rulemaking decision not later than the 60<sup>th</sup> day after the date on which the decision becomes final.

A person who participates in a rulemaking hearing and who is affected by the rule adopted by the Board may not file suit against the District under Section 36.251, Texas Water Code, if a request for rehearing was not filed on time.

#### **RULE 16.4 EMERGENCY RULES**

- A. The Board may adopt an emergency rule without prior notice or hearing, or with an abbreviated notice and hearing, if the Board:
  1. Finds that a substantial likelihood of imminent peril to the public health, safety, or welfare, or a requirement of state or federal law, requires adoption of a rule on less than 20 days' notice; and
  2. Prepares a written statement of the reasons for its finding under Subdivision (1).
- B. Except as provided by Subsection C, a rule adopted under this section may not be effective for longer than 90 days.
- C. If notice of a hearing on the final rule is given not later than the 90th day after the date the rule is adopted, the rule is effective for an additional 90 days.
- D. A rule adopted under this section must be adopted at a meeting held as provided by Chapter 551, Government Code.

#### **RULE 16.5 PETITION FOR ADOPTION OR MODIFICATION OF RULES.**

- A. A person with a real property interest in groundwater located within the District may petition the District to request the adoption or modification of a rule.
- B. Petitions shall be submitted in writing to the General Manager, and shall comply with the following requirements:
  - 1. each rule requested must be submitted by separate petition;
  - 2. each petition must be signed and state the name and address of the petitioner(s) and identify with a brief written description and drawing the petitioner's real property interest in groundwater within the District;
  - 3. each petition shall include:
    - a. a brief explanation of the proposed rule;
    - b. the text of the proposed rule prepared in a manner to indicate the words to be added or deleted from the text of the current rule, if any;
    - c. a statement of the statutory or other authority under which the proposed rule is to be promulgated; and
    - d. an allegation of injury or inequity that could result from the failure to adopt the proposed rule.
- C. Except for good cause show, petitions must be and will only be considered when submitted between February 1 and March 31. The District may consider petitions filed outside this period if the petitioner demonstrates in writing to the satisfaction of the General Manager good cause for such filing. Good cause may include a demonstrated economic, technological, legal, or other type of hardship.
- D. The General Manager may reject a petition for failure to comply with the requirements of subsection (B) and (C) of this section.
- E. Not later the 90<sup>th</sup> day after the date the District receives the petition that complies with this section, the Board shall either deny the petition and provide an explanation for the denial in the minutes of the Board meeting or in a letter, or engage in rulemaking consistent with the granted petition as provided by Section 36.101 of the Water Code.
- F. There is no private cause of action for a decision to accept or deny a petition.

## **SECTION 17. AQUIFER STORAGE AND RECOVERY PROJECTS**

### **17.1. DEFINITIONS**

In this Rule, “aquifer storage and recovery project,” “ASR injection well,” “ASR recovery well,” and “project operator” have the meanings assigned by Water Code Section 27.151.

### **17.2. REGISTRATION AND REPORTING OF WELLS**

- A. A project operator shall:
  - 1. Register the ASR injection wells and ASR recovery wells associated with the aquifer storage and recovery project with the District;
  - 2. Each calendar month by the deadline established by the Texas Commission on Environmental Quality (TCEQ) for reporting to the TCEQ, provide the District with a copy of the written or electronic report required to be provided to the TCEQ under Water Code Section 27.155; and
  - 3. Annually by the deadline established by the TCEQ for reporting to the TCEQ, provide the District with a copy of the written or electronic report required to be provided to the TCEQ under Section 27.156.
- B. If an aquifer storage and recovery project recovers an amount of groundwater that exceeds the volume authorized by the TCEQ to be recovered under the project, the project operator shall report to the District the volume of groundwater recovered that exceeds the volume authorized to be recovered in addition to providing the report required by Subsection A.2.

### **17.3. PERMITTING, SPACING, AND PRODUCTION REQUIREMENTS**

- A. Except as provided by Subsection B, the District may not require a permit for the drilling, equipping, operation, or completion of an ASR injection well or an ASR recovery well that is authorized by the TCEQ.
- B. The ASR recovery wells that are associated with an aquifer storage and recovery project are subject to the permitting, spacing, and production requirements of the District if the amount of groundwater recovered from the wells exceeds the volume authorized by the TCEQ to be recovered under the project. A project operator must submit an operating permit application with the District in accordance with Rule 8.5 within 60 days of the time that the amount of groundwater recovered from the wells exceeds the volume authorized by the TCEQ to be recovered under the project. The requirements of the District apply only to the portion of the volume of groundwater recovered from the ASR recovery wells that exceeds the volume authorized by the TCEQ to be recovered.

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

**17.4. FEES AND SURCHARGES**

- A. The District may not assess a production fee or a transportation or export fee or surcharge for groundwater recovered from an ASR recovery well, except to the extent that the amount of groundwater recovered under the aquifer storage and recovery project exceeds the volume authorized by the commission to be recovered.
- B. The District may assess a well registration fee or other administrative fee for an ASR recovery well in the same manner that the District assesses such a fee for other wells registered with the District.

**17.5. CONSIDERATION OF DESIRED FUTURE CONDITIONS**

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

## **Appendix E**

# **Documentation Associated with Updated Guidelines for Preparation of Hydrogeologic Reports in Support of Applications for the Permitted Use of Groundwater**

*Final Report*

**Documentation Associated with Updated Guidelines for Preparation of  
Hydrogeologic Reports in Support of Applications for the Permitted  
Use of Groundwater**



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## **Appendices**

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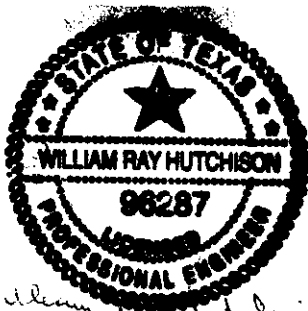
B – Proposed Updated Rule 8.5(F)

C – Example Phase I-a Report for Terra Verde Permit Applications

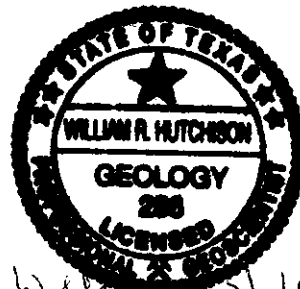
## Professional Engineer and Professional Geoscientist Seals

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*William R. Hutchison*  
4/14/2023



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4/14/2023

## **1.0 Introduction**

### **1.1 Background and Objectives**

Currently, under Rule 8.5(F), the Bluebonnet Groundwater Conservation District (BGCD) requires the submittal of Phase I and Phase II hydrogeologic report for non-exempt wells with an inside diameter of eight (8) inches or greater as part of the permit application process. These reports include hydrogeologic information addressing, and specifically related to, the impacts of the proposed well (e.g. area of influence, drawdown, recovery, and subsidence).

Phase I reports are intended to use existing information and data, including groundwater model results, to quantitatively estimate impacts of the proposed production. Phase II reports are intended to be a final report that relies on site-specific data, information, test results and analyses.

Rule 8.5(F) and the current document “Guidelines for Preparation of Hydrogeologic Reports for Submission in Support of Applications for the Permitted Use of Groundwater” dated October 15, 2014 are proposed to be updated.

These updates are proposed to streamline the process for submission and review of permit applications for wells with diameters of eight inches or greater with production requests equal to or less than 200 million gallons per year. The streamlined process will likely reduce costs to both permit applicants and BGCD.

As developed below, production requests for 200 million gallons per year or below will require a Phase I-a report. The proposed Phase I-a report would rely on analytical calculations as developed in this report. For production requests for over 200 million gallons per year, a Phase I-b report will be required. The proposed Phase I-b report would include a groundwater model simulation in addition to the same analytical calculations in a Phase I-a report. Phase II reports are still required, and scope and content are independent of the production request.

It is proposed that BGCD complete Phase I-a or Phase I-b reports in accordance with a proposed updated guideline document. Permit applicants have the option to submit a completed Phase I-a or Phase I-b report with a permit application that meets all the requirements of BGCD. Under the proposed guidelines document, Phase II reports would continue to be completed by the applicant after well construction and testing.

### **1.2 Use of HAGM Data and Results**

As part of the development of these recommended changes to Rule 8.5(F) and the associated guideline document, a review of available data on the Gulf Coast Aquifer was completed to document the differences within and between the aquifer units (Chicot, Evangeline, Burkeville, and Jasper). This review relied on the current Groundwater Availability Model (GAM) of the area (also known as the Houston Area Groundwater Model, or HAGM) which is documented in Kasmarek (2013). Kasmarek (2013) represented an update to Kasmarek and Robinson (2004), the initial GAM of the region.

The HAGM is the best source of comprehensive and integrated hydrogeologic data for the Gulf Coast Aquifer in the area. Analyses contained in this report that rely on the HAGM input data and results should not be interpreted to mean that the data and information are necessarily considered accurate and reliable. This is inherently recognized in the BGCD permitting process by requiring the Phase II analyses to be based on actual site-specific drilling data and test data from the permitted well.

The analyses that rely on the HAGM for Phase I submittals are simply utilizing the “best” currently available comprehensive and integrated hydrogeologic data and information to provide quantitative information and estimates of potential impacts of the proposed production. One of the objectives of this report is to process and organize that information and data so that it can be leveraged to advance BGCD management objectives, including streamlining the permitting process.

The HAGM is recognized as an imperfect tool, and it is recognized that improvements are needed. The recently released GULF model (Ellis and others, 2023) is currently in review by the Texas Water Development Board (TWDB) and other stakeholders in the region represents an update to the HAGM. If the GULF model (or a modification to the GULF model as a result of the TWDB and stakeholder review) is approved by the Texas Water Development Board as the updated GAM for the region, the new information and data from that updated model can be used to update the information and data in this report. This potential future update would also be considered advancing BGCD management objectives by using the most updated and data and model results that would be considered more reliable.

## 2.0 Extraction of HAGM Simulation Results and Parameters

As described in Hutchison (2021), the Groundwater Conservation Districts in Groundwater Management Area 14 (GMA 14) reviewed a series of balancing and multi-metric simulations with the updated Northern Gulf Coast Groundwater Availability Model (also known as the Houston Area Groundwater Model, or HAGM) as part of the third round of Joint Planning.

In summary, the review of these simulations and the consideration of nine statutory factors by GMA 14 resulted in the adoption of desired future conditions by the districts in GMA 14. Hutchison (2021) completed additional analyses with the model results as part in support of BGCD adopting the DFCs relevant to BGCD. The HAGM simulation that was used in the development of the desired future condition and modeled available groundwater was used for this effort.

### 2.1 Simulation Results

Simulations with the HAGM for the joint planning process used the calibration period (1891 to 2009) and added the years 2010 to 2080 to represent the prediction period. Hutchison (2021) used the 2009 groundwater elevations as the baseline for drawdown calculations. Drawdowns in 2080 are the groundwater elevation in 2009 minus the groundwater elevation in 2080 (Hutchison, 2021).

Cell by cell simulation results relevant to this effort are groundwater elevations, pumping, and subsidence in 2009 and 2080. Relevant files and file date are as follows:

- *HAGM\_BT\_base\_2080.hds* (file dated 4/26/2021)
- *HAGM\_BT\_base\_2080.cbb* (file dated 4/26/2021)
- *HAGM\_BT\_base\_subsidence\_2080.hds* (file dated 4/26/2021)

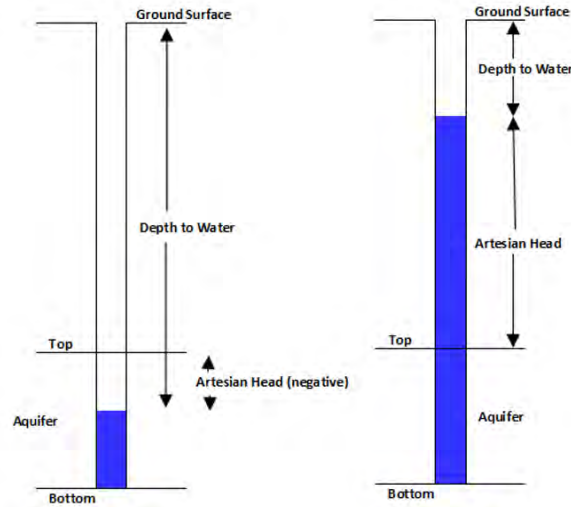
As noted in Hutchison (2021), the input files for the joint planning simulation that formed the basis for the adopted desired future condition were obtained from the GMA 14 consultant. The output control file was modified from the obtained version by specifying that cell-by-cell output for all stress periods in the predictive period (2010 to 2080) were output. The output files listed above were, therefore, based on the running the model with the updated output control file specifications.

These results were extracted from the output files of the joint planning simulation with the FORTRAN program *hedpumpsub.exe*. The program read the groundwater elevation, cell by cell flows, and subsidence files listed above and wrote a single output file named *hedpumpsub.dat*. This output file included each cell in the model (designated by layer, row, column) and the groundwater elevation, pumping and subsidence in each cell in 2009 and 2080.

### 2.2 GAM Parameters

The FORTRAN program *HAGMparam.exe* was written to read various HAGM input files and process the data for this effort. In summary, the program:

- Reads the HAGM grid file which, among other things, designates geographic attributes of each cell. Attributes used for this effort were county code, x- and y-coordinates of the cell center, groundwater management area, flag that signifies if the model cell is active or inactive, and a flag that signifies if the cell is inside or outside the official aquifer boundary (as defined by TWDB).
- Reads the subsidence input file (*hagm.2012.sub*) to obtain cell by cell parameters related to subsidence (pre-consolidation head, elastic storage, inelastic storage).
- Reads the aquifer parameter file (*hagm.2012.bcf*) to obtain storativity, transmissivity, and leakage parameters. The layer-specific multiplier in layer 4 storativity and transmissivity in were used to make the appropriate adjustments.
- Reads the file with designations of active and inactive cells (*hagm.2012.bas*).
- Reads the file with specifications of cell top and bottom elevations (*hagm.2012.dis*).
- Cell thickness was calculated based on top and bottom elevation specifications.
- Cell hydraulic conductivity was calculated as the transmissivity divided by the cell thickness.
- Surface elevation and outcrop layer number for each cell in the 2-D grid of cells was calculated based on the top elevation of the cell in the outcrop.
- Clay thickness data for each cell were read from data files developed by the USGS as part of HAGM development (Kasmarek, 2013):
  - *1chclaythk.csv* (Layer 1, Chicot Aquifer)
  - *2evclaythk.csv* (Layer 2, Evangeline Aquifer)
  - *3bvclaythk.csv* (Layer 3, Burkeville Confining Unit)
  - *4jaclaythk.csv* (Layer 4, Jasper Aquifer)
- Reads the groundwater elevation, pumping, and subsidence output for 2009 and 2080 described above (*hedpumpsub.dat*).
- Based on aquifer parameters in the HAGM, calculates the drawdown from a 36-hour pumping test in a hypothetical pumping well (100 gpm) at the well site and ½ mile away, and the drawdown after one year of pumping ½ mile away (100 gpm). These calculations are based on the Theis equation and are limited to cells with transmissivity greater than 100 gpd/ft and storativity less than 1E-03 (confined aquifers). If the cell parameters do not fit these specifications, a value of -9999 is written. Limitations of the Theis equation prevents reliable results in unconfined aquifers, especially away from the production well.
- For more general application, and because the drawdown calculated by the Theis equation is linear with respect to pumping rate, a drawdown-pumping ratio for the three cases is also included that can be used to calculate the drawdown under any hypothetical pumping rate. To obtain a calculated drawdown, the drawdown-pumping ratio is multiplied by the pumping rate of interest.
- Calculate the artesian head (height of water above the top of the aquifer) based on the 2009 groundwater elevation. If the artesian head is negative, this means that the groundwater elevation is below the top of the aquifer (unconfined condition). Figure 1 illustrates the depth to water and artesian head concepts. This calculation is useful when considering “available drawdown” as articulated in the desired future statement adopted by GMA 14.
- Writes four output files with parameters as presented in Table 1.



**Figure 1. Well Diagram Illustrating the Concept of Artesian Head**

**Table 1. Summary of HAGMparam.exe Output Files**

Output File Column	Common to All Output Files			
1	County Name			
2	County Code			
3	Outcrop Layer			
4	Layer			
5	Row			
6	Column			
	<i>gridparam.dat</i>	<i>HAGMparam.dat</i>	<i>HAGMresults.dat</i>	<i>theisparam.dat</i>
7	x-coordinate (GAM-ft)	Hydraulic Conductivity (ft/day)	Groundwater Elevation in 2009 (ft MSL)	Drawdown in Production Well at 100 gpm for 36 hours
8	y-coordinate (GAM-ft)	Transmissivity (gpd/ft)	Groundwater Elevation in 2080 (ft MSL)	Drawdown 1/2 mile from Production Well at 100 gpm for 36 hours
9	Surface Elevation (ft MSL)	Leakage (1/day)	DFC Drawdown (ft)	Drawdown 1/2 miles from Production Well at 100 gpm for 1 year
10	Cell Top Elevation (ft MSL)	Storativity (dimensionless)	Artesian Head (ft)	Drawdown-Pumping Ratio for Production Well for 36 hours
11	Cell Bottom Elevation (ft MSL)	Elastic Storativity (dimensionless)	Subsidence in 2009 (ft)	Drawdown-Pumping Ratio for 1/2 mile from Production Well for 36 hours
12	Cell Thickness (ft)	Inelastic Storativity (dimensionless)	Subsidence in 2080 (ft)	Drawdown-Pumping Ratio for 1/2 mile from Production Well for 1 yr
13	Clay Thickness (ft)		Subsidence from 2009 to 2080 (ft)	
14	Clay Thickness (% of Cell Thickness)		Cell Pumping in 2009 (AF/yr)	
15			Cell Pumping in 2080 (AF/yr)	



The four output files were imported into an Excel spreadsheet names *BGCD Parameters.xlsx*. The individual county data are in tabs organized by the output files of *HAGMparam.exe* (Table 1) named:

- *gridparam*
- *HAGMparam*
- *HAGMresults*
- *theisparam*

Please note that due to the limitations of the Theis equation noted above, the only wells listed in the *Theis Param* tab are in the Evangeline Aquifer (HAGM layer 2) and the Jasper Aquifer (HAGM layer 4).

## 3.0 Evaluation of Threshold Production

### 3.1 Background and Objective

Based on the current BGCD Rules and guideline document, all non-exempt wells with a casing diameter of 8 inches or greater require a Phase I report, including a HAGM simulation to compare the results of the DFC simulation with the DFC simulation plus proposed pumping. Since the guideline document was updated (October 15, 2014), many of the simulation results show that the predicted drawdown is relatively small due to the production rate (i.e. low production results in minimal drawdown). In addition, the subsidence estimates attributable to the proposed wells were considered negligible and within the error of the HAGM.

As part of this update, permit applications for wells with a casing diameter of greater than eight inches with a “relatively low” production rate (i.e. a production rate that will result in minor drawdown) are proposed to be reviewed without the need for a HAGM simulation. Instead, it is proposed that the BGCD staff review of the application with “relatively low” production rates will rely on aquifer parameter data from the HAGM, and an estimate of drawdown after 36 hours of pumping and one year of pumping using the Theis equation. The review documentation will constitute a Phase I-a report, and will be completed by BGCD.

It is proposed that wells with “relatively high” production rates will still require a HAGM simulation, but with BGCD completing the simulation and completing a Phase I-b report. The proposal also provides an option that the permit applicant can prepare the Phase I-b report (consistent with the updated guidance document) and submit it with the permit application.

This section of the report discusses analyses that were completed with current permitted wells to rationally identify what is a “relatively low” production rate and what is a “relatively high” production rate to incorporate into the guideline document and/or BGCD Rules.

### 3.2 BGCD Permitted Wells

On March 17, 2023, Zach Holland emailed a spreadsheet containing various data associated with the 411 permitted wells that were obtained from the BGCD HYDROS database as of that date. The pertinent information for these analyses are the well identification, well depth, latitude, longitude, and annual production limit in gallons. The original transmitted file is named *well\_report\_17\_03\_2023.csv*.

This file was modified and saved as *WellPermitLimits.xlsx* to include the pertinent information listed above, and added:

- Production limits in millions of gallons per year
- Production limits in acre-feet per year
- Average pumping rate in gpm (assuming constant operation 24 hours a day, 365 days of the year)
- Three times the average pumping rate in gpm (assumed operation 1/3 of the time during the year) to hypothetically simulate actual production rate of the well.

The data were filtered to only include wells with depth information and latitude/longitude location data. One additional well was eliminated because it had a permit limit of zero gallons. The latitude and longitude data were used to converted to x- and y-coordinates using Surfer, a commercial gridding program. The resulting file (with 311 records) was saved as *FilteredWellPermitLimits.xlsx* and *FilteredWellPermitLimits.csv*.

The file *FilteredWellPermitLimits.csv* was used as input to a FORTRAN program (*PermWellLRC.exe*) that identified the HAGM cell for each permitted well (layer, row, column). Output from this program is named *permwellLRC.dat*. The layer, row, and column data results were imported into *FilteredWellPermitLimits.xlsx*, and wells that fell outside the grid were eliminated. These remaining 235 wells were saved in the file *PermittedWellsLRCAAll.xlsx*.

Due to the limitations of the Theis equation noted above, these results were filtered to only include wells identified as layer 2 or layer 4 wells (Evangeline and Jasper aquifers). The file *PermittedWellsLRCEvanJas.xlsx* and includes data for 191 wells. The file was also saved as *PermittedWellsLRCEvanJas.csv* for further use as described below.

The processing described above resulted in usable data associated with about 46 percent of BGCD permitted wells. These data can be used to characterize differences in permit limits and well production rates and evaluate a rational threshold permit limit value to define “relatively low” and “relatively high” permitting limits.

### **3.3 Calculation of Drawdown using the Theis Equation**

The FORTRAN program named *PermitTheis.exe* was written to calculate drawdown in each of the 191 permitted wells in the Evangeline and Jasper aquifers. The program reads the drawdown-pumping ratios described above (*ptresults.dat*). The program then reads the list of 191 permitted wells in *PermittedWellsLRCEvanJas.csv* and calculates drawdown using the drawdown-pumping ratios of the cell where the well is located as follows:

- Scenario 1: Drawdown in the production well at the end of a 36-hour pumping test. Pumping rate is assumed to be three times the average annual pumping rate.
- Scenario 2: Drawdown in a well ½ mile from the production well at the end of a 36-hour pumping test. Pumping rate is assumed to be three times the average annual pumping rate.
- Scenario 3: Drawdown in a well ½ mile from the production well at the end of one year of pumping at the average annual pumping rate.

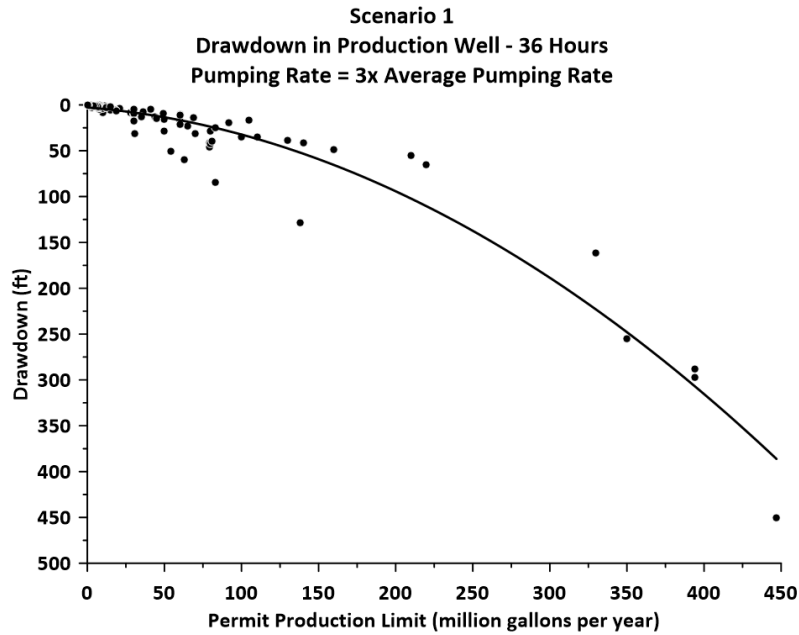
Results were written to a file named *PermitTheisdd.dat* and imported and saved in an Excel spreadsheet named *PermittedWellsTheisDrawdown.xlsx*.

These results were used to plot the permitted limit for each well (in million gallons per year) on the x-axis and the scenario drawdown on the y-axis to provide insight into an appropriate threshold permit limit as follows:

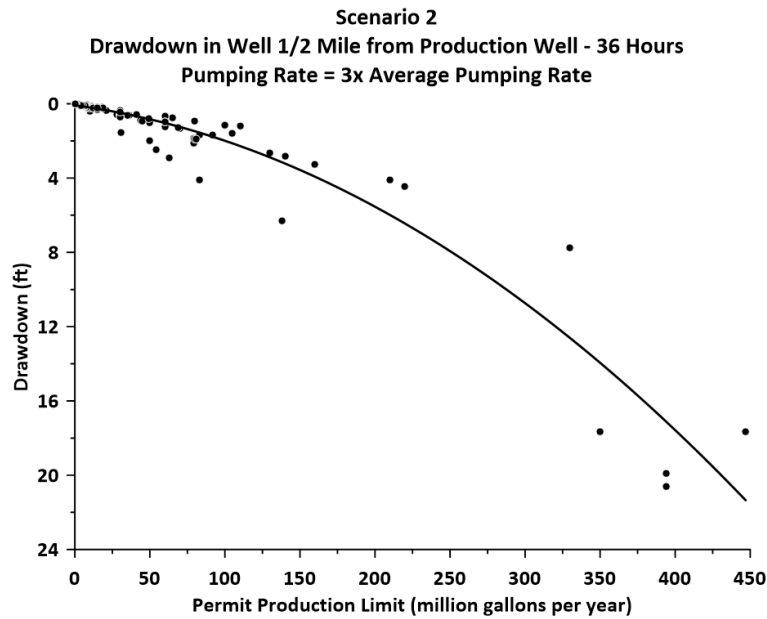
- Figure 2 presents the results of Scenario 1

- Figure 3 presents the results of Scenario 2
- Figure 4 presents the results of Scenario 3

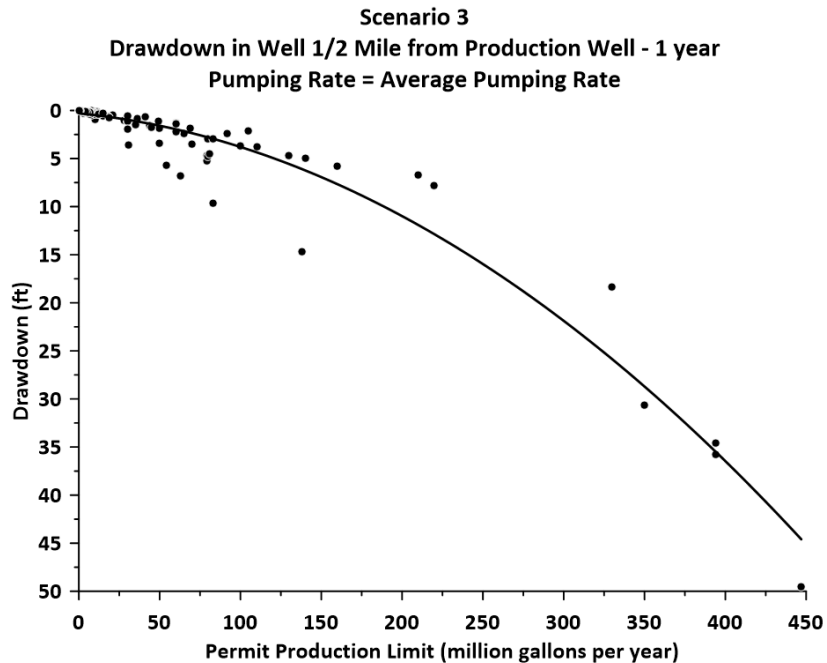
Please note that a best-fit polynomial line is included in each figure. The data in these figures are used to define “relatively low” and “relatively high” permit production limits.



**Figure 2. Drawdown in Production Well - 36 Hours**



**Figure 3. Drawdown in Well 1/2 mile from Production Well - 36 Hours**



**Figure 4. Drawdown in Well 1/2 mile from Production Well – One Year**

### 3.4 Threshold Permit Production Limit

The data in Figures 2, 3, and 4 depict the variation within the Gulf Coast Aquifer when comparing the permit production limit and the drawdown in the production well and in a well ½ mile away. The best-fit polynomial line provides an average condition using all the data. There are two notable breaks in data based on the annual permit production limit: one is between about 175 and 200 million gallons 250 and 325 million gallons.

Based on an evaluation of the historic permits and the drawdowns presented in Figures 2, 3, and 4, the recommended threshold permit production limit that defines “relatively low” and “relatively high” permit production limits is 200 million gallons. At the recommended permit production limit, the following observations can be made:

- At 200 million gallons per year is equivalent to about 614 AF/yr. The average pumping rate (assuming 24-hour/365-day operation) is about 152 gpm. Three times the average pumping rate (the assumed capacity of the well assuming that the well is only operated 1/3 of the time) would be about 456 gpm.
- Drawdown in the production well after 36 hours of pumping at three times the average production rate would be slightly less than 100 feet (Figure 2).
- Drawdown in a well ½ mile from the production well after 36 hours of pumping at three times the average production rate would be about 6 feet (Figure 3).
- Drawdown in a well ½ mile away from the production well after one year of pumping at the average production rate would be about 10 feet.
- Of the 411 permitted wells in BGCD, 31 have annual permit production limits greater than 200 million gallons (about 8 percent).

Based on this threshold, a permit application for a well with a casing diameter of eight inches or greater with a production limit equal to or below 200 million gallons would be considered “relatively low”. As described below, the Theis equation drawdown analyses presented in this report would be applied and the results would constitute the Phase I-a report.

Also as described below, A permit application for a well with a casing diameter of eight inches or greater with a production limit above 200 million gallons would require a Phase I-b report that would include the results of a HAGM simulation in addition to the analytical calculations of a Phase I-a report.

## **4.0 Updated Phase I and Phase II Procedures**

As stated in the current version of the BGCD Rules, Phase I reports are intended to use existing regional information and data, including groundwater model results, to quantitatively estimate impacts of the proposed production. Phase II reports are intended to be a final report that relies on site-specific data, information, test results and analyses.

The Phase I reports provide information, data, and an estimate of impacts of the proposed well for BGCD and nearby landowners. This information represents a baseline that can be supplemented if the permit is contested.

Phase II reports provides information, data, and an updated estimate of impacts of the proposed well based on test data of the completed well. This information can be used to modify permit limits if the data and information warrant a modification.

### **4.1 Proposed Phase I-a Reports**

The Phase I-a report would be developed from the information provided by the applicant, the data in the Excel spreadsheet *BGCD Parameters.xlsx* described above and summarized in Table 1, and calculations of drawdown using the Theis equation to estimate potential impacts of the proposed pumping. No HAGM simulation would be required in a Phase I-a report.

The Phase I-a report would consist of five required elements in the form of tables:

- Grid parameters
- HAGM parameters
- HAGM results
- Theis parameters
- Theis results

This report would be prepared by the District within 30 days of submission of a completed application with all the required elements from Rule 8.5(F)(2). The Phase I-a report is part of an administratively complete permit application.

The permit applicant has the option to submit a completed Phase I-a report with their application. The District would review a submitted Phase I-a report within 30 days of submission.

### **4.2 Proposed Phase I-b Reports**

The Phase I-b report (required for proposed annual production greater than 200 million gallons) would include the five tables required for the Phase I-a report plus a HAGM simulation. The report would include the results of a simulation using the Groundwater Availability Model for the area that adds the proposed well to the then most recent model run that was used to establish the desired future condition.

This report would be prepared by the District within 30 days of submission of a completed application with all the required elements from Rule 8.5(F)(2). The Phase I-b report is part of an administratively complete permit application.

The permit applicant has the option to submit a completed Phase I-b report with their application. The District would review a submitted Phase I-a report within 30 days of submission.

### 4.3 Proposed Phase II Reports

Phase II reports would be required to be submitted by the permit applicant after an approved program of drilling and aquifer testing have been completed. The data obtained from the drilling and aquifer testing shall be used in the analyses of the Phase II report and contains the following elements:

- Completed Well Construction Diagram
- Results of Borehole Drilling and Well Construction
- Results of Aquifer Tests
- Water Quality Data Collected during Aquifer Tests
- Updated Simulation of Pumping

### 4.4 Proposed Update to Guideline Document

A proposed and recommended update to the document “*Guidelines for Preparation of Hydrogeologic Reports in Support of Applications for the Permitted Use of Groundwater*” is presented in Appendix A.

### 4.5 Proposed Update to Rule 8.5(F)

Proposed and recommended updates to Rule 8.5(F) are presented in Appendix B.

### 4.6 Proposed Update to Fee Schedule

The following are the proposed fees associated with the review and/or preparation of Phase I-a and Phase I-b reports.

<b>District Involvement</b>	<b>Phase I-a Report</b>	<b>Phase I-b Report</b>
District Prepares	\$1,500	\$7,500
Applicant Submits/District Reviews	\$500	\$1,500



## **5.0 Examples of Updated Phase I-a Review**

### **5.1 Background**

Two permit applications have been submitted to BGCD by Terra Verde Utility Company LLC. Two wells are proposed, and are designated as BGCD IDs BWLL-0041D and BWLL-0041E. Both wells are proposed for production from the Evangeline Aquifer.

The combined “Estimated Annual Water Production” is 80 million gallons (40 million gallons per well). Thus, the applications are below the recommended 200 million gallons per year threshold. Therefore, these applications were used to illustrate the review process and the results of a Phase I-a analysis of potential drawdown under the proposed and recommended approach.

### **5.2 Well Locations on HAGM Grid**

The latitude and longitude data on the applications were used to convert the location data to x- and y-coordinates in the GAM coordinate system using Surfer, a commercial gridding program. The FORTRAN program *WellLRC.exe* was used to find the HAGM cell for those x- and y-coordinates. The results of this effort yielded that both wells are located in HAGM row 37, column 92. The applications noted that the target aquifer is the Evangeline (HAGM layer 2). Based on the HAGM cell data at this location, the well depths proposed on the application are consistent with this aquifer designation.

### **5.3 Grid Parameters, HAGM Parameters, HAGM Results, Theis Parameters**

The Excel spreadsheet named *BGCD Parameters.xlsx* contains the data needed for the review and Phase I-a calculations. For each tab in *BGCD Parameters.xlsx*, data from layer 2, row 37, column 92 were copied and transposed into the spreadsheet *TerraVerdeParamTables.xlsx*. These results are summarized into four tables as follows:

- Table 2: Grid Parameters
- Table 3: HAGM Parameters
- Table 4: HAGM Results
- Table 5: Theis Parameters

These data represent the best integrated data of the area from a regional perspective. The local-scale data will be developed as part of the Phase II investigation. This will include more site-specific information and data on aquifer depth, clay content, and aquifer parameters calculated from the 36-hour pumping test.

**Table 2. Grid Parameters for Terra Verde Utility Company LLC Wells**

County Name	Waller
County Code	237
Outcrop Layer	1
Layer	2
Row	37
Column	92
x-coordinate (GAM-ft)	6233922
y-coordinate (GAM-ft)	19297190
Surface Elevation (ft MSL)	253
Cell Top Elevation (ft MSL)	108
Cell Bottom Elevation (ft MSL)	-828
Cell Thickness (ft)	936
Clay Thickness (ft)	420
Clay Thickness (% of Cell Thickness)	44.87

**Table 3. HAGM Parameters for Terra Verde Utility Company LLC Wells**

County Name	Waller
County Code	237
Outcrop Layer	1
Layer	2
Row	37
Column	92
Hydraulic Conductivity (ft/day)	2.20
Transmissivity (gpd/ft)	15,403
Leakage (1/day)	7.50E-06
Storativity (dimensionless)	3.60E-04
Elastic Storativity (dimensionless)	8.70E-05
Inelastic Storativity (dimensionless)	8.70E-03

**Table 4. HAGM Results for Terra Verde Utility Company LLC Wells**

County Name	Waller
County Code	237
Outcrop Layer	1
Layer	2
Row	37
Column	92
Groundwater Elevation in 2009 (ft MSL)	155
Groundwater Elevation in 2080 (ft MSL)	100
DFC Drawdown (ft)	55
Artesian Head (ft)	47
Subsidence in 2009 (ft)	0.05
Subsidence in 2080 (ft)	0.72
Subsidence from 2009 to 2080 (ft)	0.67
Cell Pumping in 2009 (AF/yr)	50.69
Cell Pumping in 2080 (AF/yr)	38.63

**Table 5. This Parameters for Terra Verde Utility Company LLC Wells**

County Name	Waller
County Code	237
Outcrop Layer	1
Layer	2
Row	37
Column	92
Drawdown in Production Well at 100 gpm for 36 hours	13.51
Drawdown 1/2 mile from Production Well at 100 gpm for 36 hours	0.90
Drawdown 1/2 miles from Production Well at 100 gpm for 1 year	4.85
Drawdown-Pumping Ratio for Production Well for 36 hours	0.13512
Drawdown-Pumping Ratio for 1/2 mile from Production Well for 36 hours	0.00903
Drawdown-Pumping Ratio for 1/2 mile from Production Well for 1 yr	0.04845

#### 5.4 This Equation Calculations

Groundwater production data from the permit application were used along with the drawdown-pumping ratios contained in Table 5 to develop three estimates of drawdown:

- Scenario 1: drawdown in the production well after 36-hours of pumping at three times the average annual pumping rate
- Scenario 2: drawdown in a well ½ mile from the production well after 36 hours of pumping at three times the annual pumping rate
- Scenario 3: drawdown in a well ½ mile from the production well after one year at the average pumping rate.

Results of these calculations are presented in Table 6.

**Table 6. This Results for Terra Verde Utility Company LLC Wells**

<b>Production Summary</b>	<b>Value</b>	
Annual Permit Production Limit (gallons)	80,000,000	
Annual Permit Production Limit (acre-feet)	246	
Average Pumping Rate (gpm)	152	
3X Average Pumping Rate (gpm)	457	

<b>Drawdown Calculations</b>	<b>Drawdown-Pumping Ratios</b>	<b>Calculated Drawdown (ft)</b>
Production Well - 36 hours (3X avg pumping)	0.13512	61.70
1/2 mile from Production Well - 36 hours (3X avg pumping)	0.00903	4.12
1/2 mile from Production Well - one year (avg pumping)	0.04845	7.37

## **5.5 Example Phase I-a Report**

This section of the report provides an example of the information required for a Phase I-a report. The report (in letter form) for this example is provided in Appendix C.

## **6.0 References**

Hutchison, W.R., 2021. Implementation of GMA 14 Desired Future Condition Based on Multi-Metric Simulation (70% Available Drawdown, 1 Foot of Subsidence, 30K Pumping Limit, 2016 Pumping Distribution). Final Report to Zach Holland, General Manager of Bluebonnet Groundwater Conservation District, April 27, 2021, 54p.

Kasmarek, M.C., 2013. Hydrogeology and Simulation of Groundwater Flow and Land-Surface Subsidence in the Northern Part of the Gulf Coast Aquifer System, Texas, 1891-2009. US Geological Survey Scientific Investigations Report 2012-5154, Version 1.1, November 2013, 69p.

Kasmarek, M.C. and Robinson, J.L., 2004. Hydrogeology and Simulation of Ground-Water Flow and Land-Surface Subsidence in the Northern Part of the Guld Coast Aquifer System, Texas. US Geological Survey Scientific Investigations Report 2004-5102, 123p.

**Appendix A**  
**Proposed Guideline Document**

# Bluebonnet Groundwater Conservation District

## Guidelines for Submitting Data and Information and the Preparation of Hydrogeologic Reports in Support of Applications for the Permitted Use Of Groundwater

April 14, 2023

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### 1.0 Introduction

#### 1.1 Summary of Rule 8.5(F)

Rule 8.5(F) of the Bluebonnet Groundwater Conservation District (BGCD) outlines the requirements of data, information and hydrogeologic reports required for Non-Exempt wells with inside casing diameter of eight inches or greater.

Rule 8.5(F)(2) lists data requirements that are expected to be submitted as part of the application:

- Well coordinates.
- Well construction diagram.
- A map showing the location of the proposed well, all existing wells, hydrologic features, and geologic features located within ½ mile of the proposed well site.
- Proposed production of the well or wells.
- Proposed production rate for the well or wells.

The reporting requirements are split into Phase I reports and a Phase II report. In general, the Phase I report is intended to be a preliminary report that relies on existing regional information. The Phase I report is intended to evaluate the impacts of pumping using existing data and the existing regional groundwater flow model of the area for the aquifer in which the well is to be completed. The Phase II report is intended to be a final report that relies on site specific data, information, test results and analyses.

The required data and information associated with Rule 8.5(F)(2) and the information on the permit application forms will be used by the BGCD to prepare a Phase I hydrogeologic report using existing regional data and information. Applicants have the option to submit a Phase I report that meets all the requirements of this guideline document. Phase II reports are to be prepared by the applicant as detailed below.

As described in Rule 8.5(F)(4), Phase I-a reports will be completed if the annual proposed production rate is equal to or less than 200 million gallons. Phase I-b reports will be completed if the proposed production rate is greater than 200 million gallons. The scope of Phase II reports are independent of proposed production rate.

As described in Rule 8.5(F)(6), hydrogeologic reports, whether completed by BGCD or submitted by the applicant, must meet the standards set forth in these guidelines and must be sealed by a Professional Geoscientist (P.G.) or Professional Engineer (P.E.) licensed to practice in the State of Texas.

## **1.2 Objective**

This guideline document is intended to set standards and expectations for the investigations and reports. The planning and implementation of investigations should be coordinated with BGCD to insure acceptability. BGCD may exercise discretion in the application of the guidelines on an individual and site-specific basis in order to allow a practicable application of the guidelines while ensuring a result yielding the information needed by BGCD to process the permit application. The exercise of this discretion by BGCD shall not be construed as limiting the authority of BGCD in any other matter. BGCD should be notified at least 24 hours in advance of the anticipated conduct of any test-hole drilling, well construction, or pumping test conducted as part of the hydrogeologic investigation performed to meet the requirements of these guidelines.

## **2.0 Phase I Reports**

The Phase I report is intended to evaluate the impacts of pumping using existing data and the existing regional groundwater flow model of the area for the aquifer in which the well is to be completed. Phase I-a reports will be completed if proposed annual production is equal to or less than 200 million gallons. Phase I-b reports will be completed if proposed annual production is greater than 200 million gallons.

## 2.1 Phase I-a Report

As documented in Hutchison (2023), since this guideline document was updated in 2014, permit applications with “relatively low” proposed production rates yielded drawdown and subsidence results from HAGM simulations that were not considered significant.

The Phase I-a report uses the information provided by the applicant, the data the Excel spreadsheet *BGCD Parameters.xlsx* (Hutchison, 2023), and calculations of drawdown using the Theis equation (Hutchison, 2023) to estimate potential impacts of the proposed pumping. No HAGM simulation is required as part of a Phase I-a report.

The Phase I-a report consists of five required elements in the form of tables as documented in Hutchison (2023):

- Grid parameters
- HAGM parameters
- HAGM results
- Theis parameters
- Theis results

This report will be prepared by the District within 30 days of submission of a completed application with all the required elements from Rule 8.5(F)(2). The Phase I-a report is part of an administratively complete permit application.

## 2.2 Phase I-b Report

The Phase I-b report (required for proposed annual production greater than 200 million gallons) will include the five tables required for the Phase I-a report plus a HAGM simulation. The report shall include the results of a simulation using the Groundwater Availability Model for the area that adds the proposed well to the then most recent model run that was used to establish the desired future condition.

Results of the simulation must include:

- A drawdown hydrograph of the cell or cells in which pumping is proposed, including a comparison with the desired future condition drawdown of the subject cell or cells.
- A time series graph that compares maximum subsidence under the DFC condition and the maximum subsidence with the additional proposed pumping in the immediate area of the pumping.
- Tables of drawdown and subsidence at the locations of existing registered and permitted wells contained in the BGCD database.
- A county-aquifer level groundwater budget that includes a comparison of the HAGM simulation with the proposed well and the groundwater water budget of the desired future condition simulation.

The water budget requirement must use net flow values and separately identify net lateral flows to neighboring counties. A summary table of the groundwater budgets should be organized



substantially similar to the example presented below:

	DFC Run (2010 to 2080)	QV Sunterra Run (2010 to 2080)	Difference (AF/yr)	Difference (% of Pumping Increase)
<b>Inflow</b>				
Recharge and Net Surface Water Inflow (GHB Boundary)	41,382	41,757	374	12.2
Interbed Storage	2,956	3,089	133	4.3
From Austin County	6,232	6,304	71	2.3
From Grimes County	1,816	1,816	1	0.0
From Washington County	1,243	1,243	0	0.0
<b>Total Inflow</b>	<b>53,629</b>	<b>54,209</b>		
<b>Outflow</b>				
Pumping	55,495	58,564	3,070	100.0
To Fort Bend County	10,422	10,014	-408	13.3
To Harris County	4,157	2,644	-1,513	49.3
To Montgomery County	5,922	5,922	1	0.0
<b>Total Outflow</b>	<b>75,996</b>	<b>77,145</b>		
<b>Inflow - Outflow</b>	<b>-22,367</b>	<b>-22,937</b>		
<b>Model Calculated Storage Change</b>	<b>-22,366</b>	<b>-22,936</b>	<b>-570</b>	<b>18.6</b>
<b>Model Error</b>	<b>-1</b>	<b>-1</b>		

A discussion of the results of the simulations is required and should focus on recommendations regarding the design of a drilling and testing program that would be completed as part of the Phase II report.

This report will be prepared by the District within 30 days of submission of a completed application with all the required elements from Rule 8.5(F)(2) and the completed HAGM simulation. The Phase I-b report is part of an administratively complete permit application.

### 2.3 Option for Applicant Submittal of Phase I Reports

An applicant has the option to submit a Phase I-a or Phase I-b report (depending on the proposed annual production rate) with the permit application. The submitted report must meet all requirements of these guidelines and Rule 8.5(F). BGCD review of a submitted Phase I-a or Phase I-b report will be completed within 30 days of submittal.

## 3.0 Phase II Report

Phase II reports are to be completed after an approved program of drilling and aquifer testing have been completed. The data obtained from the drilling and aquifer testing shall be used in the analyses of the Phase II report. The Phase II report shall be submitted to BGCD in accordance with Rule 8.5(F)(8). As provided in Rule 8.5(F)(9), the information in the Phase II report can be used as a basis for modifying the permitted production rate or result in special conditions on the permit.

### 3.1 Completed Well Construction Diagram

A diagram of the as-built completion details of all production and monitoring wells must be included that shows, at a minimum, well depths, borehole and casing diameters, depth interval of well screens, and gravel pack design. The State of Texas Water Well Report (Drillers Log) shall

also be included but should not be used as a substitute for the more detailed requirements listed above.

### **3.2 Results of Borehole Drilling and Well Construction**

The following data and analyses must be included in the report:

- Geologist logs of all boreholes
- Geophysical logs of all boreholes
- Estimates of clay thickness and clay percentage for each borehole calculated based on model layer intervals for comparison to regional data.

### **3.3 Results of Aquifer Tests**

In general, the aquifer tests shall consist of a pre-test phase where the static water levels of the test and monitor wells are measured on a regular basis for 24 hours prior to the test, a constant pumping phase of not less than 24 hours and a recovery phase of a period sufficient for a 90% recovery of beginning water levels the test and monitor well locations or at least a 24-hour period, unless an alternative procedure is found acceptable by BGCD. Existing private wells within ½ mile of the test location or otherwise acceptable to BGCD may be used as monitor wells for the pumping test.

The following data and analyses must be included in this report:

- A map giving the location and elevation above mean sea level (NGVD 1929 or NAVD 1988) of the test well, any existing or newly constructed monitor wells and all surrounding wells that exist within a ½ mile radius of the test well. The map shall include streets, roads and the bounds of land tracts sufficient to determine the location of the test well within the tract of land on which it is located. The map shall also include recharge features, geologic features, other water system features (e.g. storage tanks, existing wells), and potential sources of contamination.
- Narrative describing the aquifer test (dates and times run, pumping rate, wells monitored during test, method of data collection, etc.).
- A discussion of the conduct of the test giving details of the significant events of the test, any equipment failures and any contingency measures that may have been employed.
- Analyses of the test results, including the method(s) of analysis, the calculated aquifer parameters should include the transmissivity, hydraulic conductivity and storage coefficient (storativity) values.
- A table giving the water-level drawdown and recovery data from the test and monitor wells, and figures giving the water level recovery curves from which the aquifer parameters were calculated.
- A discussion of the conclusions drawn from the analytical results of the calculation of the aquifer parameters at the test location including and the effects of any boundary conditions identified during the test.
- A discussion comparing the parameters calculated from the analyses of the test to HAGM data from the Phase I report.

In addition, electronic versions of all test data shall be submitted to BGCD as part of the report.

### **3.4 Water Quality**

The report shall include:

- A table of specific conductance, temperature, and pH measurements taken at regular intervals during the aquifer test giving the measured value and time of the measurement.
- Laboratory analysis of a water sample taken at the end of the pumping phase of the aquifer test.
- A discussion of the water quality analysis stating whether the sample was of a quality to meet Texas Commission on Environmental Quality Primary Drinking Water Standards.
- A discussion of expected changes in water quality that may be anticipated from future pumping either at the proposed well or any existing registered or permitted well within 1 mile of the proposed well.

### **3.5 Updated Simulation of Pumping**

The objective of the updated simulations of the proposed pumping is to update the Phase I analytical calculation of drawdown with the local scale information developed from the drilling and testing program. Depending on the results of the aquifer test analyses, this updated simulation may be run using analytical methods or numerical methods. The scope and time frame of the analysis should be the same as the time frame of the simulation completed in Phase I to discuss and analyze a comparison of the results.

The report shall include the results of a simulation using a local scale analytical or numerical model, and the results compared to the results from the Phase I analytical results. This section of the Phase II report must include:

- A discussion of the specific method used, and the associated assumptions associated with the method.
- A drawdown hydrograph at the location of the pumping well(s) and any monitoring wells used during the test.
- Comparison of the results with the Phase I analytical results.
- Tables of updated drawdown and subsidence at the locations of existing registered and permitted wells contained in the BGCD database.

## **4.0 References**

Hutchison, W.R., 2023. Documentation Associated with Updated Guidelines for Preparation of Hydrogeologic Reports in Support of Applications for the Permitted Use of Groundwater. Report prepared for Zach Holland, General Manager of the Bluebonnet Groundwater Conservation District. April 14, 2023, final.

**Appendix B**  
**Proposed Updated Rule 8.5(F)**

## Proposed Update to Rule 8.5(F)

### F. Data, Information, and Hydrogeological Reports Required for Non-Exempt Wells

1. Applicants seeking to (a) permit a nonexempt well completed with an inside casing diameter of eight (8) inches or greater, (b) permit wells to be completed as an aggregate well system or (c) increase production or production capacity of a Public Water Supply, Municipal, Commercial, or Industrial, well with an inside casing diameter of eight (8) inches or greater, shall be subject to District requirements to submit data, information, and reports that address the area of influence, drawdown, subsidence, and other pertinent information in accordance with the guidelines developed and required by the District.
2. As part of an administratively complete application, applicants must provide:
  - a. Coordinates of proposed location of the well or wells (in latitude/longitude or other appropriate and identified coordinate system).
  - b. A proposed well construction diagram.
  - c. A map showing the location of the proposed well, all existing wells, hydrologic features, and geologic features located within ½ mile of the proposed well site.
  - d. Proposed production of the well or wells.
  - e. Proposed production rate for the well or wells.
3. The data and information required of the applicant, and the scope and requirements of Phase I reports, and Phase II reports are detailed in *Guidelines for Submitting Data and Information and the Preparation of Hydrogeologic Reports in Support of Applications for the Permitted Use Of Groundwater*, adopted April 13, 2023, as amended.
4. Phase I reports are classified as either (a) Phase I-a reports for annual production rates equal to or less than 200 million gallons, or (b) Phase I-b reports for annual production rates greater than 200 million gallons per year. The scope of Phase II reports is independent of production rate.
5. Phase I-a reports and Phase I-b reports will be completed by the District with the submitted data and information as described in the guidance document. The applicant has the option to submit a Phase I-a report or a Phase I-b report that meets all requirements of the guidance document at the time of application submission.
6. All hydrogeologic reports (whether submitted by the applicant or prepared by the District) must be prepared and sealed by a Texas licensed professional geoscientist or a Texas licensed engineer.
7. Applicants may supplement the requirements with data and information such as test-hole, monitor well, and aquifer testing data. An applicant, who incurs the cost to include such supplemental data and information or prepare and submit reports summarizing and interpreting the submitted data, bears the risk that the Board may deny the permit application even with the supplemental data and information and submitted reports.

8. Phase II hydrogeological reports, if required, must be submitted by the applicant after permit issuance and must address permitted well(s) equipped and tested for ultimate permitted volume and use. Phase II hydrogeological reports must be submitted within 180 days of well construction. Data and analysis from the Phase II testing will be used to update and refine the analysis of permitted pumpage impacts from the Phase I report. These Phase II data and analyses will also be used to address production parameters and permit conditions.
9. After notice to the applicant and affected persons and an opportunity for a hearing, the Board will consider the results of the Phase II hydrogeological report may modify a permit with special conditions and changes to the permitted volume of groundwater. A Phase II hydrogeological report must address any special conditions in a permit.

## **Appendix C**

### **Example Phase I-a Report for Terra Verde Permit Applications**

**William R. Hutchison, Ph.D., P.E., P.G.**  
Independent Groundwater Consultant

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March 20, 2023

Mr. Zach Holland  
General Manager  
Bluebonnet Groundwater Conservation District  
PO Box 269  
Navasota, TX 77868-0269

**RE: Phase I-a Report: Terra Verde Utility Company LLC**

Dear Mr. Holland,

This letter represents the Phase I-a report for two permit applications submitted by the Terra Verde Utility Company LLC. Two wells are proposed and have been designated as BGCD IDs BWLL-0041D and BWLL-0041E. Both wells are proposed for production from the Evangeline Aquifer.

The combined “Estimated Annual Water Production” is 80 million gallons (40 million gallons per well). The requested production are below the 200 million gallons per year threshold. Therefore, these applications require the preparation of a Phase I-a analysis of potential drawdown.

**Well Locations on HAGM Grid**

The latitude and longitude data on the applications were used to convert the location data to x- and y-coordinates in the GAM coordinate system using Surfer, a commercial gridding program. The FORTRAN program *WellLRC.exe* was used to find the HAGM cell for those x- and y-coordinates. The results of this effort yielded that both wells are located in HAGM row 37, column 92. The applications noted that the target aquifer is the Evangeline (HAGM layer 2). Based on the HAGM cell data at this location, the well depths proposed on the application are consistent with this aquifer designation.

**Grid Parameters, HAGM Parameters, HAGM Results, This Parameters**

The Excel spreadsheet named *BGCD Parameters.xlsx* contains the data needed for the review and Phase I-a calculations. For each tab in *BGCD Parameters.xlsx*, data from layer 2, row 37, column 92 were copied and transposed into the spreadsheet *TerraVerdeParamTables.xlsx*. These results are summarized into four tables as follows:

- Table 1: Grid Parameters
- Table 2: HAGM Parameters
- Table 3: HAGM Results



- Table 4: Theis Parameters

These data represent the best integrated data of the area from a regional perspective. The local-scale data will be developed as part of the Phase II investigation. This will include more site-specific information and data on aquifer depth, clay content, and aquifer parameters calculated from the 36-hour pumping test.

**Table 1. Grid Parameters for Terra Verde Utility Company LLC Wells**

County Name	Waller
County Code	237
Outcrop Layer	1
Layer	2
Row	37
Column	92
x-coordinate (GAM-ft)	6233922
y-coordinate (GAM-ft)	19297190
Surface Elevation (ft MSL)	253
Cell Top Elevation (ft MSL)	108
Cell Bottom Elevation (ft MSL)	-828
Cell Thickness (ft)	936
Clay Thickness (ft)	420
Clay Thickness (% of Cell Thickness)	44.87

**Table 2. HAGM Parameters for Terra Verde Utility Company LLC Wells**

County Name	Waller
County Code	237
Outcrop Layer	1
Layer	2
Row	37
Column	92
Hydraulic Conductivity (ft/day)	2.20
Transmissivity (gpd/ft)	15,403
Leakage (1/day)	7.50E-06
Storativity (dimensionless)	3.60E-04
Elastic Storativity (dimensionless)	8.70E-05
Inelastic Storativity (dimensionless)	8.70E-03

**Table 3. HAGM Results for Terra Verde Utility Company LLC Wells**

County Name	Waller
County Code	237
Outcrop Layer	1
Layer	2
Row	37
Column	92
Groundwater Elevation in 2009 (ft MSL)	155
Groundwater Elevation in 2080 (ft MSL)	100
DFC Drawdown (ft)	55
Artesian Head (ft)	47
Subsidence in 2009 (ft)	0.05
Subsidence in 2080 (ft)	0.72
Subsidence from 2009 to 2080 (ft)	0.67
Cell Pumping in 2009 (AF/yr)	50.69
Cell Pumping in 2080 (AF/yr)	38.63

**Table 4. Theis Parameters for Terra Verde Utility Company LLC Wells**

County Name	Waller
County Code	237
Outcrop Layer	1
Layer	2
Row	37
Column	92
Drawdown in Production Well at 100 gpm for 36 hours	13.51
Drawdown 1/2 mile from Production Well at 100 gpm for 36 hours	0.90
Drawdown 1/2 miles from Production Well at 100 gpm for 1 year	4.85
Drawdown-Pumping Ratio for Production Well for 36 hours	0.13512
Drawdown-Pumping Ratio for 1/2 mile from Production Well for 36 hours	0.00903
Drawdown-Pumping Ratio for 1/2 mile from Production Well for 1 yr	0.04845

**Theis Equation Calculations**

Groundwater production data from the permit application were used along with the drawdown-pumping ratios contained in Table 4 to develop three estimates of drawdown:

- Scenario 1: drawdown in the production well after 36-hours of pumping at three times the average annual pumping rate
- Scenario 2: drawdown in a well 1/2 mile from the production well after 36 hours of pumping at three times the annual pumping rate
- Scenario 3: drawdown in a well 1/2 mile from the production well after one year at the average pumping rate.

Results of these calculations are presented in Table 5.

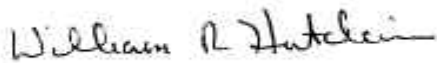
**Table 5. Theis Results for Terra Verde Utility Company LLC Wells**

<b>Production Summary</b>	<b>Value</b>
Annual Permit Production Limit (gallons)	80,000,000
Annual Permit Production Limit (acre-feet)	246
Average Pumping Rate (gpm)	152
3X Average Pumping Rate (gpm)	457

<b>Drawdown Calculations</b>	<b>Drawdown- Pumping Ratios</b>	<b>Calculated Draw down (ft)</b>
Production Well - 36 hours (3X avg pumping)	0.13512	61.70
1/2 mile from Production Well - 36 hours (3X avg pumping)	0.00903	4.12
1/2 mile from Production Well - one year (avg pumping)	0.04845	7.37

I appreciate the opportunity to work with you on this effort. Please feel free to call me at 512-745-0599 or email me at [billhutch@texasgw.com](mailto:billhutch@texasgw.com) if you have any questions.

Sincerely,



William R. Hutchison, Ph.D., P.E., P.G.

## **Appendix F**

**Implementation of GMA 14 Desired Future Conditions Based on Multi-Metric Simulation (70% Available Drawdown, 1 Foot Subsidence, 30K Pumping Limit, 2016 Pumping Distribution)**

*Final Report*

**Implementation of GMA 14 Desired Future Condition  
Based on Multi-Metric Simulation  
(70% Available Drawdown, 1 Foot of Subsidence, 30K Pumping Limit,  
2016 Pumping Distribution)**



*Prepared for:*

**Zach Holland**

General Manager

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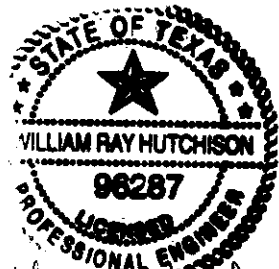
[billhutch@texasgw.com](mailto:billhutch@texasgw.com)

**April 27, 2021**

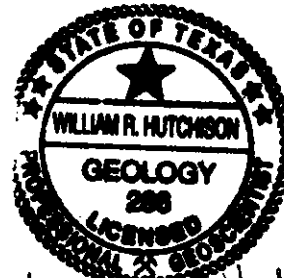
## Professional Engineer and Professional Geoscientist Seals

This report was prepared by William R. Hutchison, Ph.D., P.E., P.G., who is licensed in the State of Texas as follows:

- Professional Engineer (Geological and Civil) No. 96287
- Engineering Firm Registration No. 14526
- Professional Geoscientist (Geology) No. 286



*William R. Hutchison*  
4/27/2021



*William R. Hutchison*  
4/27/2021

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- E – Source code for *getdd.exe*



## 1.0 Introduction

### 1.1 Joint Planning Process in GMA 14

The Groundwater Conservation Districts in Groundwater Management Area 14 have reviewed a series of balancing and multi-metric simulations with the updated Northern Gulf Coast Groundwater Availability Model (also known as the Houston Area Groundwater Model, or HAGM) as part of the third round of Joint Planning. Ultimately, the review of these simulations and the consideration of nine statutory factors will result the adoption of desired future conditions for Groundwater Management Area 14. Joint planning can be summarized as a three-step process:

1. After considering the nine factors and applying a balancing test, the Groundwater Conservation Districts propose for adoption desired future conditions for the relevant aquifers within the management area.
2. Once proposed, a 90-day public comment period begins that includes at least one public hearing in each Groundwater Conservation District. Each Groundwater Conservation District compiles a summary of relevant comments, any suggested revisions to the proposed desired future conditions, and the basis for the revisions.
3. After receipt of all the summary reports from the Groundwater Conservation Districts, Groundwater Management area representatives meet, consider any suggested revisions, and finally adopt the desired future conditions for the management area.

During the discussion of the nine factors and the review of early simulations that focused on hydrogeologic issues of the Gulf Coast Aquifer, there was a stated objective by the Groundwater Conservation District representatives to develop a desired future condition statement that was applicable for the entirety of Groundwater Management Area 14.

Developing a GMA-wide DFC was in response to deficiencies in the Desired Future Condition statements and Joint Planning process during the second round of joint planning that ended in 2016. These deficiencies in the second round were identified in a petition filed against the Lone Star Groundwater Conservation District that challenged the reasonableness of the desired future conditions for Montgomery County.

As part of the implementation a GMA-wide DFC, the Groundwater Management Area 14 consultant developed a series of multi-metric HAGM simulations. These simulations featured pumping adjustments to all counties in GMA 14 (except Fort Bend, Galveston, and Harris counties) that were made consistent with certain constraints and thresholds.

### 1.2 Proposed Desired Future Condition

On April 9, 2021, the groundwater conservation districts in Groundwater Management Area 14 unanimously proposed a desired future condition as follows:

***In each county in GMA 14, no less than 70 percent median available drawdown remaining in 2080 and no more than an average of 1.0 additional foot of subsidence between 2009 and 2080.***

Unfortunately, the language of the statement is insufficient to fully describe the simulation that was used as a basis for the proposed desired future condition. A more complete description of the various assumptions and constraints is provided below:

- 70 percent median available drawdown remaining in 2080 (using 2009 as a base condition),
- No more than 1 ft additional average subsidence in 2080 (using 2009 as a base condition),
- Pumping in a county is no more than 30,000 above the maximum projected water demand between 2020 and 2070 as defined in the current state water plan,
- The initial pumping distribution was taken from the 2016 modeled available groundwater simulation of the HAGM for the second round of desired future conditions.

Details of these constraints and assumptions will be fully documented in the Groundwater Management Area 14 Explanatory Report and associated technical reports.

## **1.2 Implementation of Desired Future Condition in Bluebonnet GCD**

The deadline for final adoption of the desired future condition by Groundwater Management Area 14 is January 5, 2022. Once the desired future condition is adopted by the groundwater conservation districts in Groundwater Management Area 14 (step 3 above), the Texas Water Development Board reviews the submitted resolution, explanatory report, and model runs for administrative completeness. Once the Texas Water Development Board sends a letter acknowledging administrative completeness, each district is then required to adopt the desired future conditions applicable to the district as defined in the resolution and report (Texas Water Code Section 36.108 d-4).

Once the district adopts the desired future condition, Texas Water Code Section 36.1071 (7) requires that the district's management plan include a management goal that addresses the desired future condition adopted by the district. The Texas Administrative Code (Chapter 356.52) requires that the management objectives be specific and time-based statements of future outcomes that are linked to a management goal. Also, performance standards for each management objective are required to evaluate the effectiveness and efficiency of district activities.

The implementation of the desired future condition for Bluebonnet GCD involves taking the single GMA 14-wide desired future statement and quantifying it for use as a management goal and objective for inclusion in the district's management plan. The HAGM simulation that serves as the basis for the GMA 14-wide desired future condition can provide the district-specific drawdown and subsidence information that acts as the foundation for the adopted desired future condition that is adopted by Bluebonnet GCD.

## **1.3 Report Objectives**

The main objective of this report is to present the model results from the simulation that formed the basis of the GMA-wide desired future condition that was proposed by the groundwater conservation districts of Groundwater Management Area 14 on April 9, 2021 that are relevant to the Bluebonnet Groundwater Conservation District (Austin, Grimes, Walker, and Waller counties). These results include:

- Annual pumping for each county-aquifer unit in Bluebonnet GCD
- Annual average drawdown for each county-aquifer unit in Bluebonnet GCD
- Annual average and maximum subsidence in each county in Bluebonnet GCD

Through these results, the Bluebonnet GCD-specific desired future conditions are identified that form the basis for inclusion in the district’s management plan. This represents the link between planning activities and management activities of Bluebonnet GCD. As developed in this report, the link between management activities and regulatory activities involves the Phase I and Phase II hydrogeologic reports and analyses required of all large well permit applicants. Finally, this report provides an initial comparison of actual and simulated drawdowns that is described in the district’s management plan.

#### 1.4 Recommended Bluebonnet GCD-Specific Desired Future Conditions

As developed in this report, the recommended desired future conditions applicable to Bluebonnet GCD that are based on the GMA 14-wide desired future conditions are listed in Table 1. The expected modeled available groundwater values are also provided in the table.

**Table 1. Recommended BGCD-Specific DFCs  
Based on GMA 14-Wide DFC: 70% Available Drawdown Remaining, One Foot Additional  
Average Subsidence, 30K Pumping Increase Limit, 2016 Pumping Distribution**

County	Aquifer	Recommended BGCD-Specific Desired Future Conditions		Expected Modeled Available Groundwater (Pumping in AF/yr from 2010 to 2080)
		Average Drawdown in ft from 2009 to 2080	Maximum Subsidence in ft from 1890 to 2080	
Austin	Chicot	54	3.39	2,892
	Evangeline	38		41,706
	Burkeville	39		0
	Jasper	165		1,971
Grimes	Chicot	35	0.25	0
	Evangeline	26		15,907
	Burkeville	26		0
	Jasper	147		35,546
Walker	Chicot	1	0.17	0
	Evangeline	16		3,141
	Burkeville	7		0
	Jasper	96		39,279
Waller	Chicot	50	5.39	791
	Evangeline	59		54,336
	Burkeville	60		0
	Jasper	218		329

## 2.0 HAGM Simulation

The HAGM files used for this report were obtained from Wade Oliver of INTERA, the technical consultant for Groundwater Management Area 14. The output control file was modified from the obtained version. The modified file specifies head and cell-by-cell output for all stress periods in the predictive period (2010 to 2080). Table 2 summarizes the input files and Table 3 summarizes the output files used for this report.

**Table 2. HAGM Simulation Input Files**

<b>Package</b>	<b>FORTRAN Unit Number</b>	<b>File Name</b>	<b>File Date</b>
Basic	1	HAGM_BT_base_2080.bas	6/19/2012
Discretization	14	HAGM_BT_base_2080.dis	3/19/2020
Block Center Flow	11	HAGM_BT_base_2080.bcf	8/23/2013
Well	12	HAGM_BT_base_pest_2080.wel	4/30/2020
General Head Boundary	23	HAGM_BT_base_2080.ghb	3/19/2020
Output Control	22	HAGM_rev20210312.oc	3/12/2021
Solver (Strongly Implicit Method)	21	HAGM_BT_base_2080.sip	6/15/2012
Subsidence	19	HAGM_BT_base_2080.sub	4/17/2014

**Table 3. HAGM Simulation Output Files**

<b>Output Type</b>	<b>FORTRAN Unit Number</b>	<b>File Name</b>	<b>File Date</b>
Standard (List File)	7	HAGM_BT_base_2080.lst	4/26/2021
Data(binary)	50	HAGM_BT_base_2080.cbb	4/26/2021
Data(binary)	30	HAGM_BT_base_2080.hds	4/26/2021
Data(binary)	31	HAGM_BT_base_2080.ddn	4/26/2021
Data(binary)	150	HAGM_BT_base_subsidence_2080.hds	4/26/2021
Data(binary)	151	HAGM_BT_base_compaction_2080.hds	4/26/2021
Data(binary)	152	HAGM_BT_base_interbedcomp_2080.hds	4/26/2021
Data(binary)	153	HAGM_BT_base_displacement_2080.hds	4/26/2021
Data(binary)	154	HAGM_BT_base_nodelay_precon_2080.hds	4/26/2021
Data(binary)	155	HAGM_BT_base_delay_precon_2080.hds	4/26/2021

## 3.0 Simulated Pumping

### 3.1 Post-Processing of Simulation Results

Simulated pumping results were extracted from the cell-by-cell output file with the FORTRAN post-processor *getpump.exe*. Source code for the post-processor is presented in Appendix A. The program:

- Reads the cell-by-cell output file,
- Reads a list of counties in Groundwater Management Area 14,
- Reads the HAGM grid file,
- Sums pumping for each stress period by county-aquifer unit and total pumping in each county.

The program writes three sets of output files:

- A set of 5 files that list pumping for each aquifer by county for each of the four model layers (Chicot, Evangeline, Burkeville, and Jasper) and a total for all model layers from 1989 to 2080.
- A set of 4 files list pumping for each county in the Bluebonnet Groundwater Conservation District (Austin, Grimes, Walker, and Waller). Each column in the output file represents a model layer. The last column is a county total.
- A set of 4 files that list pumping in a modeled available groundwater format for each aquifer. The columns represent the decadal pumping from 2010 to 2080.

### 3.2 Simulated Bluebonnet GCD Pumping

Simulated pumping results are graphically presented as follows:

- Figure 1 – Austin County
- Figure 2 – Grimes County
- Figure 3 – Walker County
- Figure 4 – Waller County

Please note that in Austin County and Waller counties, the primary aquifer is the Evangeline. In Grimes County, most of the pumping is from the Jasper with significant pumping also from the Evangeline. Pumping in Walker County is primarily from the Jasper Aquifer.

Also please note that in each county, the simulated pumping from 2010 to 2080 is substantially increased as compared to historic pumping as defined by the HAGM. In addition, the increases are assumed to occur in 2010 and are held constant through 2080. The increases are generally due to the specified constraint of finding pumping associated with 70 percent available drawdown remaining in 2080.

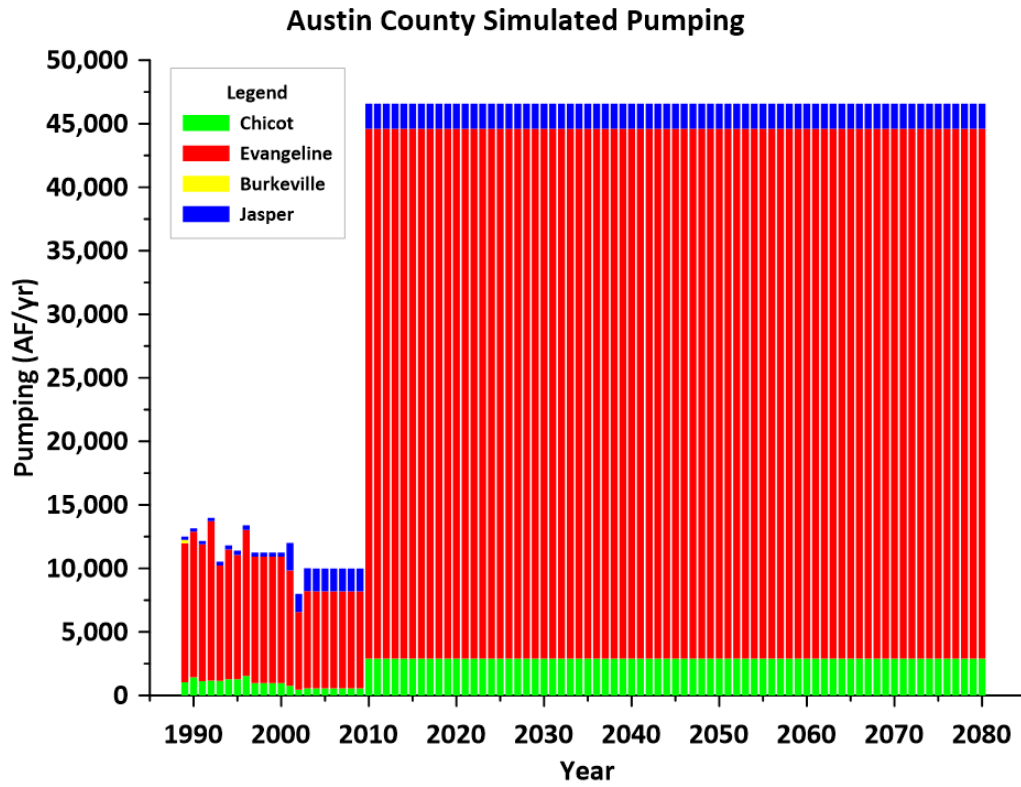


Figure 1. Simulated Pumping - Austin County

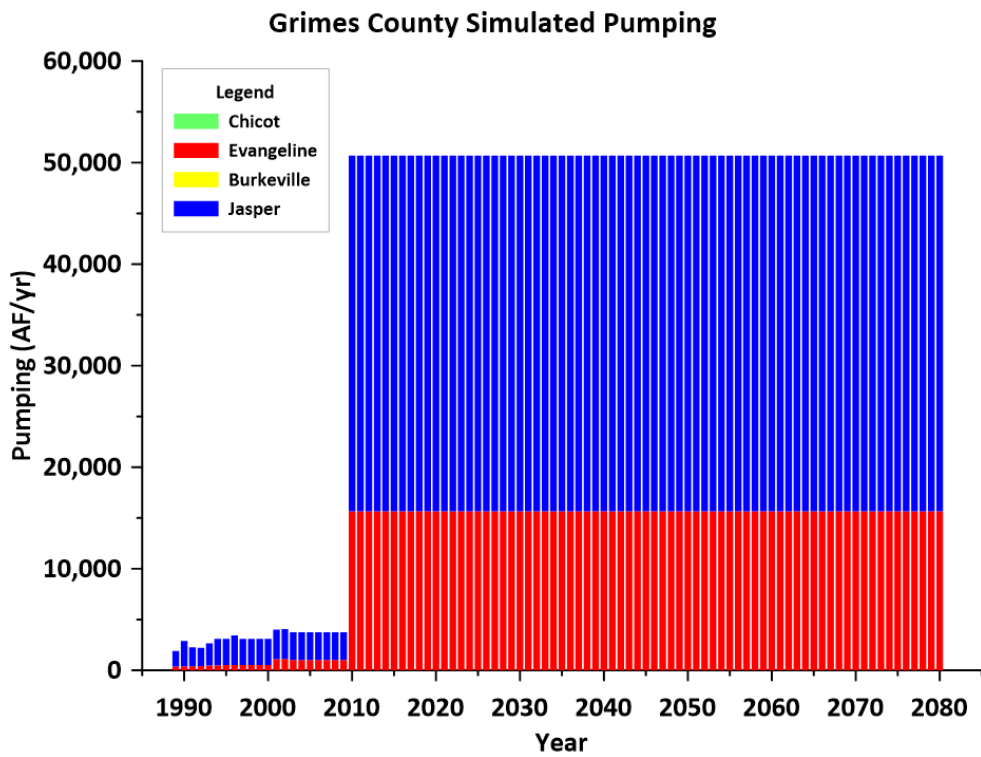
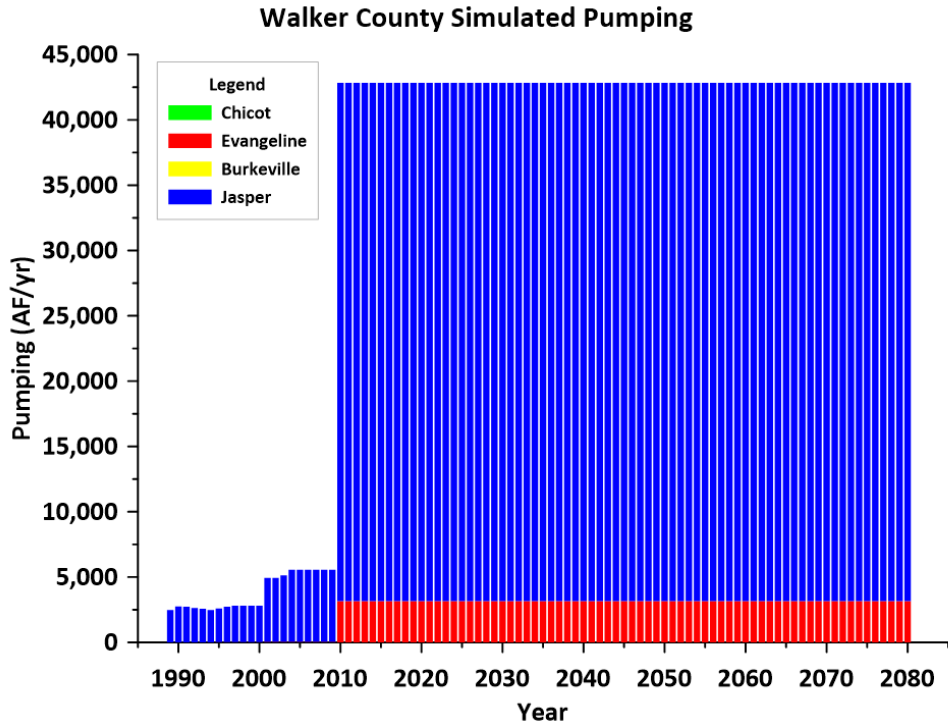
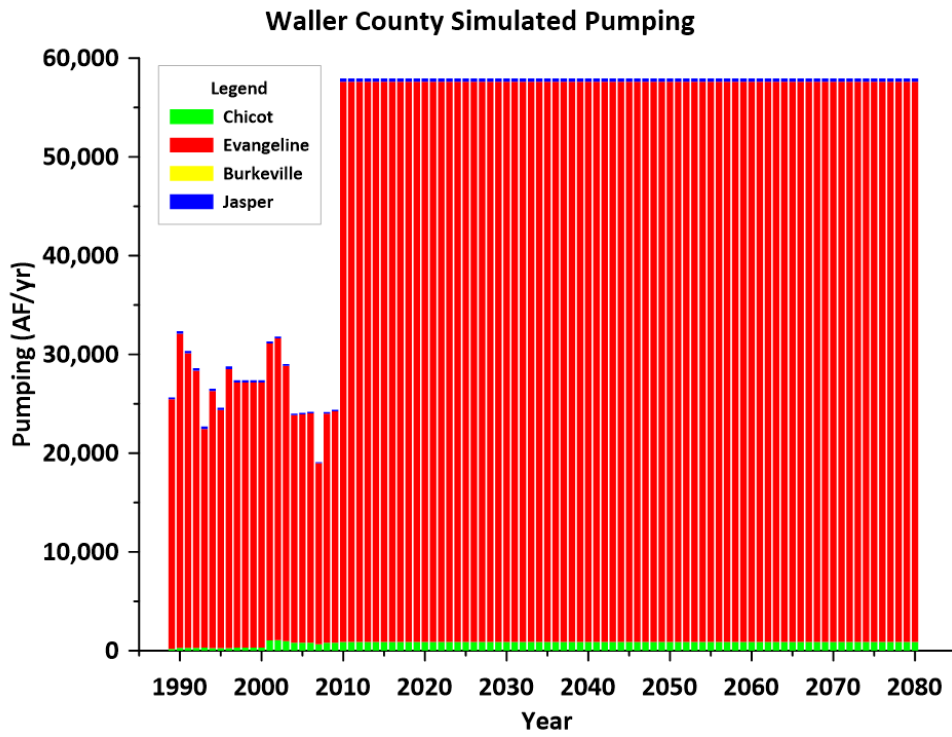


Figure 2. Simulated Pumping – Grimes County



**Figure 3. Simulated Pumping – Walker County**



**Figure 4. Simulated Pumping – Waller County**

### 3.2 Comparison of Simulated Future Pumping with Historic Pumping and Existing Modeled Available Groundwater

Table 4 presents a comparison of the current Modeled Available Groundwater (MAG) with the simulated pumping from the simulation. It is expected that the simulated pumping from 2010 to 2080 will be the new modeled available groundwater values.

The table also presents the historic pumping in 2009 used by the HAGM, the current MAG from the HAGM simulation used in the second round of joint planning, and the difference between the pumping used in this HAGM simulation and the current MAG.

Please note that the total simulated pumping is over four times the historic pumping (as simulated by the HAGM in 2009) and over twice the previous modeled available groundwater.

**Table 4. Comparison of Existing MAG with Simulated Pumping**

County	Aquifer	Historic Simulated Pumping (2009) in AF/yr	Current MAG (2010 to 2070) in AF/yr	Simulated Pumping (2010 to 2080) in AF/yr	Expected Increase in MAG (AF/yr)
Austin	Chicot	562	1,005	2,892	1,887
	Evangeline	7,632	14,517	41,706	27,189
	Burkeville	0	0	0	0
	Jasper	1,802	76	1,971	1,895
Grimes	Chicot	0	0	0	0
	Evangeline	1,023	8,759	15,907	7,148
	Burkeville	0	371	0	-371
	Jasper	2,712	8,624	35,546	26,922
Walker	Chicot	0	0	0	0
	Evangeline	41	2,000	3,141	1,141
	Burkeville	0	0	0	0
	Jasper	5,520	15,973	39,279	23,306
Waller	Chicot	811	300	791	491
	Evangeline	23,423	40,993	54,336	13,343
	Burkeville	0	0	0	0
	Jasper	152	300	329	29
<b>Total</b>	<b>All Aquifers</b>	<b>43,678</b>	<b>92,918</b>	<b>195,898</b>	<b>102,980</b>



## 4.0 Simulated Average Drawdown

### 4.1 Post-Processing Simulation Results

Average drawdown for each county-aquifer unit was calculated using the FORTRAN post-processor *getavgdd.exe*. Source code for *getavgdd.exe* is presented in Appendix B. The program:

- Reads a file that identifies the dates associated with each stress period,
- Reads a list of counties in Groundwater Management Area 14 and the associated file names for county-level output,
- Reads the HAGM grid file,
- Counts the number of cells in each county-aquifer unit and writes the counts to an output file,
- Reads the binary head output file from the simulation and calculates drawdown for each cell for each stress period using 2009 as the base year,
- Calculates the average drawdown for each county-aquifer unit by dividing the sum of the drawdowns in each county-aquifer unit by the number of cells in the county-aquifer unit,
- Writes annual county drawdowns for each aquifer unit and for the county as a whole,
- Writes drawdown summaries for each aquifer unit by county for the year 2080.

### 4.2 Simulated Bluebonnet GCD Average Drawdown

Average drawdown graphs from 1980 to 2080 (using 2009 as the base year) are presented as follows:

- Figure 5 – Austin County
- Figure 6 – Grimes County
- Figure 7 – Walker County
- Figure 8 – Waller County

Based on a comparison of the pumping increases shown in the previous section (summarized in Table 4 in the previous section), it appears that the Jasper Aquifer drawdown in Austin and Waller counties is largely due to increases in pumping outside of these counties as opposed to pumping within these counties.

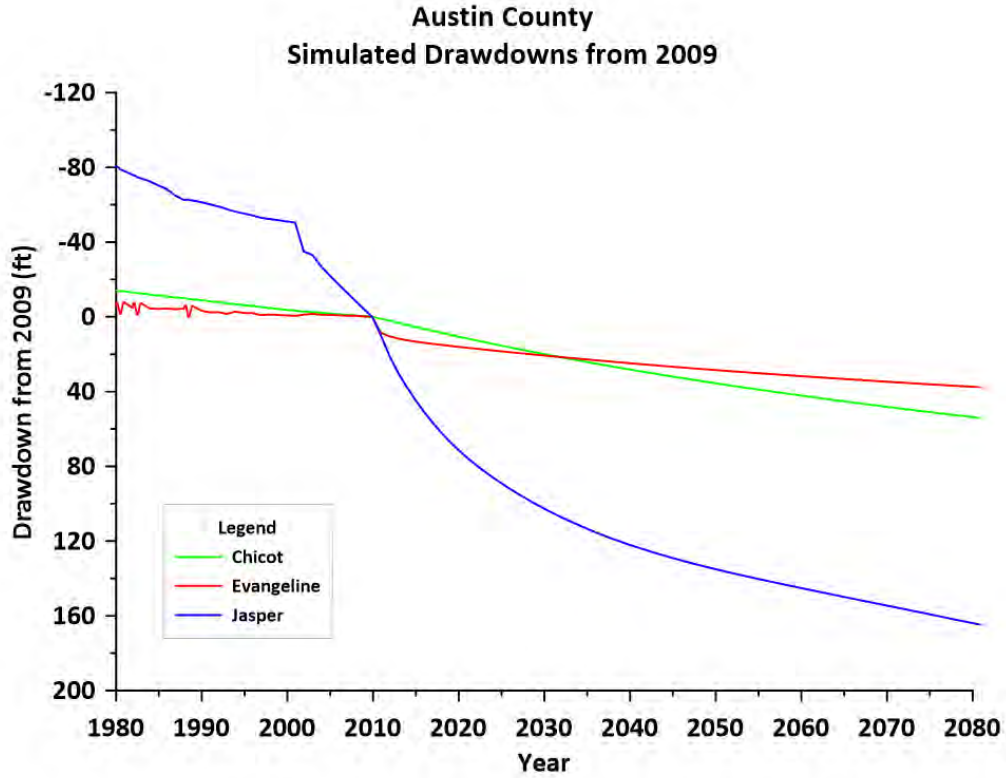


Figure 5. Simulated Average Drawdown - Austin County

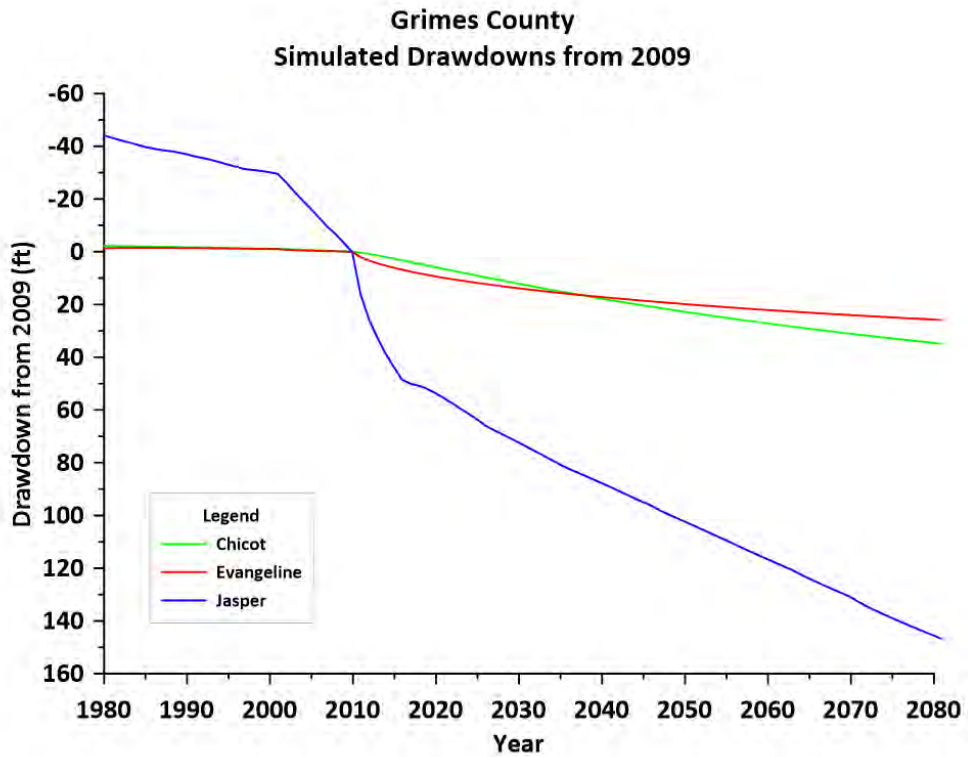


Figure 6. Simulated Average Drawdown - Grimes County

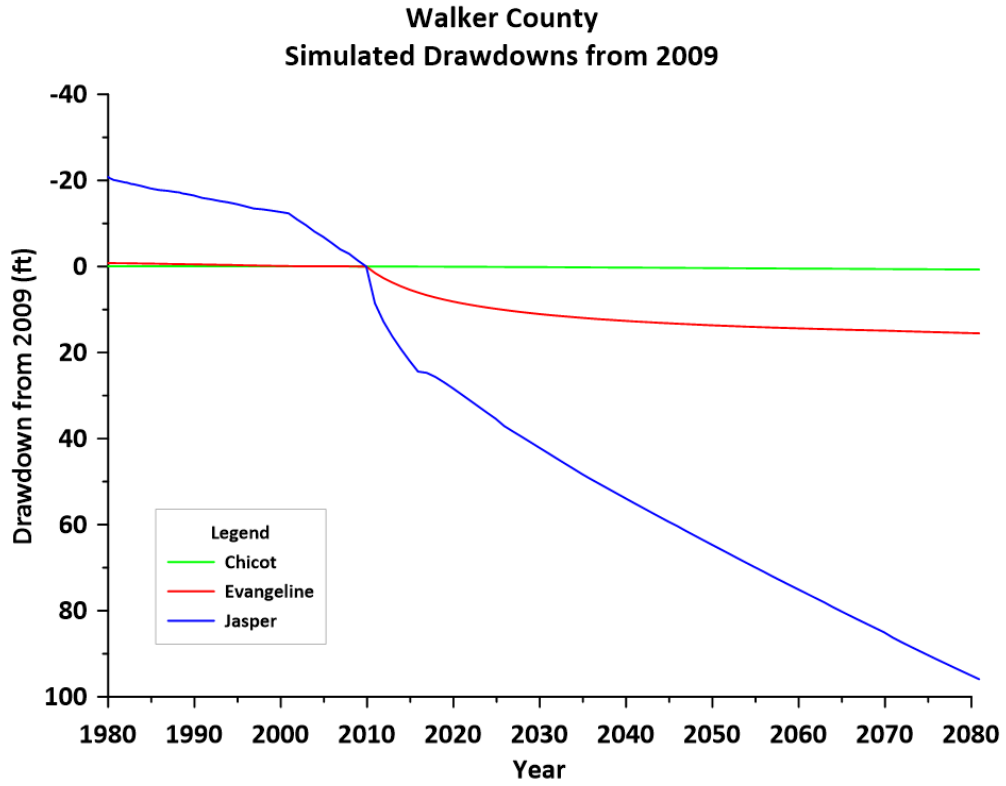


Figure 7. Simulated Average Drawdown - Walker County

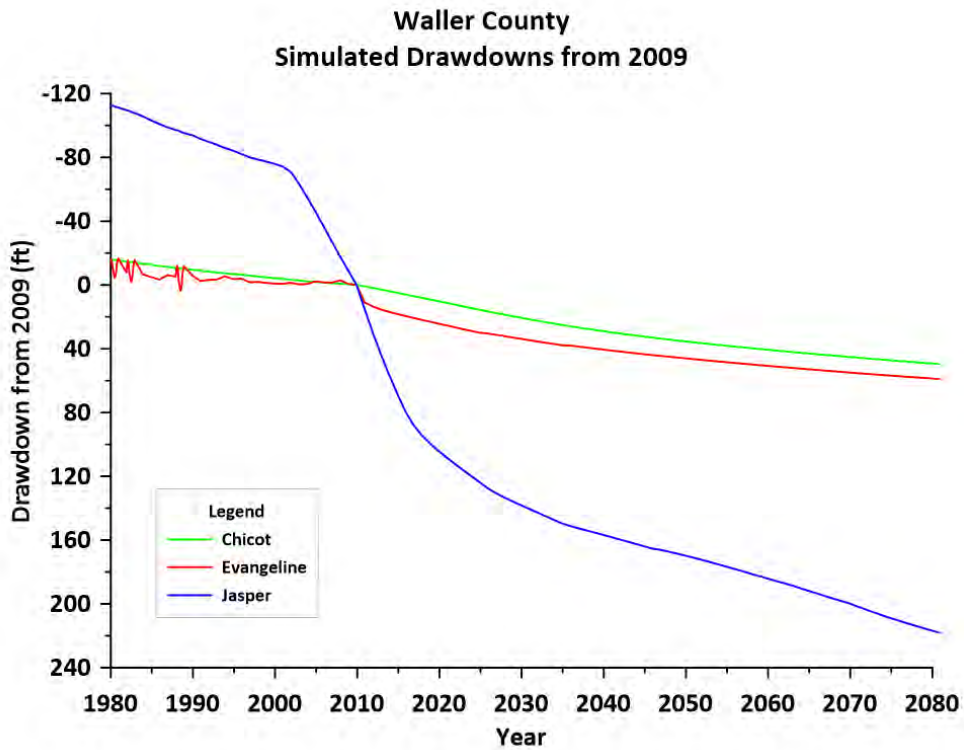


Figure 8. Simulated Average Drawdown - Waller County

### 4.3 Comparison of Simulated Average Drawdowns with Current Desired Future Conditions

Table 5 presents a comparison of the current desired future conditions (DFCs) and calculated average drawdowns from the HAGM simulation for three time periods. The current DFC is a drawdown calculation from 2009 to 2070. The calculated average drawdowns from this HAGM simulation include:

- 2009 to 2026 (for use in future comparisons before the 4<sup>th</sup> round of joint planning)
- 2009 to 2070 (for direct comparison with the current desired future condition)
- 2009 to 2080 (covers the full period of the simulation, and represents the Bluebonnet GCD-specific DFC that would be adopted)

**Table 5. Current DFCs and Calculated Drawdowns from HAGM Simulation**

County	Aquifer	Current DFC (ft of drawdown from 2009 to 2070)	Average Drawdown from Simulation (ft drawdown from 2009 to 2026)	Average Drawdown from Simulation (ft drawdown from 2009 to 2070)	Average Drawdown from Simulation (ft drawdown from 2009 to 2080)
Austin	Chicot	39	17	49	54
	Evangeline	23	19	35	38
	Burkeville	23	20	36	39
	Jasper	76	95	155	168
Grimes	Chicot	5	10	31	35
	Evangeline	5	13	24	26
	Burkeville	6	11	24	26
	Jasper	52	68	133	147
Walker	Chicot	N/A	0	1	1
	Evangeline	9	10	15	16
	Burkeville	4	3	6	7
	Jasper	42	38	86	96
Waller	Chicot	39	18	46	50
	Evangeline	39	31	55	59
	Burkeville	40	32	56	60
	Jasper	101	131	200	218

A comparison of the last two columns of Table 5, shows that drawdown continues to increase from 2070 to 2080, which means the hydraulic system under the specified pumping has not reached a state of near equilibrium. This may be a limitation of the HAGM, which has been criticized as an inadequate model for the purposes of joint planning (e.g. Hutchison, 2014a and 2014b).

Comparing the current DFC and the average drawdown from 2009 to 2070 yields the conclusion that the increased pumping of this simulation as compared to the simulation that was the basis for the current DFC results in increased drawdown. The increased drawdown is a combined result of increased pumping in the individual county and the result of increased pumping in surrounding counties.

The calculated average drawdown from 2009 to 2026 represents the short-term drawdown that will be compared to actual data over the next five years (i.e. before the 4<sup>th</sup> round of joint planning is completed). This is significant because it is anticipated that a new groundwater flow model will be available for use in the next round of joint planning. It is expected that the new model will correct some of the known limitations with the HAGM and may be a more appropriate tool for use in the joint planning process. Because of the anticipated improvements in the new groundwater flow model, it is important to keep perspective of how these results will be used in the future and the strong possibility that results from the next model will be different and, hopefully, more reliable.

## 5.0 Simulated Subsidence

### 5.1 BGCD Rule Regarding Subsidence

Bluebonnet GCD Rule 8.18 prohibits the production of groundwater that causes the potential of measurable subsidence. The potential for measurable subsidence must be addressed by applicants and permittees in Phase I and Phase II hydrogeologic reports required under Rule 8.5F. If the District has reason to believe that a non-exempt well has the potential to cause measurable subsidence, the District may, after notice and the opportunity for hearing, take all actions it deems necessary, in accordance with this Rule 8.18, to address the potential subsidence.

As documented in Hutchison (2014b), comparison of measured and simulated subsidence in the HAGM is better than the previous GAM (North Gulf Coast Groundwater Availability Model). However, as shown in Figure 9 (Figure 17 of Hutchison, 2014b), the calibration comparison of measured and simulated subsidence is generally plus or minus one foot. Currently, the rule definition of “measurable subsidence” is guided by the calibration of the HAGM. In general, Phase I and Phase II reports that include simulation results of less than one foot of additional subsidence are regarded as satisfying the threshold pumping that will not cause “measurable subsidence”.

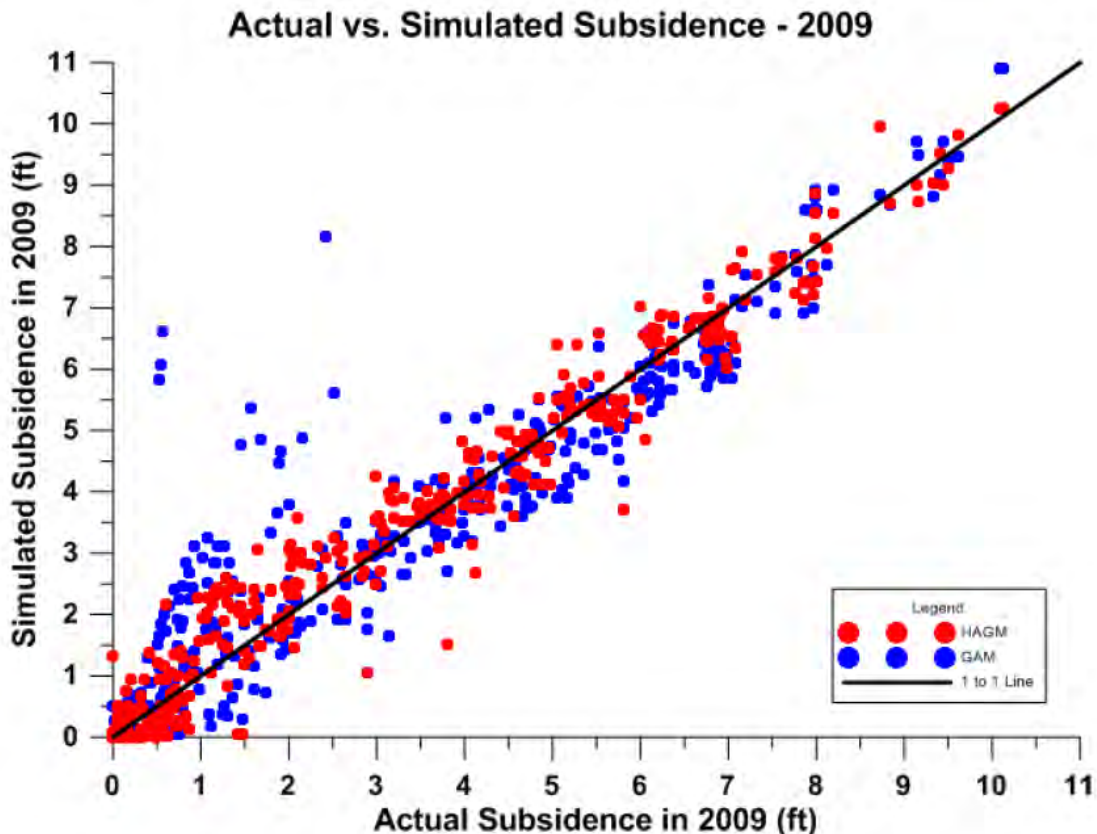


Figure 9. Comparison of Actual Subsidence from 1906 to 2000 and Estimated Subsidence from 1891 to 2009 from the GAM and HAGM

## 5.2 Post-Processing Simulation Results

Subsidence for each county was calculated using the FORTRAN post-processor *getsub.exe*. Source code for *getsub.exe* is presented in Appendix C. The program:

- Reads a file that identifies the dates associated with each stress period,
- Reads a list of counties in Groundwater Management Area 14,
- Reads the HAGM grid file,
- Counts the number of cells in each county-aquifer unit and writes the counts to an output file,
- Reads the binary subsidence file from the simulation and sums the subsidence results and finds the maximum subsidence for each county,
- Calculates the average subsidence for each county by dividing the sum of the subsidence values in each county by the number of cells in the county,
- Reads a file with file names for each county and writes county output (average subsidence and maximum subsidence),
- Writes 2080 subsidence results for each county in a single file.

## 5.3 Simulated Bluebonnet GCD Average and Maximum Subsidence

Average and maximum subsidence graphs from 1980 to 2080 (using 1890 as the base year) are presented as follows:

- Figure 10 – Austin County
- Figure 11 – Grimes County
- Figure 12 – Walker County
- Figure 13 – Waller County

Please note that the graphs suggest that subsidence does not appear to be a significant concern in Grimes and Walker counties (i.e. maximum subsidence in 2080 less than 0.5 ft). However, in Austin and Waller counties, the results presented requires some additional discussion as detailed below after a discussion of the relationship between average and maximum subsidence.

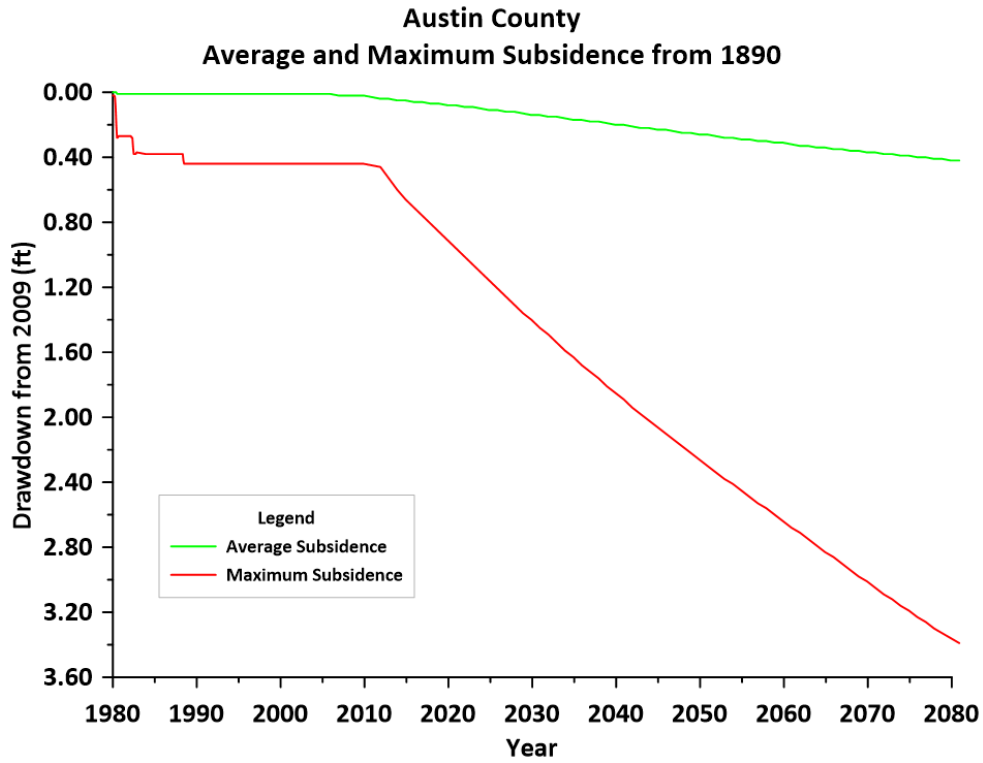


Figure 10. Average and Maximum Subsidence - Austin County

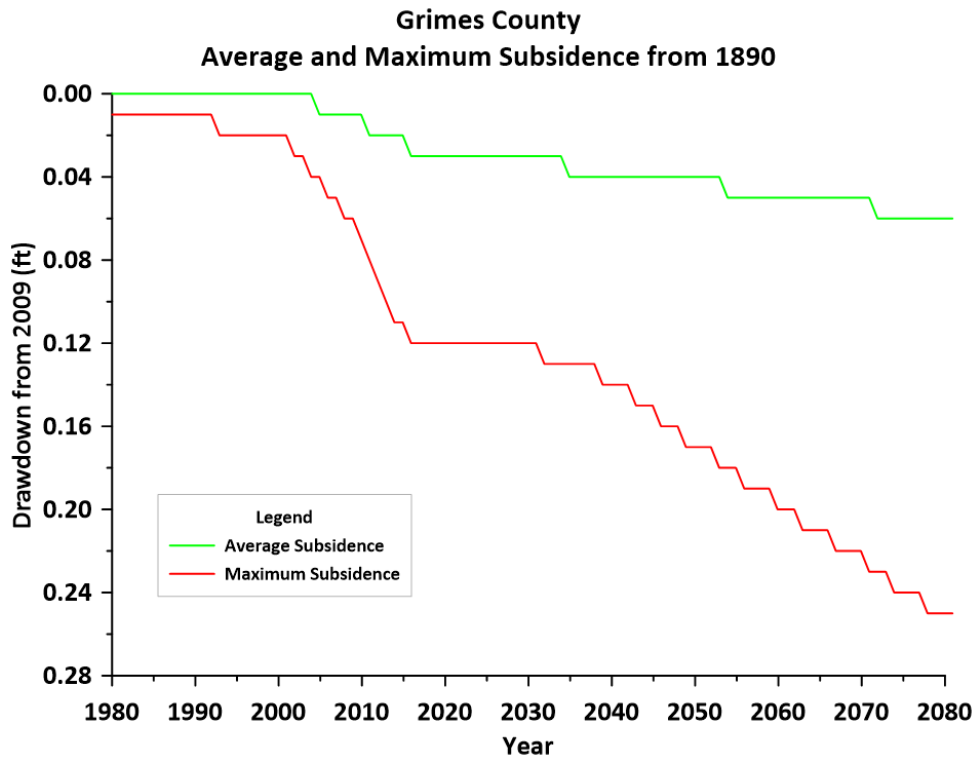


Figure 11. Average and Maximum Subsidence - Grimes County



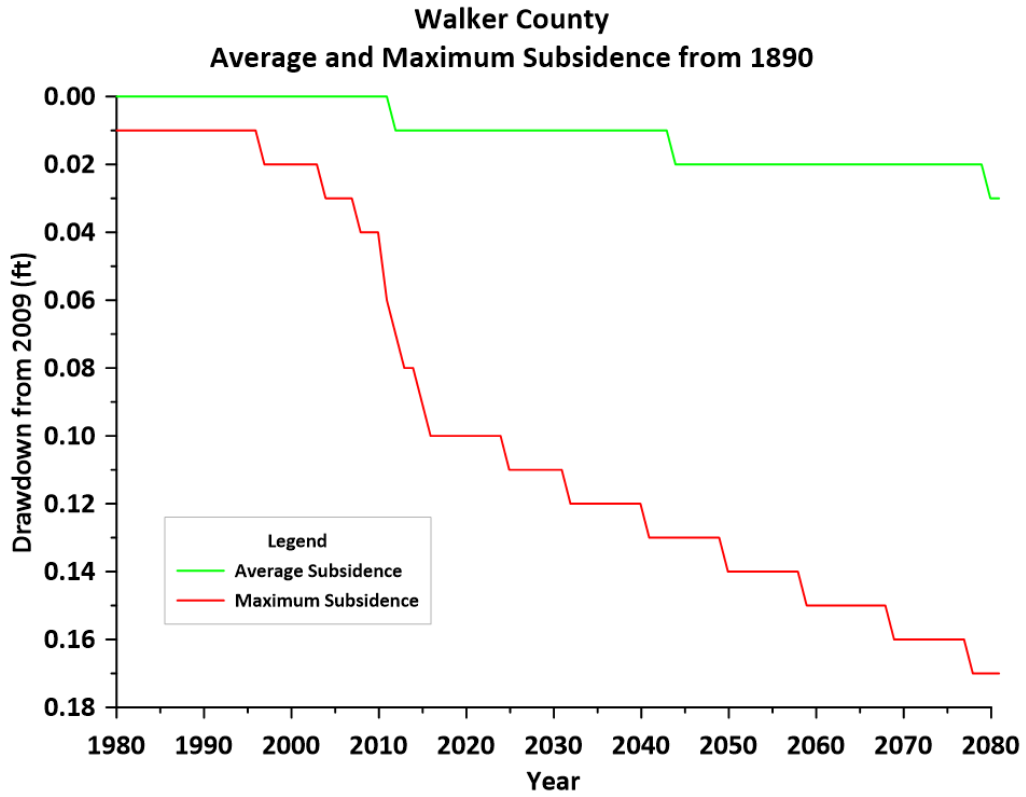


Figure 12. Average and Maximum Subsidence - Walker County

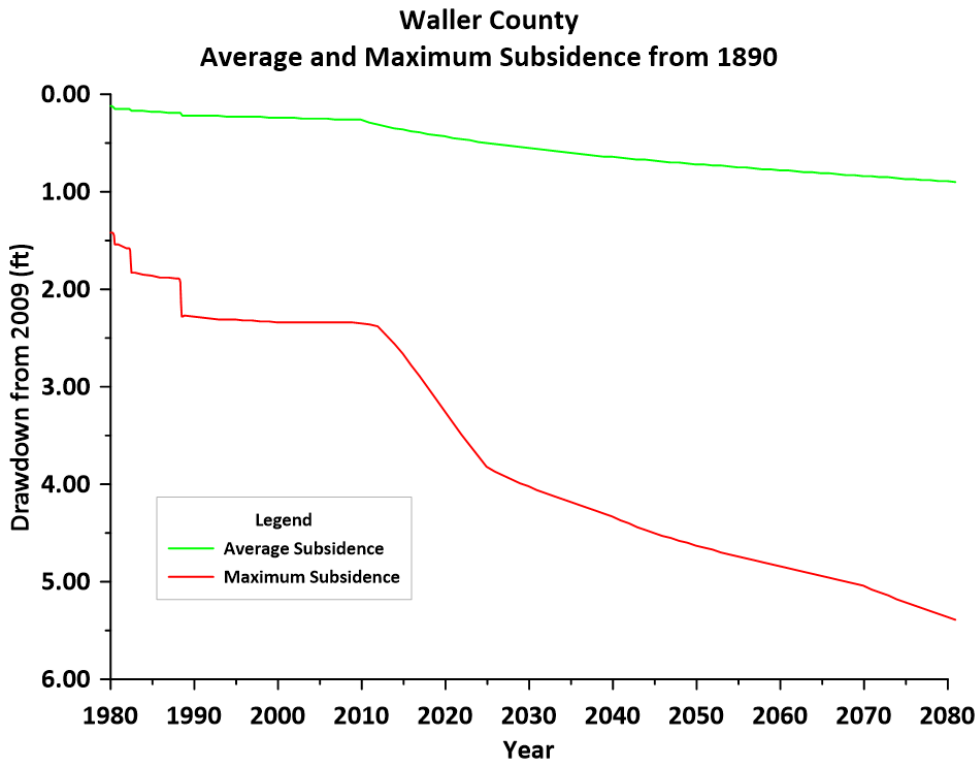
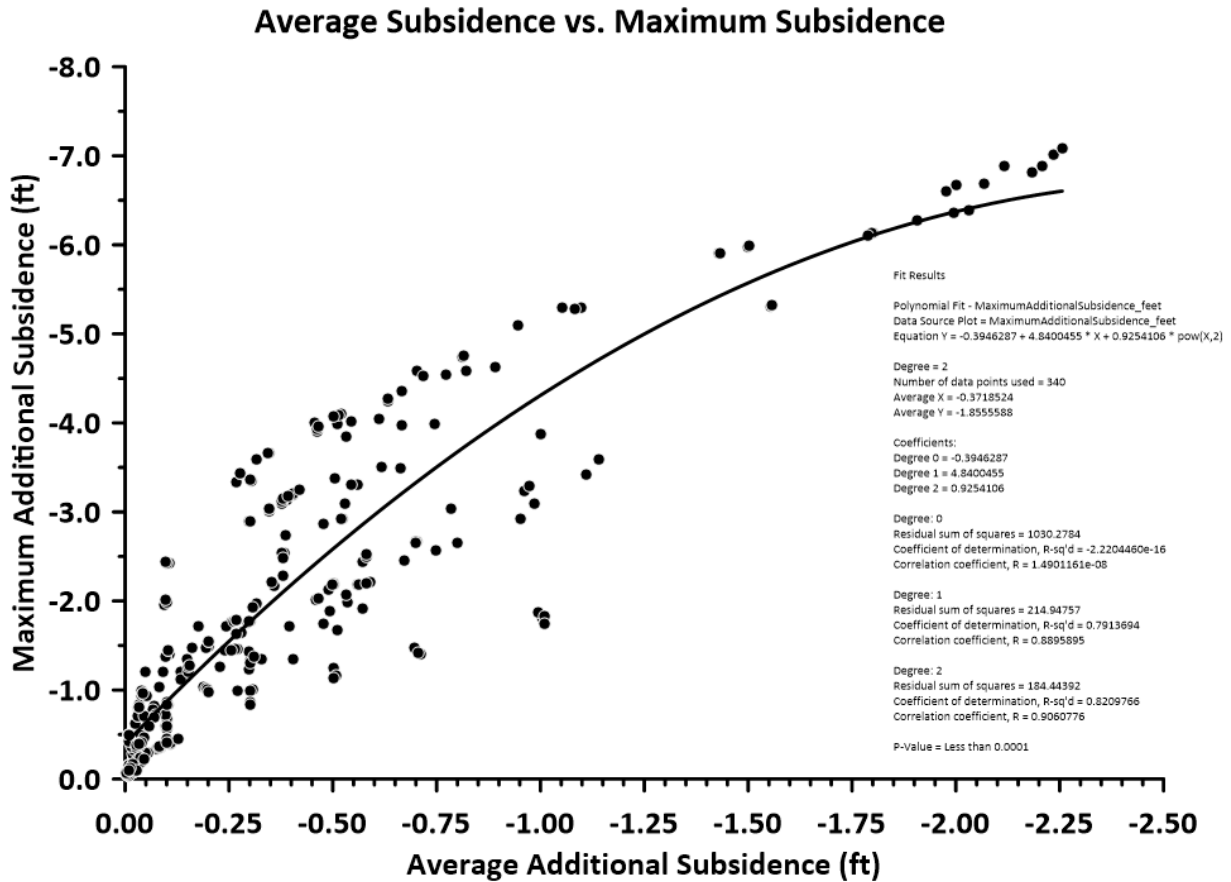


Figure 13. Average and Maximum Subsidence - Waller County

## 5.4 Interpretation of Average and Maximum Subsidence

At the April 29, 2020 meeting of Groundwater Management Area 14, the relationship between average additional subsidence and maximum additional subsidence was discussed based on simulation results from several different scenarios from Wade Oliver of INTERA (the GMA 14 technical consultant). Figure 14 represents a plot of average additional subsidence versus maximum additional subsidence for each county in Groundwater Management Area 14 for all the simulations that had been completed at that time.



**Figure 14. Average Additional Subsidence vs. Maximum Additional Subsidence - HAGM Simulations**

## 5.5 Comparison of Simulated Maximum Subsidence with Current Desired Future Conditions

In 2016, the desired future condition that was adopted by the groundwater conservation districts of Groundwater Management Area 14 included a maximum subsidence desired future condition for each of the counties in the Bluebonnet GCD. No other counties in Groundwater Management Area 14 GCD had included subsidence as part of the desired future condition statement. Because Bluebonnet GCD has a specific rule regarding the avoidance of subsidence, Bluebonnet GCD requested that the maximum subsidence be included to provided consistency and a link between the district’s three areas of focus:

- Planning activities (joint planning and desired future conditions)
- Management activities (district management plan)
- Regulatory activities (rules and permit review procedures)

Table 6 presents the current subsidence-based desired future condition values and four subsidence results for each county from the HAGM simulation that is the subject of this report.

**Table 6. Current DFC and Maximum Subsidence Results from HAGM Simulation**

County	Current DFC - Maximum Subsidence from 1890 to 2070 (ft)	Simulated Maximum Subsidence (ft)				Simulated Additional Subsidence (ft from 2009)		
		1890 to 2009	1890 to 2026	1890 to 2070	1890 to 2080	2009 to 2026	2009 to 2070	2009 to 2080
Austin	2.83	0.44	1.26	3.05	3.39	0.82	2.61	2.95
Grimes	0.12	0.07	0.12	0.23	0.25	0.05	0.16	0.18
Walker	0.04	0.04	0.11	0.16	0.17	0.07	0.12	0.13
Waller	4.73	2.35	3.91	5.08	5.39	1.56	2.73	3.04

The first subsidence column is the current desired future condition (DFC) which is expressed as the maximum subsidence from 1890 to 2070 in feet. This was obtained from the results of the HAGM simulation that formed the basis for all the desired future conditions for the second round of joint planning. The next four columns present the results of the current HAGM simulation that is the subject of this report for four different time periods:

- 1890 to 2009 (the calibration period of the HAGM to establish a baseline of “current” subsidence)
- 1890 to 2026 (the simulated subsidence through the year 2026)
- 1890 to 2070 (for direct comparison with the current desired future condition)
- 1890 to 2080 (the full simulation period)

The final three columns represent the simulated additional subsidence from the base year 2009 for three time periods: 2009 to 2026, 2009 to 2070, and 2009 to 2080. The 2009 to 2026 period is

significant because the fourth round of joint planning (proposed deadline of May 1, 2026) will presumably use a new and improved groundwater model currently under development.

The differences between the current DFC and the 1890 to 2070 subsidence are all less than one foot. Also, the differences between the current DFC and the 1890 to 2080 are also all less than one foot. Thus, it appears, based on the calibration of the HAGM, that the differences may not be significant.

The “current” subsidence (1890 to 2009) column shows that the only maximum subsidence value above one foot is in Waller County. The simulated subsidence is a result of pumping in Waller County and surrounding counties as demonstrated in Hutchison (2014b).

The columns that represent “additional” subsidence and are greater than one foot in Austin and Waller counties. This values are not necessarily significant relative to Bluebonnet GCD management and regulatory activities for the following reasons:

- Previous work in the area (Hutchison 2014b) demonstrated that much of the drawdown and associated subsidence is the result of pumping outside of the regulatory authority of the Bluebonnet GCD,
- The simulation assumed that total pumping in all counties would increase beginning in 2010. This higher pumping was assumed constant from 2010 to 2080. Actual pumping from 2010 to present is likely closer to the 2009 value than the assumed increase used in the simulation. Therefore, it is unlikely that the drawdown estimated by the simulation has occurred. Because of the established link between groundwater pumping, drawdown, and subsidence, it is unlikely that this amount of subsidence is likely before 2026.

The Bluebonnet GCD permit process requires that permit applicants evaluate the potential for subsidence for all proposed large well production permits. The joint planning process provides a reasonable foundation for the review of any permit applications, but the results are not considered regulatory limits by Bluebonnet GCD.

Based on the values provided above, permit applications for large increases in pumping are unlikely to be constrained by subsidence in Grimes and Walker counties. Permit applications in Austin and Waller counties will require more permit-specific review with particular attention to the relative contribution of any predictive subsidence from pumping within the Bluebonnet GCD and the relative contribution of any predictive subsidence from pumping in surrounding counties. The next section provides some more details on how the HAGM model results associated with the joint planning process can inform permit application review.

## 6.0 Simulated Drawdown versus Simulated Subsidence

### 6.1 Post-Processing Simulation Results

HAGM results for drawdown and subsidence for all cells within the Bluebonnet GCD were extracted from model output using the FORTRAN post-processor *ddsub.exe*. Source code for *ddsub.exe* is presented in Appendix D. The program:

- Reads the HAGM grid file,
- Reads the binary head output file and calculates drawdown for each model layer using 2009 as the base year,
- Reads the binary subsidence output file and calculates “additional” subsidence using 2009 as the base year,
- Writes “additional” subsidence and model layer drawdown output for all of Bluebonnet GCD, each county of Bluebonnet GCD (Austin, Grimes, Walker and Waller).

### 6.2 Simulated BGCD Aquifer Drawdown versus Additional Subsidence

The results for the main aquifers are presented as follows:

- Figure 15 (Chicot Aquifer – HAGM Layer 1)
- Figure 16 (Evangeline Aquifer – HAGM Layer 2)
- Figure 17 (Jasper Aquifer – HAGM Layer 4)

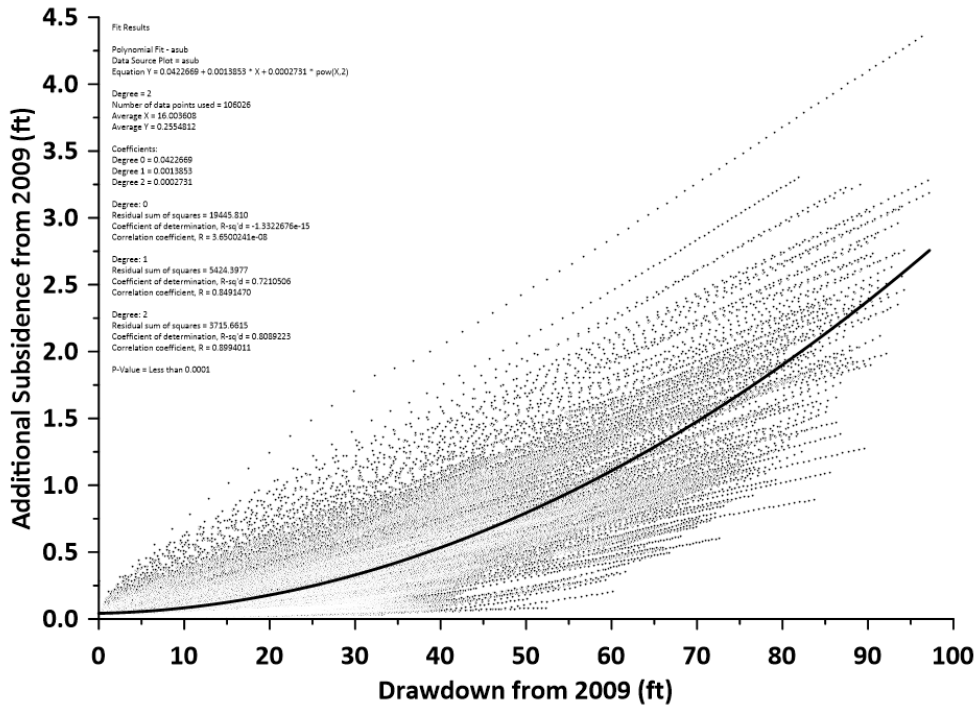
For each plot, each data point represents a drawdown result and an additional subsidence result from one cell and from one stress period. Because drawdown and subsidence tend to increase with time (2010 to 2080), there are near-linear trends within the plot that represent the drawdown-subsidence relationship for an individual cell through time. There is a polynomial best fit line also shown on each plot.

From these plots, the best fit line suggests the following relationships:

- For the Chicot Aquifer, a drawdown of about 60 feet would be needed to achieve one foot of subsidence,
- For the Evangeline Aquifer, a drawdown of about 100 feet would be needed to achieve one foot of subsidence,
- For the Jasper Aquifer, a drawdown of about 325 feet would be needed to achieve one foot of subsidence.

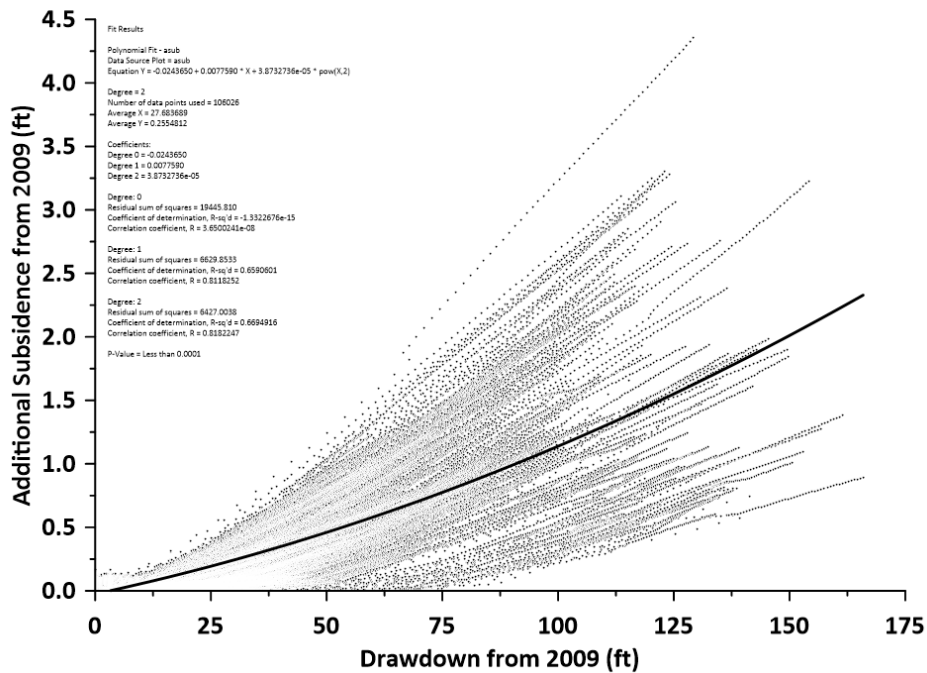
From the plots, it can also be seen that there is considerable variability in the drawdown-subsidence relationship. From a planning perspective, this variability is not necessarily limiting. From a management or regulatory perspective, this degree of variability would be an issue of concern without additional data or analysis, which is the primary reason for the Bluebonnet GCD Phase I and Phase II hydrogeologic report requirements related to permit applications.

**Bluebonnet Groundwater Conservation District  
Chicot Aquifer Drawdown vs. Additional Subsidence**



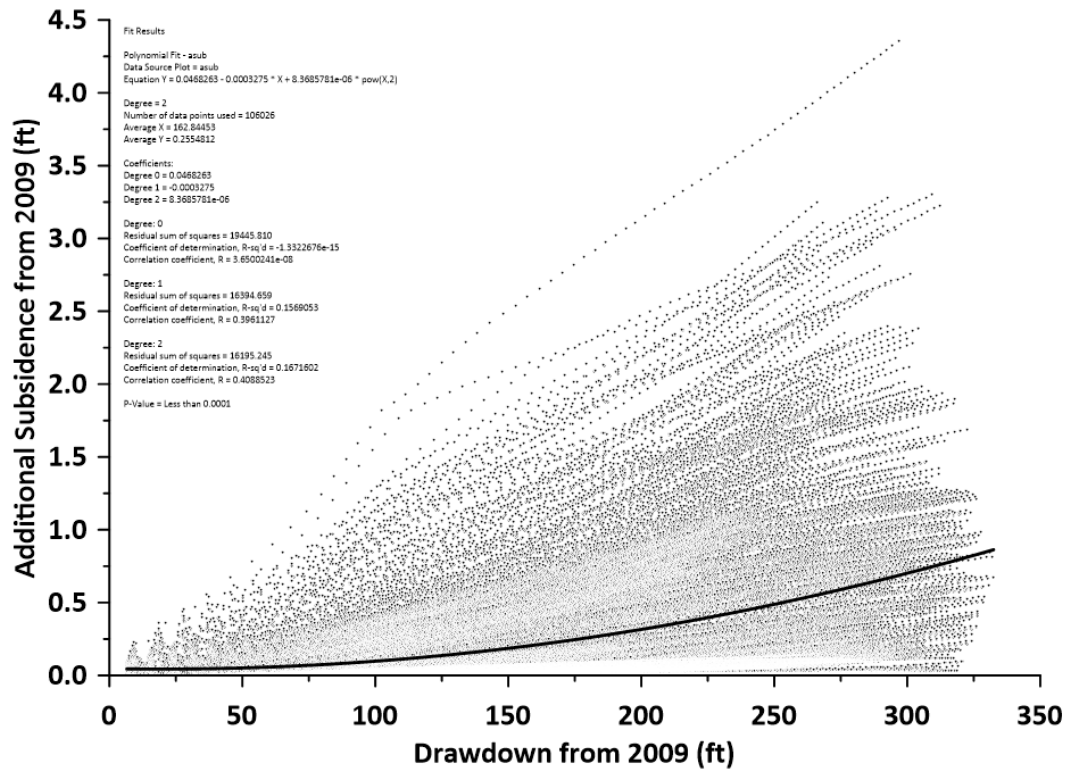
**Figure 15. BGCD Drawdown vs. Additional Subsidence - Chicot Aquifer**

**Bluebonnet Groundwater Conservation District  
Evangeline Aquifer Drawdown vs. Additional Subsidence**



**Figure 16. BGCD Drawdown vs. Additional Subsidence - Evangeline Aquifer**

### Bluebonnet Groundwater Conservation District Jasper Aquifer Drawdown vs. Additional Subsidence



**Figure 17. BGCD Drawdown vs. Additional Subsidence - Jasper Aquifer**

### 6.3 Simulated County-Specific Drawdown versus Additional Subsidence

Based on the analysis of the previous section, subsidence is not a significant concern in Grimes and Walker counties and could be an issue of concern in Austin and Waller counties. In addition, due to limitations of the HAGM, the simulated relationship between drawdown and additional subsidence for the Jasper Aquifer may not be reliable. County and aquifer specific plots of drawdown versus additional subsidence are presented as follows:

- Figure 18 – Austin County, Chicot Aquifer
- Figure 19 – Austin County, Evangeline Aquifer
- Figure 20 – Waller County, Chicot Aquifer
- Figure 21 – Waller County, Evangeline Aquifer

For each plot, each data point represents a drawdown result and an additional subsidence result from one cell and from one stress period. Because drawdown and subsidence tend to increase with time (2010 to 2080), there are near-linear trends within the plot that represent the drawdown-subsidence relationship for an individual cell through time. There is a polynomial best fit line also shown on each plot.

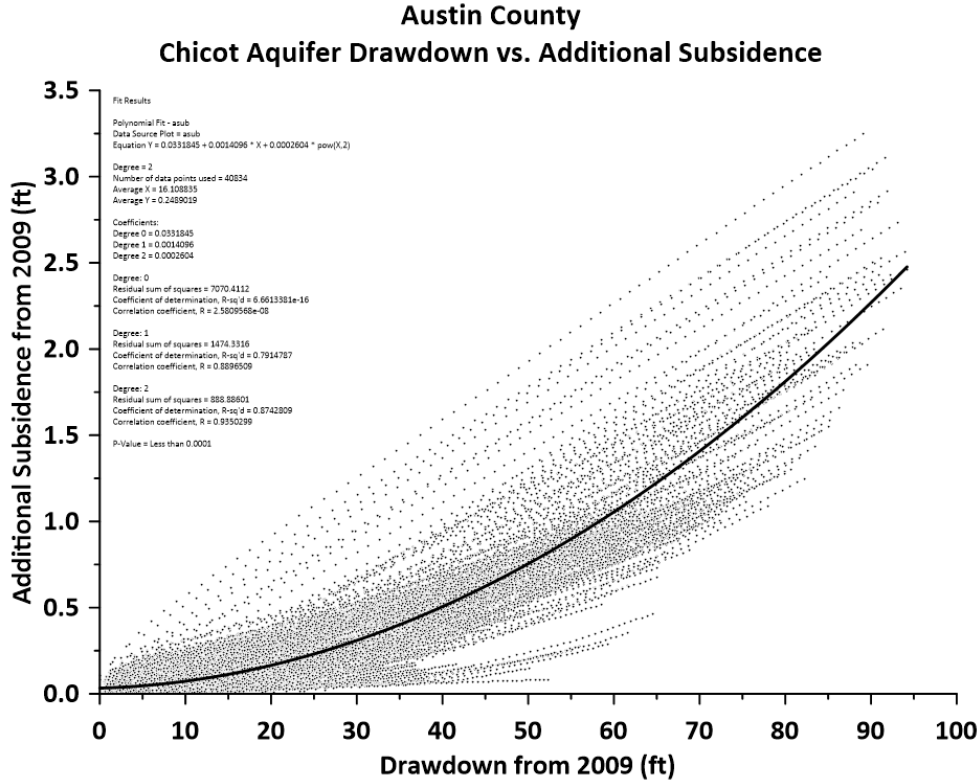


Figure 18. Austin County Drawdown vs. Additional Subsidence - Chicot Aquifer

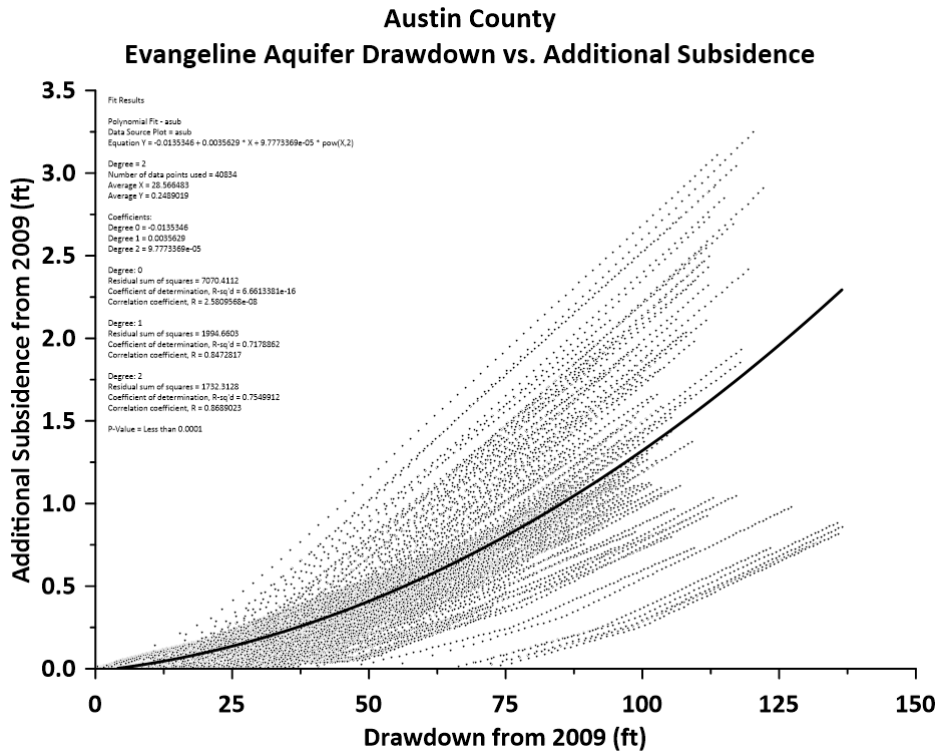


Figure 19. Austin County Drawdown vs. Additional Subsidence - Evangeline Aquifer



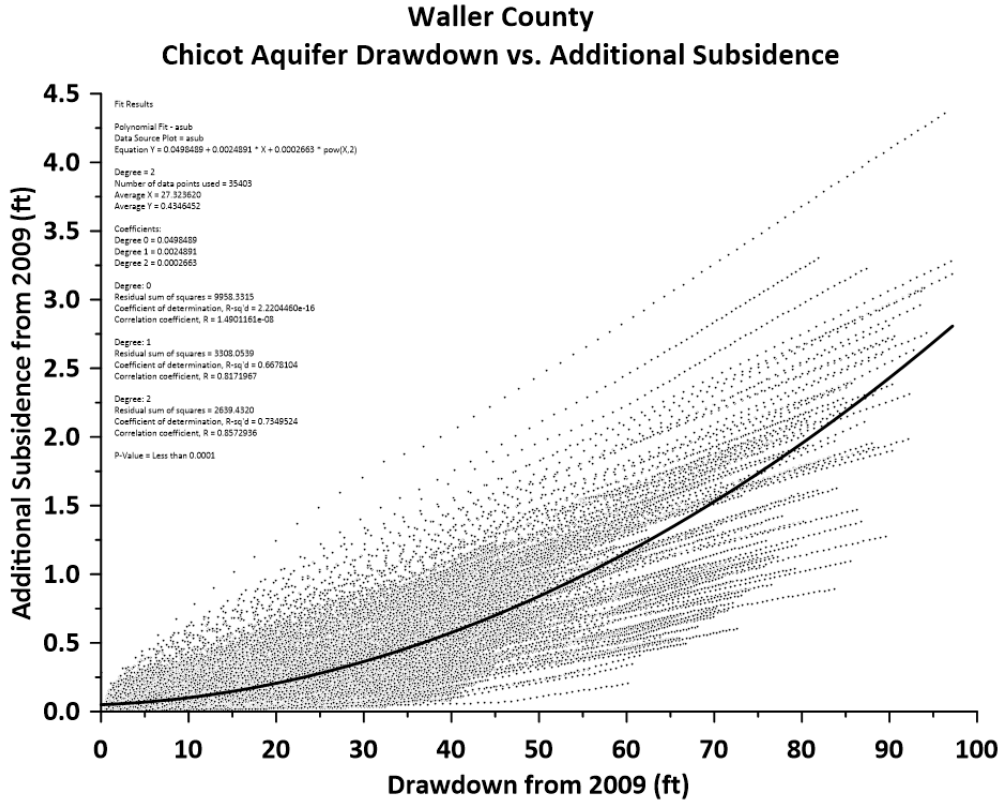


Figure 20. Waller County Drawdown vs. Additional Subsidence - Chicot Aquifer

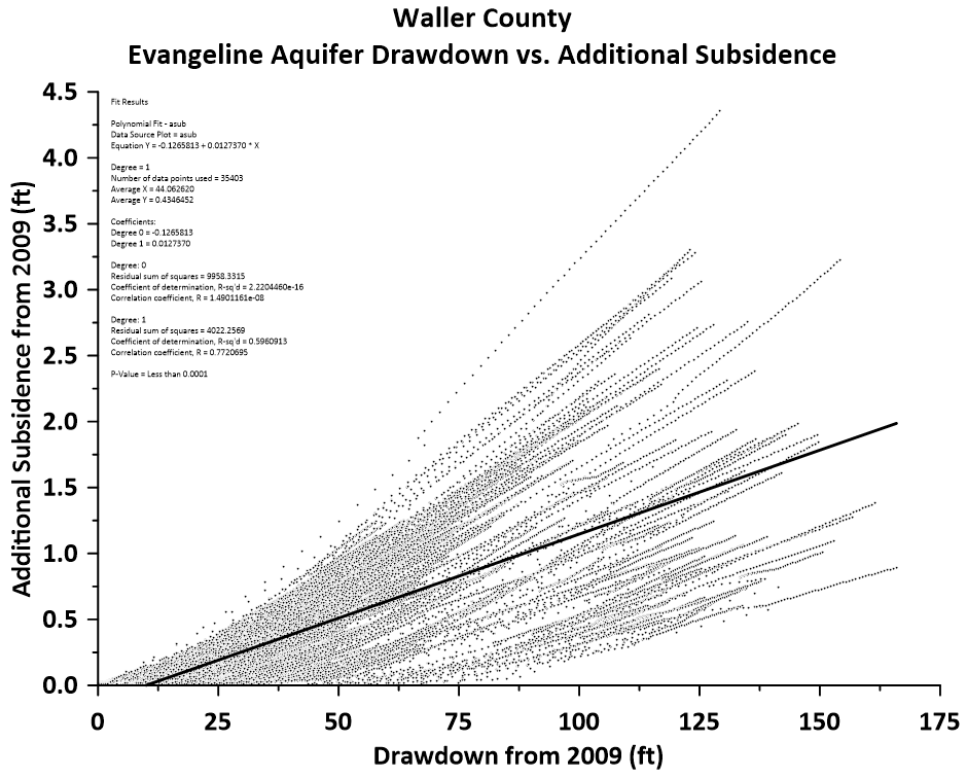


Figure 21. Waller County Drawdown vs. Additional Subsidence - Evangeline Aquifer

The Austin County plots (Figures 18 and 19) show:

- In the most vulnerable places of Austin County, a Chicot Aquifer drawdown of about 25 feet would result in about one foot of additional subsidence, and an Evangeline Aquifer drawdown of about 50 feet would result in about one foot of additional subsidence.
- Based on the best fit line, a Chicot Aquifer drawdown of about 60 feet would result in about one foot of drawdown, and an Evangeline Aquifer drawdown of about 80 feet would result in about one foot of additional subsidence

The Waller County plots (Figures 20 and 21) show:

- In the most vulnerable places of Waller County, a Chicot Aquifer drawdown of about 20 feet would result in about one foot of additional subsidence, and an Evangeline Aquifer drawdown of about 50 feet would result in about one foot of additional subsidence.
- Based on the best fit line, a Chicot Aquifer drawdown of about 60 feet would result in about one foot of additional subsidence, and an Evangeline Aquifer drawdown of about 100 feet would result in about one foot of additional subsidence.

These observations provide some guidance to evaluating future Phase I or Phase II hydrogeologic results for new permit applications. They are not intended to be absolute limits but provide a foundation upon which to review predicted drawdowns in the context of subsidence. Indeed, the need for site-specific data is evident in a groundwater management or regulation context that is quite different than how these results are viewed in a planning context.

## 7.0 Comparison of Measured and Simulated Drawdowns

Hutchison (2021) completed a comparison of measured drawdown data with simulated drawdown results from the HAGM simulation that was the basis for the 2016 desired future condition. This approach to compare measured drawdown and simulated drawdown on a well-by-well basis has been used over the last several years by Bluebonnet GCD to track desired future condition progress as documented in the management plan. The comparison is also at the foundation of the Phase I hydrogeologic reports required of large well permit applications.

Because the HAGM was calibrated from 1890 to 2009, and the predictive simulations used for joint planning include predictive pumping from 2010 to the end of the simulation, it is possible to complete a comparison of measured drawdown and simulated drawdown from 2010 to 2020 of the simulation covered in this report.

### 7.1 Measured Drawdowns

Hutchison (2021) documented the process used to process TWDB Groundwater Database groundwater elevations to usable measured drawdowns for all of Groundwater Management Area 14. The resulting file from that process (*agwe2009base.dat*) was used in this effort.

### 7.2 Post-Processing Simulation Results

HAGM results for simulated drawdown for all cells within the Bluebonnet GCD were extracted from model output using the FORTRAN post-processor *getdd.exe*. Source code for *getdd.exe* is presented in Appendix E. The program:

- Reads the HAGM binary head output file and calculates drawdowns using 2009 as the base year,
- Reads the actual drawdown data from Hutchison (2021) that includes the layer, row, column, and stress period of the actual drawdown,
- Writes the actual drawdown and simulated drawdown for each data point in the actual drawdown file.

The resulting file from the post-processor was imported into Excel and data from the four counties were extracted. The entire output and the data from the four counties were saved in an Excel file named *BluebonnetCompare.xlsx*. One sheet has the results for all of GMA 14, and each county in the Bluebonnet GCD (Austin, Grimes, Walker, and Waller) has an individual sheet.

### 7.3 Actual Drawdown versus Simulated Drawdown

Figure 22 presents the comparison of actual drawdown and simulated drawdown that is color coded for each county. Please note that the diagonal line represents the one-to-one relationship between actual and simulated drawdown (actual drawdown and simulated drawdown are equal). The vertical line on the right side of the graph represents zero actual drawdown (data points to the right of the line

represent negative drawdown, or groundwater level recovery, data points to the left of the line represent positive drawdown, or groundwater level decline).

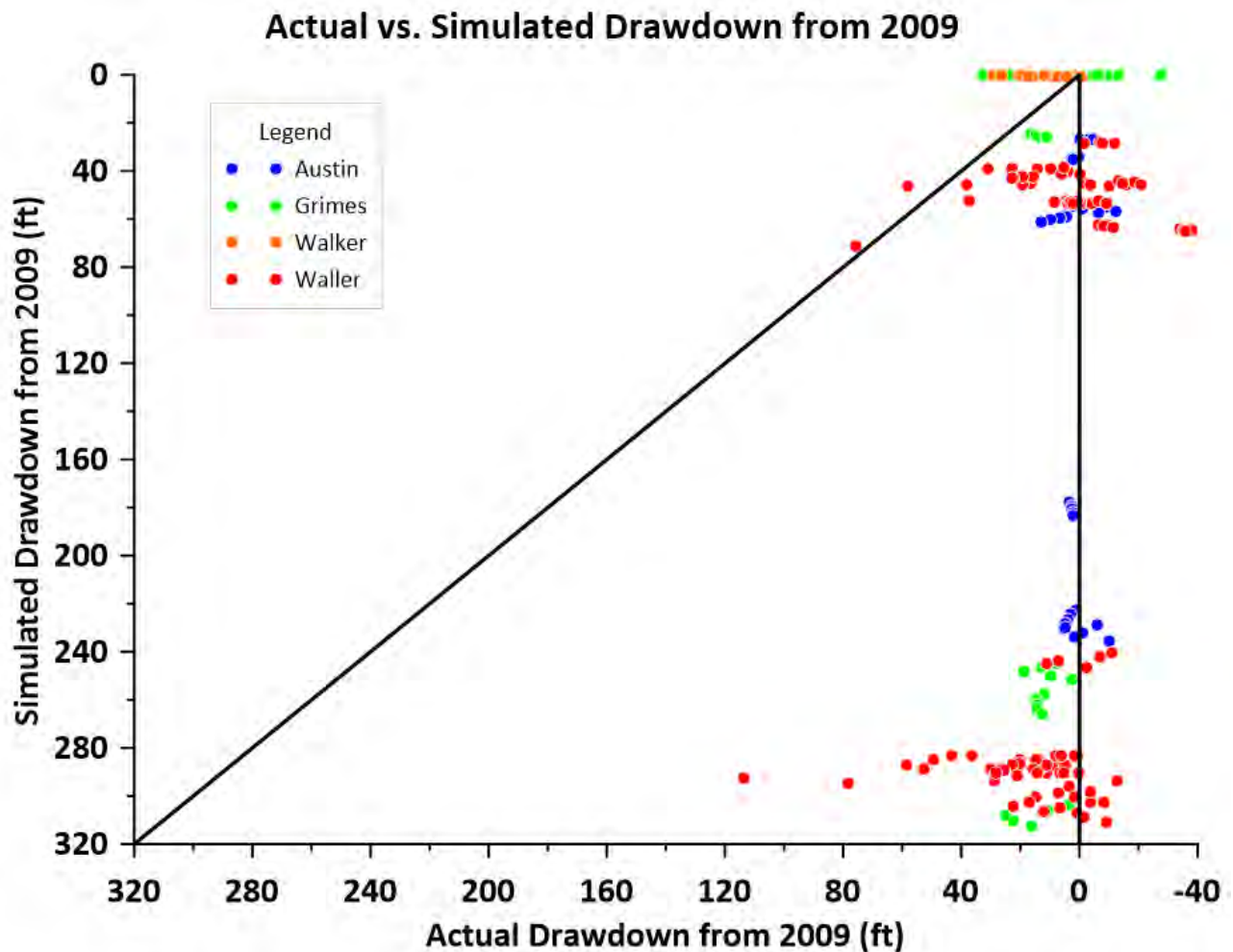


Figure 22. Actual vs. Simulated Drawdown from 2009

Please note that the highest actual drawdown is nearly 120 feet, while there are numerous instances where simulated drawdown is greater than 250 feet. The simulated drawdown values are associated with simulated pumping that is significantly higher than historic pumping, and, as has been discussed, is likely not realistic.

The plot also depicts several data points with simulated drawdown of zero and actual drawdown of between about -40 and 60 feet (the horizontal collection of points at the upper right of the plot). This suggests potential problems with the model predictions in specific parts of Grimes and Walker counties, or an issue with the aquifer designation of the well.

There is a large collection of points near the upper right portion of the graph that show actual drawdowns of between about -40 to 100 feet and simulated drawdowns between about 40 to 80 feet.

Please note that only two points are to the left of or above the diagonal line for points with a non-zero simulated drawdown. For these points, the actual drawdowns are greater than the simulated drawdowns.

Overall, the plot demonstrates the comparison yields the conclusion that actual drawdowns are less than simulated drawdowns. This is due to simulated pumping that is likely higher than actual pumping, and, in some cases, the limitations of the model.

## **8.0 References**

Hutchison, W.R., 2014a. Comparison of Various Input Parameters of the Houston Area Groundwater Model (HAGM) and the Northern Gulf Coast Groundwater Availability Model (GAM) for Austin, Grimes, Walker, and Waller Counties, Texas. Report prepared for Bluebonnet Groundwater Conservation District, Navasota, Texas. January 7, 2014, 46p.

Hutchison, W.R., 2014b. Technical Review of Electro Purification LLC Applications for: 1) Authorization to Drill, Operate, and Aggregate Ten New Wells for Production of Groundwater within the Bluebonnet Groundwater Conservation District, and 2) Out-of-District Transport of Groundwater for Beneficial Uses in Fort Bend County. Report prepared for Bluebonnet Groundwater Conservation District, Navasota, Texas. January 12, 2014, 274p.

Hutchison, W.R., 2021. Comparison of Measured and Simulated Drawdowns in Groundwater Management Area 14. Report prepared for Bluebonnet Groundwater Conservation District, Navasota, Texas. Draft of January 14, 2021, 14p.

## **Appendix A**

**Source Code for *getpump.exe***

```

1  ! getpump.exe
2  !
3  ! read cbb file
4  ! read grid file and list of counties
5  ! sum pumping for each county-aquifer unit
6  ! write summary files
7  ! write summary files for BGCD
8
9  ! declare arrays
10
11 dimension cbb(4,245,137),pump(149,4,137,245)
12 character*16 text
13 dimension icolist(20)
14 character*30 conam(20)
15 dimension ib(4,137,245),icogrid(137,245),igma(137,245)
16 dimension sumpump(149,20,5)
17
18 ! read cbb file
19
20 open (1,file='HAGM_BT_base_2080.cbb',form='binary')
21 open (2,file='cbbheader.dat')
22
23 ! first steady state stress period
24
25 do 100 k=1,7
26 read (1) kstp,kper,text,ncol,nrow,nlay
27 write (2,210) kstp,kper,text,ncol,nrow,nlay
28 210 format (2i10,1x,a16,3i10)
29 read (1) (((cbb(il,ic,ir),ic=1,245),ir=1,137),il=1,4)
30 100 continue
31
32 ! transient stress periods
33
34 do 101 isp=2,149
35 do 102 k=1,8
36 read (1) kstp,kper,text,ncol,nrow,nlay
37 write (2,210) kstp,kper,text,ncol,nrow,nlay
38 read (1) (((cbb(il,ic,ir),ic=1,245),ir=1,137),il=1,4)
39 if (k.eq.6.and.isp.ge.58) then
40 do 103 il=1,4
41 do 104 ir=1,137
42 do 105 ic=1,245
43 pump(isp,il,ir,ic)=-cbb(il,ic,ir)*365/43560
44 105 continue
45 104 continue
46 103 continue

```

```

47  end if
48  102 continue
49  101 continue
50
51  ! read list of counties
52
53  open (4,file='gma14counties.csv')
54  do 400 k=1,20
55  read (4,*) conam(k),icolist(k)
56  400 continue
57
58  ! read grid file
59
60  open (5,file='glfc_n_grid_poly082615v2.csv')
61  read (5,*) text
62  do 500 k=1,33565
63  read (5,*) ir,ic,icogrid(ir,ic),(ib(il,ir,ic),il=1,4),igma(ir,ic)
64  500 continue
65
66  ! sum pumping by county-aquifer unit
67
68  do 600 ir=1,137
69  do 601 ic=1,245
70  do 602 ico=1,20
71  if (icogrid(ir,ic).eq.icolist(ico)) then
72  do 603 isp=58,149
73  do 604 il=1,4
74  sumpump(isp,ico,il)=sumpump(isp,ico,il)+pump(isp,il,ir,ic)
75  604 continue
76  603 continue
77  end if
78  602 continue
79  601 continue
80  600 continue
81
82  ! sum total pumping in each county
83
84  do 700 isp=58,149
85  do 701 ico=1,20
86  sumpump(isp,ico,5)=sumpump(isp,ico,1)+sumpump(isp,ico,2)+sumpump(isp,ico,3)+su
87  mpump(isp,ico,4)
88  701 continue
89  700 continue
90
91  ! write annual pumping results
92

```



```

93  open (11,file='annpumpchicot.dat')
94  open (12,file='annpumpevan.dat')
95  open (13,file='annpumpburke.dat')
96  open (14,file='annpumpjasper.dat')
97  open (15,file='annpumptotal.dat')
98  open (16,file='annaustin.dat')
99  open (17,file='anngrimes.dat')
100 open (18,file='annwalker.dat')
101 open (19,file='annwaller.dat')
102 do 800 isp=58,149
103   iyr=isp+1931
104   write (11,810) isp,iyr,(sumpump(isp,ico,1),ico=1,20)
105   write (12,810) isp,iyr,(sumpump(isp,ico,2),ico=1,20)
106   write (13,810) isp,iyr,(sumpump(isp,ico,3),ico=1,20)
107   write (14,810) isp,iyr,(sumpump(isp,ico,4),ico=1,20)
108   write (15,810) isp,iyr,(sumpump(isp,ico,5),ico=1,20)
109   write (16,811) isp,iyr,(sumpump(isp,1,il),il=1,5)
110   write (17,811) isp,iyr,(sumpump(isp,6,il),il=1,5)
111   write (18,811) isp,iyr,(sumpump(isp,18,il),il=1,5)
112   write (19,811) isp,iyr,(sumpump(isp,19,il),il=1,5)
113   810 format (2i10,20f10.0)
114   811 format (2i10,5f10.0)
115   800 continue
116
117 ! write decadal pumping results by county
118
119 open (21,file='MAGChicot.dat')
120 open (22,file='MAGEvangeline.dat')
121 open (23,file='MAGBurkeville.dat')
122 open (24,file='MAGJasper.dat')
123 do 900 ico=1,20
124   write (21,910) conam(ico),(sumpump(isp,ico,1),isp=79,149,10)
125   write (22,910) conam(ico),(sumpump(isp,ico,2),isp=79,149,10)
126   write (23,910) conam(ico),(sumpump(isp,ico,3),isp=79,149,10)
127   write (24,910) conam(ico),(sumpump(isp,ico,4),isp=79,149,10)
128   910 format (a16,1x,8f10.0)
129   900 continue
130
131
132 stop
133 end

```

## **Appendix B**

**Source Code for *getavgdd.exe***

```

1  ! getavgdd.exe
2  !
3  ! read gam dates for each stress period
4  ! read list of GMA 14 counties
5  ! read GAM grid file
6  ! count cells in each county-aquifer unit
7  ! read simulated head file
8  ! calculate and sum drawdowns
9  ! read list of county file names
10 ! write annual drawdowns for each county
11 ! write summaries of final drawdowns
12
13 ! declare arrays
14
15 character*4 TEXT
16 dimension ib(4,137,245),hds(149,4,245,137)
17 dimension xc(137,245),yc(137,245)
18 dimension TEXT(4)
19 character*30 text2
20 dimension icogrid(137,245),igma(137,245),icolist(20),cocount(5,20)
21 character*16 conam(20)
22 character*60 fn(21)
23 dimension sumdd(149,5,21),avgdd(149,5,21),spdate(149)
24
25 ! initialize arrays
26
27 do 11 isp=1,149
28 do 12 il=1,5
29 do 13 icnty=1,21
30 sumdd(isp,il,icnty)=0
31 avgdd(isp,il,icnty)=0
32 13 continue
33 12 continue
34 11 continue
35
36 ! read dates for each stress period
37
38 open (1,file='gamspdates.dat')
39 do 100 isp=1,149
40 read (1,*) spdate(isp),x1
41 100 continue
42
43 ! read list of counties and codes
44
45 open (2,file='gma14counties.csv')
46 do 200 k=1,20

```

```

47 read (2,*) conam(k),icolist(k)
48 200 continue
49
50 ! read GAM grid
51
52 open (3,file='glfc_n_grid_poly082615v2.csv')
53 read (3,*) text
54 do 300 k=1,33565
55 read (3,*) ir,ic,icogrid(ir,ic),(ib(il,ir,ic),il=1,4),igma(ir,ic)
56 300 continue
57
58 ! count cells
59
60 do 400 il=1,4
61 do 401 ir=1,137
62 do 402 ic=1,245
63 do 403 icnty=1,20
64 if (icogrid(ir,ic).eq.icolist(icnty).and.igma(ir,ic).eq.14) then
65 if (ib(il,ir,ic).ne.0) cocount(il,icnty)=cocount(il,icnty)+1
66 end if
67 403 continue
68 402 continue
69 401 continue
70 400 continue
71
72 ! sum layer count to overall county count
73
74 do 410 icnty=1,20
75 cocount(5,icnty)=cocount(1,icnty)+cocount(2,icnty)+cocount(3,icnty)+cocount(4,icnty)
76 410 continue
77
78 ! write county count output
79
80 open (4,file='countycount.dat')
81 do 420 icnty=1,20
82 write (4,430) conam(icnty),(cocount(il,icnty),il=1,5)
83 430 format (a16,4x,5f10.0)
84 420 continue
85
86 ! read hds file
87
88 open (6,file='header.dat')
89 OPEN(5,FILE='HAGM_BT_base_2080.hds',FORM='binary')
90
91 500 read(5,end=599) KSTP,KPER,PERTIM,TOTIM,TEXT,NCOL,NROW,IL
92 write (6,510) k,KSTP,KPER,PERTIM,TOTIM,TEXT,NCOL,NROW,IL

```

```

93 510 format (3i10,2f15.2,4a4,3i10)
94 read(5) ((hds(kper,il,IC,IR),IC=1,NCOL),IR=1,NROW)
95 goto 500
96 599 continue
97
98 ! calculate drawdown
99
100 do 600 isp=1,149
101 do 601 il=1,4
102 do 602 ir=1,137
103 do 603 ic=1,245
104
105 if (ib(il,ir,ic).ne.0) then
106 dd=hds(78,il,ic,ir)-hds(isp,il,ic,ir)
107 do 604 icnty=1,20
108 if (icogrid(ir,ic).eq.icolist(icnty).and.igma(ir,ic).eq.14) then
109 sumdd(isp,il,icnty)=sumdd(isp,il,icnty)+dd
110 end if
111 604 continue
112 end if
113
114 603 continue
115 602 continue
116 601 continue
117 600 continue
118
119 ! sum drawdowns
120
121 do 610 isp=1,149
122 do 611 il=1,4
123 do 612 icnty=1,20
124 sumdd(isp,5,icnty)=sumdd(isp,1,icnty)+sumdd(isp,2,icnty)+sumdd(isp,3,icnty)+sumdd(isp,4,icnty)
125 612 continue
126 611 continue
127 610 continue
128
129
130 ! calculate average drawdowns
131
132 do 700 isp=1,149
133 do 701 il=1,5
134 do 702 icnty=1,20
135 if (cocount(il,icnty).gt.0) then
136 avgdd(isp,il,icnty)=sumdd(isp,il,icnty)/cocount(il,icnty)
137 else
138 avgdd(isp,il,icnty)=-9999

```

```

139  end if
140  702 continue
141  701 continue
142  700 continue
143
144  ! write annual county drawdowns
145
146  open (8,file='countyfn.dat')
147  do 801 icnty=1,20
148  read (8,*) fn(icnty)
149  open (11,file=fn(icnty))
150  do 802 isp=1,149
151  write (11,810) conam(icnty),isp,spdate(isp),(avgdd(isp,il,icnty),il=1,5)
152  802 continue
153  810 format (a16,4x,i10,6f10.2)
154  close (11)
155  801 continue
156
157  ! write drawdown summaries
158
159  open (31,'DFCsummary.dat')
160  open (32,file='Chicot.dat')
161  open (33,file='Evangeline.dat')
162  open (34,file='Burkeville.dat')
163  open (35,file='Jasper.dat')
164  do 900 icnty=1,20
165  write (31,910) conam(icnty),(avgdd(149,il,icnty),il=1,4)
166  910 format (a16,1x,4f10.0)
167  write (32,911) conam(icnty),avgdd(149,1,icnty)
168  write (33,911) conam(icnty),avgdd(149,2,icnty)
169  write (34,911) conam(icnty),avgdd(149,3,icnty)
170  write (35,911) conam(icnty),avgdd(149,4,icnty)
171  911 format (a16,1x,f10.2)
172  900 continue
173
174  stop
175  end
176

```

## **Appendix C**

### **Source Code for *getsub.exe***

```

1  ! getsub.exe
2  !
3  ! read gam dates/sp
4  ! read list of counties and grid file
5  ! count cells in each county
6  ! read subsidence output
7  ! write output files
8
9  ! declare arrays
10
11 character*4 TEXT
12 dimension ib(4,137,245),sub(149,245,137)
13 dimension TEXT(4)
14 character*30 text2
15 dimension icogrid(137,245),igma(137,245),icolist(20),cocount(5,20)
16 character*16 conam(20)
17 character*60 fn(21)
18 dimension
19 sumsub(149,20),avgsub(149,20),spdate(149),xmaxsub(149,20),cosubcount(149,20)
20
21 ! initialize subsidence variables
22
23 do 11 isp=1,149
24 do 13 icnty=1,21
25 sumsub(isp,icnty)=0
26 xmaxsub(isp,icnty)=0
27 13 continue
28 12 continue
29 11 continue
30
31 ! read gam sp dates
32
33 open (1,file='gamspdates.dat')
34 do 100 isp=1,149
35 read (1,*) spdate(isp),x1
36 100 continue
37
38 ! read list of counties
39
40 open (2,file='gma14counties.csv')
41 do 200 k=1,20
42 read (2,*) conam(k),icolist(k)
43 200 continue
44
45 ! read gam grid file
46

```



```

47 open (3,file='glfc_n_grid_poly082615v2.csv')
48 read (3,*) text
49 do 300 k=1,33565
50 read (3,*) ir,ic,icogrid(ir,ic),(ib(il,ir,ic),il=1,4),igma(ir,ic)
51 300 continue
52
53 ! count cells in each county
54
55 do 400 il=1,4
56 do 401 ir=1,137
57 do 402 ic=1,245
58 do 403 icnty=1,20
59 if (icogrid(ir,ic).eq.icolist(icnty).and.igma(ir,ic).eq.14) then
60 if (ib(il,ir,ic).ne.0) cocount(il,icnty)=cocount(il,icnty)+1
61 end if
62 403 continue
63 402 continue
64 401 continue
65 400 continue
66
67 do 410 icnty=1,20
68 cocount(5,icnty)=cocount(1,icnty)+cocount(2,icnty)+cocount(3,icnty)+cocount(4,icnty)
69 410 continue
70
71 ! write county count results
72
73 open (4,file='countycount.dat')
74 do 420 icnty=1,20
75 write (4,430) conam(icnty),(cocount(il,icnty),il=1,5)
76 430 format (a16,4x,5f10.0)
77 420 continue
78
79 ! read subsidence output file
80
81 open (6,file='header.dat')
82 OPEN(5,FILE='HAGM_BT_base_subsidence_2080.hds',FORM='binary')
83 500 read(5,end=599) KSTP,KPER,PERTIM,TOTIM,TEXT,NCOL,NROW,IL
84 write (6,510) iscen,k,KSTP,KPER,PERTIM,TOTIM,TEXT,NCOL,NROW,IL
85 510 format (4i10,2f15.2,4a4,3i10)
86 read(5) ((sub(kper,IC,IR),IC=1,NCOL),IR=1,NROW)
87 goto 500
88 599 continue
89
90 ! sum subsidence results for each county and find max subsidence
91
92 do 601 isp=1,149

```

```

93 do 602 ir=1,137
94 do 603 ic=1,245
95
96 do 604 il=1,4
97 if (ib(il,ir,ic).ne.0) icheck=icheck+1
98 604 continue
99
100 if (icheck.gt.0) then
101 do 605 icnty=1,20
102 if (icogrid(ir,ic).eq.icolist(icnty).and.igma(ir,ic).eq.14) then
103 xmaxsub(isp,icnty)=max(xmaxsub(isp,icnty),sub(isp,ic,ir))
104 sumsub(isp,icnty)=sumsub(isp,icnty)+sub(isp,ic,ir)
105 cosubcount(isp,icnty)=cosubcount(isp,icnty)+1
106 end if
107 605 continue
108 end if
109
110 icheck=0
111 603 continue
112 602 continue
113 601 continue
114
115 ! calculate average subsidence
116
117 do 701 isp=1,149
118 do 702 icnty=1,20
119 if (cosubcount(isp,icnty).gt.0) then
120 avgsub(isp,icnty)=sumsub(isp,icnty)/cosubcount(isp,icnty)
121 else
122 avgsub(isp,icnty)=-9999
123 end if
124 702 continue
125 701 continue
126
127 ! read county file names and write county output
128
129 open (8,file='countyfn.dat')
130 do 801 icnty=1,20
131 read (8,*) fn(icnty)
132 open (11,file=fn(icnty))
133 do 802 isp=1,149
134 write (11,810) conam(icnty),isp,spdate(isp),avgsub(isp,icnty),xmaxsub(isp,icnty)
135 802 continue
136 810 format (a16,4x,i10,3f10.2)
137 close (11)
138 801 continue

```

```
139
140
141 ! write 2080 subsidence results
142
143 open (31,file='sub2080.dat')
144 do 900 icnty=1,20
145 avg1=avgsub(149,icnty)
146 avg2=avgsub(149,icnty)-avgsub(78,icnty)
147 xmax1=xmaxsub(149,icnty)
148 xmax2=xmaxsub(149,icnty)-xmaxsub(78,icnty)
149 write (31,910) conam(icnty),avg1,avg2,xmax1,xmax2
150 910 format (a16,1x,4f10.2)
151 900 continue
152
153
154 stop
155 end
156
```

## **Appendix D**

**Source Code for *ddsub.exe***

```

1  ! ddsb.exe
2
3  ! reads GAM grid file
4  ! reads hds file and calculates dd
5  ! reads sub file
6  ! writes cell by cell dd and "additional" subsidence output for BGCD cells
7
8  ! declare arrays
9
10 character*4 TEXT
11 dimension ib(4,137,245),hds(149,4,245,137),dd(149,4,245,137),sub(149,245,137)
12 dimension xc(137,245),yc(137,245)
13 dimension TEXT(4)
14 character*30 text2
15 dimension icogrid(137,245),igma(137,245),icolist(20),cocount(5,20)
16
17 ! read gam grid file
18
19 open (2,file='glfc_n_grid_poly082615v2.csv')
20 read (2,*) text
21 do 200 k=1,33565
22 read (2,*) ir,ic,icogrid(ir,ic),(ib(il,ir,ic),il=1,4),igma(ir,ic)
23 200 continue
24
25 ! read hds file
26
27 open (4,file='headerhds.dat')
28 OPEN(3,FILE='HAGM_BT_base_2080.hds',FORM='binary')
29
30 300 read(3,end=399) KSTP,KPER,PERTIM,TOTIM,TEXT,NCOL,NROW,IL
31 write (4,310) k,KSTP,KPER,PERTIM,TOTIM,TEXT,NCOL,NROW,IL
32 310 format (3i10,2f15.2,4a4,3i10)
33 read(3) ((hds(kper,il,IC,IR),IC=1,NCOL),IR=1,NROW)
34 goto 300
35 399 continue
36
37 ! calculate drawdown
38
39 do 400 isp=1,149
40 do 401 il=1,4
41 do 402 ir=1,137
42 do 403 ic=1,245
43 if (ib(il,ir,ic).ne.0) then
44 dd(isp,il,ic,ir)=hds(78,il,ic,ir)-hds(isp,il,ic,ir)
45 if (ib(il,ir,ic).eq.0) dd(isp,il,ic,ir)=-9999
46 end if

```

```

47 403 continue
48 402 continue
49 401 continue
50 400 continue
51
52 ! read subsidence output file
53
54 open (6,file='header.dat')
55 OPEN(5,FILE='HAGM_BT_base_subsidence_2080.hds',FORM='binary')
56 500 read(5,end=599) KSTP,KPER,PERTIM,TOTIM,TEXT,NCOL,NROW,IL
57 write (6,510) k,KSTP,KPER,PERTIM,TOTIM,TEXT,NCOL,NROW,IL
58 510 format (3i10,2f15.2,4a4,3i10)
59 read(5) ((sub(kper,IC,IR),IC=1,NCOL),IR=1,NROW)
60 goto 500
61 599 continue
62
63 ! BGCD dd and sub results (cell by cell)
64
65 open (7,file='BGCDddsub.dat')
66 open (11,file='Austinddsub.dat')
67 open (12,file='Grimesddsub.dat')
68 open (13,file='Walkerddsub.dat')
69 open (14,file='Wallerddsub.dat')
70 do 700 ir=1,137
71 do 701 ic=1,245
72 do 702 isp=79,149
73 asub=sub(isp,ic,ir)-sub(78,ic,ir)
74 if (asub.gt.0.01) then
75 j0=icogrid(ir,ic)
76 j1=8
77 j2=93
78 j3=236
79 j4=237
80 if (j0.eq.j1.or.j0.eq.j2.or.j0.eq.j3.or.j0.eq.j4) then
81 write (7,710) isp,ir,ic,j0,asub,(dd(isp,il,ic,ir),il=1,4)
82 if (j0.eq.j1) write (11,710) isp,ir,ic,j0,asub,(dd(isp,il,ic,ir),il=1,4)
83 if (j0.eq.j2) write (12,710) isp,ir,ic,j0,asub,(dd(isp,il,ic,ir),il=1,4)
84 if (j0.eq.j3) write (13,710) isp,ir,ic,j0,asub,(dd(isp,il,ic,ir),il=1,4)
85 if (j0.eq.j4) write (14,710) isp,ir,ic,j0,asub,(dd(isp,il,ic,ir),il=1,4)
86 710 format (4i10,f12.4,4f10.2)
87 end if
88 end if
89 702 continue
90 701 continue
91 700 continue
92

```

93 stop  
94 end

## **Appendix E**

**Source Code for *getdd.exe***



```

1  ! getdd.exe
2  !
3  ! read 2021 DFC hds file (70,1,30K,RunD)
4  ! calculate drawdown
5  ! read actual data file
6  ! write actual and simulated drawdown
7
8  ! declare arrays
9
10 character*4 text
11 dimension text(4)
12 dimension hds(149,4,245,137),dd(2010:2020,4,245,137)
13 character*30 county
14
15 ! read hds file
16
17 open (1,file='HAGM_BT_base_2080.hds',form='binary')
18 open (2,file='header.dat')
19 100 read (1,end=199) kstp,kper,pertim,totim,text,ncol,nrow,il
20 write (2,210) k,kstp,kper,pertim,totim,text,ncol,nrow,il
21 210 format (3i10,2f15.2,4a4,3i10)
22 read (1) ((hds(kper,il,ic,ir),ic=1,ncol),ir=1,nrow)
23 goto 100
24 199 continue
25
26 ! calculate drawdowns
27
28 do 200 kper=79,149
29 do 201 il=1,4
30 do 202 ir=1,137
31 do 203 ic=1,245
32 iyr=kper+1931
33 dd(iyr,il,ic,ir)=hds(78,il,ic,ir)-hds(kper,il,ic,ir)
34 203 continue
35 202 continue
36 201 continue
37 200 continue
38
39 ! read actual data
40 ! write actual and simulated drawdowns
41
42 open (3,file='agwe2009base.dat')
43 open (4,file='actsimdd2009base.dat')
44
45 do 300 k=1,5975
46 read (3,*) i1,iwn,il,ir,ic,iyr,basegwe,actgwe,actdd,county

```

```
47 write (4,410) iwn,il,ir,ic,iyr,actdd,dd(iyr,il,ic,ir),county
48 410 format (5i10,2f10.2,2x,a20)
49 300 continue
50
51 stop
52 end
```

## **Appendix G**

### **Resolution Adopting Management Plan and Notices of Public Hearing**

**BLUEBONNET GROUNDWATER CONSERVATION DISTRICT  
RESOLUTION NO. 2023-01**

**RESOLUTION OF THE BOARD OF DIRECTORS OF THE BLUEBONNET  
GROUNDWATER CONSERVATION DISTRICT ADOPTING A DISTRICT  
MANAGEMENT PLAN**

**THE STATE OF TEXAS   §  
  §  
COUNTY OF GRIMES   §**

WHEREAS, Bluebonnet Groundwater Conservation District (District) is a duly created and existing groundwater conservation district created and operating under Chapter 8825 of the Texas Special District Laws Code and Chapter 36 of the Texas Water Code, as amended;

WHEREAS, the Management Plan of the District attached hereto as Attachment A, has been developed for the purpose of conserving, preserving, protecting, and recharging the aquifers in the District, and this action is taken under the District’s statutory authority to prevent waste and protect rights of owners of interest in groundwater;

WHEREAS, after notice and hearing the Board of Directors (“Board”) of the District revised and readopted a Management Plan on September 21, 2023; and

WHEREAS, the Management Plan meets the requirements of Texas Water Code § 36.1071 and § 36.1072 and 31 TAC §§ 356.5 and 356.6.

**NOW THEREFORE, BE IT RESOLVED AND ORDERED BY THE BOARD OF DIRECTORS OF BLUEBONNET GROUNDWATER CONSERVATION DISTRICT THAT:**

1. The facts and recitations found in the preamble of this Resolution are hereby found and declared to be true and correct, and are incorporated by reference herein and expressly made a part hereof, as if copied verbatim.
2. The Board of Directors of the District hereby adopts the attached Management Plan as the Management Plan for the District, subject to those amendments necessary based on comments received from the public at the public hearing or Board meeting, recommendations from the District Board, staff, or legal counsel, or to incorporate technical information received from the Texas Water Development Board and/or District consultants.

3. The General Manager and staff of the District are hereby authorized to take all steps necessary to implement this resolution and submit the Management Plan to TWDB for its approval.
4. The General Manager and staff of the District are further authorized to take any and all action necessary to coordinate with the TWDB as may be required in furtherance of TWDB's approval pursuant to the provisions of Section 36.1072 of the Texas Water Code.

**PASSED AND APPROVED** this the 21<sup>st</sup> day of September 2023.

  
\_\_\_\_\_  
Jared Patout, President, Board of Directors

ATTEST:

  
\_\_\_\_\_  
Milton Beckendorff, Vice President, Board of Directors



Zach Holland

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## Open Meeting Submission

**TRD:** 2023005292  
**Date Posted:** 09/13/2023  
**Status:** Accepted  
**Agency Id:** 1114  
**Date of Submission:** 09/13/2023  
**Agency Name:** Bluebonnet Groundwater Conservation District  
**Board:** Board of Directors  
**Date of Meeting:** 09/21/2023  
**Time of Meeting:** 06:00 PM (###:## AM Local Time)  
**Street Location:** 1903 Dove Crossing, Suite A  
**City:** Navasota  
**State:** TX  
**Liaison Name:** Zach Holland  
**Liaison Id:** 4  
**Additional Information Obtained From:** Zach Holland  
 PO Box 269  
 1903 Dove Crossing Lane, Suite A  
 Navasota, Texas 77868  
 936-825-7303  
 zholland@bluebonnetgroundwater.org  
**Agenda:** BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Meeting  
 Thursday, September 21, 2023  
 6:00 PM

Bluebonnet Groundwater Conservation District  
 District Office  
 1903 Dove Crossing Lane, Suite A  
 Navasota, Texas

### AGENDA

1. Call to order.
2. Public Comment.  
(Public comment is limited to a maximum of 3 minutes per speaker and/or 30 minutes total time for all speakers).
3. Public Hearing on Management Plan to commence at 6:00 PM - A copy of the draft Management Plan is available for review at the District Office at the address described above and on the District's webpage at <http://www.bluebonnetgroundwater.org/regulations/management-plan/>.
4. Public Hearing on proposed revisions to District Rules to commence at 6:00PM - Proposed revisions reflect legislative changes made during the 88th Legislative Session including municipal and county authority of groundwater availability certification of subdivisions; exemption for a well for temporary use to supply water for a rig that is actively engaged in drilling a groundwater production well permitted by the District; water use export fees and use of fees; hearing continuance; request for rehearing or finding of fact and conclusions of law; decision when final after a contested case before SOAH; petition for adoption or modification of rules; and include revisions for typos, formatting, and clarity. A copy of the draft District Rules is available for review at the District Office at the address described above and on the District's webpage at <http://www.bluebonnetgroundwater.org/regulations/rules/>.
5. Discussion and possible action to re-adopt District Management Plan.
6. Discussion and possible action to adopt District Rules.
7. Discussion and possible action to approve minutes of April 13, 2023 Board Meeting.
8. Discussion and possible action to approve quarterly Financial Report.
9. Discussion and possible action to approve quarterly Investment Report.

10. Discussion and possible action to accept quarterly Drought Status Assessment.
11. Discussion and possible action to approve investment policy and adopt a resolution approving the investment policy and appointing an investment officer.
12. Discussion and possible action to approve employment contract for GM Holland.
13. Discussion and possible action to approve amended FY 2023 District Budget.
14. Discussion and possible action to approve FY 2024 District Budget.
15. Discussion and possible action to approve designations for Money Market Account and TexPool Investment Pools.
16. Discussion and possible action to approve dates and times for FY 2024 Board of Directors Meetings.
17. Discussion of revisions and timeline to District Fee Schedule amendments.
18. Discussion and possible action regarding USGS developed GULF 2023 model submission to TWDB for approval as the regional groundwater availability model.
19. Discussion and possible action to approve Board Policies revised to reflect changes from the 88th Legislative Session.
20. General Manager's Report
  - a. Well Registration/Permitting
  - b. TAGD, TGWA & TWCA
    - i. TAGD Texas Groundwater Summit, August 29-31, Hyatt Regency Hill Country, San Antonio
  - c. Region G & H RWPG
  - d. GMA 14 Joint Planning
  - e. Legislative Update
  - f. TWRI Update
  - i. Newsletter
    - ii. Upcoming Events
  - g. BGCD Update

21. Date for next regular Board meeting - October 2023

22. Adjourn

Agenda items may be considered, discussed and/or acted upon in a different order than the order set forth above.

Executive Session

The Board of Directors of the Bluebonnet Groundwater Conservation District reserves the right to adjourn into Executive (Closed) Session at any time during the course of this meeting to discuss any of the items listed on this agenda, as authorized by the Texas Government Code, Sections 551.071 (Consultations with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices), and 551.086 (Economic Development). No final action will be taken in Executive Session.

[New Submission](#)

[HOME](#) [TEXAS REGISTER](#) [TEXAS ADMINISTRATIVE CODE](#) [OPEN MEETINGS](#)

# BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Meeting  
Thursday, September 21, 2023  
6:00 PM

Bluebonnet Groundwater Conservation District  
District Office  
1903 Dove Crossing Lane, Suite A  
Navasota, Texas

## AGENDA

1. Call to order.
2. Public Comment.  
(Public comment is limited to a maximum of 3 minutes per speaker and/or 30 minutes total time for all speakers).
3. Public Hearing on Management Plan to commence at 6:00 PM – A copy of the draft Management Plan is available for review at the District Office at the address described above and on the District’s webpage at <http://www.bluebonnetgroundwater.org/regulations/management-plan/>.
4. Public Hearing on proposed revisions to District Rules to commence at 6:00PM – Proposed revisions reflect legislative changes made during the 88<sup>th</sup> Legislative Session including municipal and county authority of groundwater availability certification of subdivisions; exemption for a well for temporary use to supply water for a rig that is actively engaged in drilling a groundwater production well permitted by the District; water use export fees and use of fees; hearing continuance; request for rehearing or finding of fact and conclusions of law; decision when final after a contested case before SOAH; petition for adoption or modification of rules; and include revisions for typos, formatting, and clarity. A copy of the draft District Rules is available for review at the District Office at the address described above and on the District’s webpage at <http://www.bluebonnetgroundwater.org/regulations/rules/>.
5. Discussion and possible action to re-adopt District Management Plan.
6. Discussion and possible action to adopt District Rules.
7. Discussion and possible action to approve minutes of April 13, 2023 Board Meeting.
8. Discussion and possible action to approve quarterly Financial Report.
9. Discussion and possible action to approve quarterly Investment Report.
10. Discussion and possible action to accept quarterly Drought Status Assessment.
11. Discussion and possible action to approve investment policy and adopt a resolution approving the investment policy and appointing an investment officer.
12. Discussion and possible action to approve employment contract for GM Holland.



13. Discussion and possible action to approve amended FY 2023 District Budget.
14. Discussion and possible action to approve FY 2024 District Budget.
15. Discussion and possible action to approve designations for Money Market Account and TexPool Investment Pools.
16. Discussion and possible action to approve dates and times for FY 2024 Board of Directors Meetings.
17. Discussion of revisions and timeline to District Fee Schedule amendments.
18. Discussion and possible action regarding USGS developed GULF 2023 model submission to TWDB for approval as the regional groundwater availability model.
19. Discussion and possible action to approve Board Policies revised to reflect changes from the 88<sup>th</sup> Legislative Session.
20. General Manager's Report
  - a. Well Registration/Permitting
  - b. TAGD, TGWA & TWCA
    - i. TAGD Texas Groundwater Summit, August 29-31, Hyatt Regency Hill Country, San Antonio
  - c. Region G & H RWPG
  - d. GMA 14 Joint Planning
  - e. Legislative Update
  - f. TWRI Update
    - i. Newsletter
    - ii. Upcoming Events
  - g. BGCD Update
21. Date for next regular Board meeting – October 2023
22. Adjourn

Agenda items may be considered, discussed and/or acted upon in a different order than the order set forth above.

#### Executive Session

The Board of Directors of the Bluebonnet Groundwater Conservation District reserves the right to adjourn into Executive (Closed) Session at any time during the course of this meeting to discuss any of the items listed on this agenda, as authorized by the Texas Government Code, Sections 551.071 (Consultations with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices), and 551.086 (Economic Development). No final action will be taken in Executive Session.

Posted 9/13/23 at 12:47 p.m.  
 By Natalie Robinson  
 (Title) Office Manager



Zach Holland

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### Open Meeting Submission

**TRD:** 2023004936  
**Date Posted:** 08/22/2023  
**Status:** Accepted  
**Agency Id:** 1114  
**Date of Submission:** 08/22/2023  
**Agency Name:** Bluebonnet Groundwater Conservation District  
**Board:** Board of Directors  
**Date of Meeting:** 09/21/2023  
**Time of Meeting:** 06:00 PM ( ###:## AM Local Time)  
**Street Location:** 1903 Dove Crossing, Suite A  
**City:** Navasota  
**State:** TX  
**Liaison Name:** Zach Holland  
**Liaison Id:** 4  
 Zach Holland, General Manager  
 P.O. Box 269  
 1903 Dove Crossing Lane, Suite A  
 Navasota, Texas 77868  
 936-825-7303  
 zholland@bluebonnetgroundwater.org

**Additional Information Obtained From:** BLUEBONNET GROUNDWATER CONSERVATION DISTRICT  
 NOTICE OF HEARING AND MEETING TO RE-ADOPT DISTRICT MANAGEMENT PLAN

September 21, 2023 at 6:00 PM  
 Bluebonnet Groundwater Conservation District  
 District Offices  
 1903 Dove Crossing Lane, Suite A  
 Navasota, Texas 77868

Notice is given that the Bluebonnet Groundwater Conservation District Board of Directors will hold a public hearing on the re-adoption of the District Management Plan with proposed revisions at a special called meeting on Thursday, September 21, 2023, at 6:00 PM, at the District Office, 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868. The public hearing and special called meeting will begin about but no earlier than at 6:00 PM.

A copy of the proposed District Management Plan is available for inspection at the District Office 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868 and may be downloaded and copied from the District's website at <http://www.bluebonnetgroundwater.org/regulations/management-plan/>.

All questions or requests for additional information regarding the District Management Plan may be submitted to Bluebonnet GCD General Manager Zach Holland at [zholland@bluebonnetgroundwater.org](mailto:zholland@bluebonnetgroundwater.org); 936-825-7303; P.O. Box 269; or 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868. Written public comment may be sent to the General Manager no later than 5:00 PM September 14, 2023. The Board will also accept public comment at the September 21, 2023, Special Called Board Meeting, &#8195; BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting  
 Thursday, September 21, 2023  
 6:00 PM  
 Bluebonnet Groundwater Conservation District  
 Board Room, Suite A  
 1903 Dove Crossing Lane  
 Navasota, Texas 77868

#### AGENDA

1. Call to order
  2. Public Comment
- (Public comment is limited to a maximum of 3 minutes per speaker and/or 30 minutes total time for all speakers)



Zach Holland

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### Open Meeting Submission

**TRD:** 2023004937  
**Date Posted:** 08/22/2023  
**Status:** Accepted  
**Agency Id:** 1114  
**Date of Submission:** 08/22/2023  
**Agency Name:** Bluebonnet Groundwater Conservation District  
**Board:** Board of Directors  
**Date of Meeting:** 09/21/2023  
**Time of Meeting:** 06:00 PM (###:## AM Local Time)  
**Street Location:** 1903 Dove Crossing, Suite A  
**City:** Navasota  
**State:** TX  
**Liaison Name:** Zach Holland  
**Liaison Id:** 4  
**Additional Information Obtained From:** Zach Holland, General Manager  
 P.O. Box 269  
 1903 Dove Crossing Lane, Suite A  
 Navasota, Texas 77868  
 936-825-7303  
 zholland@bluebonnetgroundwater.org  
**Agenda:** NOTICE OF HEARING AND MEETING TO CONSIDER RULES REVISIONS  
 OF THE BLUEBONNET  
 GROUNDWATER CONSERVATION DISTRICT

September 21, 2023 at 6:00 PM  
 Bluebonnet Groundwater Conservation District  
 District Offices  
 1903 Dove Crossing Lane, Suite A  
 Navasota, Texas 77868

The Bluebonnet Groundwater Conservation District (BGCD) will hold a public hearing on the proposed revisions to BGCD Rules (Rules) at a special called meeting on Thursday, September 21, 2023 at the District Offices located at 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868. The public hearing and special called meeting will begin about but no earlier than 6:00 PM.

The Board of Directors (Board) will consider revising the Rules at the Board special called meeting following the public hearing. The revisions reflect legislative changes made during the 88th Legislative Session including municipal and county authority of groundwater availability certification of subdivisions; exemption for a well for temporary use to supply water for a rig that is actively engaged in drilling a groundwater production well permitted by the District; water use export fees and use of fees; hearing continuance; request for rehearing or findings of fact and conclusions of law; decision when final after a contested case before SOAH; petition for adoption or modification of rules; and include revisions for typos, formatting, and clarity.

Copies of the revised draft BGCD Rules can be found at <http://www.bluebonnetgroundwater.org/regulations/rules/> or the BGCD Offices located at 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868.

Comments on the Rule revisions may be submitted orally at the hearing or in writing. Written comment should be addressed to the General Manager and must be received no later than 5:00 p.m. on September 19, 2023 by hand delivery to the BGCD Offices located at 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868; via email at [zholland@bluebonnetgroundwater.org](mailto:zholland@bluebonnetgroundwater.org); or, mailed to PO Box 269, Navasota, Texas 77868. If you have any questions or comments concerning the proposed revised draft BGCD Rules, please contact Zach Holland, General Manager at 936-825-7303 or [zholland@bluebonnetgroundwater.org](mailto:zholland@bluebonnetgroundwater.org).

&#8195;  
 BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting  
 Thursday, September 21, 2023  
 6:00 PM  
 Bluebonnet Groundwater Conservation District  
 Board Room, Suite A

**NOTICE OF HEARING AND MEETING TO CONSIDER RULES REVISIONS  
OF THE BLUEBONNET  
GROUNDWATER CONSERVATION DISTRICT**

**September 21, 2023 at 6:00 PM  
Bluebonnet Groundwater Conservation District  
District Offices  
1903 Dove Crossing Lane, Suite A  
Navasota, Texas 77868**

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# BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting

Thursday, September 21, 2023

6:00 PM

Bluebonnet Groundwater Conservation District

Board Room, Suite A

1903 Dove Crossing Lane

Navasota, Texas 77868

## AGENDA

1. Call to order
2. Public Comment  
(Public comment is limited to a maximum of 3 minutes per speaker and/or 30 minutes total time for all speakers)
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4. Discussion and possible action to adopt District Rules.
5. Adjourn

Agenda items may be considered, discussed and/or acted upon in a different order than the order set forth above.

### Executive Session

The Board of Directors of the Bluebonnet Groundwater Conservation District reserves the right to adjourn into Executive (Closed) Session at any time during the course of this meeting to discuss any of the items listed on this agenda, as authorized by the Texas Government Code, Sections 551.071 (Consultations with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices), and 551.086 (Economic Development). No final action will be taken in Executive Session.

Posted August 22nd 2023 at 12:31pm

By Mattie Robinson

(Title) Office Manager

**BLUEBONNET GROUNDWATER CONSERVATION DISTRICT  
NOTICE OF HEARING AND MEETING TO RE-ADOPT DISTRICT MANAGEMENT  
PLAN**

**September 21, 2023 at 6:00 PM  
Bluebonnet Groundwater Conservation District  
District Offices  
1903 Dove Crossing Lane, Suite A  
Navasota, Texas 77868**

Notice is given that the Bluebonnet Groundwater Conservation District Board of Directors will hold a public hearing on the re-adoption of the District Management Plan with proposed revisions at a special called meeting on Thursday, September 21, 2023, at 6:00 PM, at the District Office, 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868. The public hearing and special called meeting will begin about but no earlier than at 6:00 PM.

A copy of the proposed District Management Plan is available for inspection at the District Office 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868 and may be downloaded and copied from the District's website at <http://www.bluebonnetgroundwater.org/regulations/management-plan/>.

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# BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting

Thursday, September 21, 2023

6:00 PM

Bluebonnet Groundwater Conservation District

Board Room, Suite A

1903 Dove Crossing Lane

Navasota, Texas 77868

## AGENDA

1. Call to order
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Agenda items may be considered, discussed and/or acted upon in a different order than the order set forth above.

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Posted August 22nd 2023 at 12:31pm  
By Natasha Robinson  
(Title) Office Manager



\*VG-1753-2023-6\*

Walker County  
Kari A. French  
Walker County Clerk

Instrument Number: 6

Public Notice

PUBLIC NOTICE

Recorded On: August 23, 2023 03:37 PM

Number of Pages: 3

" Examined and Charged as Follows: "

Total Recording: \$3.00

FILED FOR POSTING  
At 03:32 o'clock P M

AUG 23 2023

KARI FRENCH, COUNTY CLERK  
WALKER COUNTY, TEXAS  
By Gerald B Deputy

\*\*\*\*\* THIS PAGE IS PART OF THE INSTRUMENT \*\*\*\*\*

Any provision herein which restricts the Sale, Rental or use of the described REAL PROPERTY because of color or race is invalid and unenforceable under federal law.

File Information:

Instrument Number: 6  
Receipt Number: 20230823000076  
Recorded Date/Time: August 23, 2023 03:37 PM  
User: Gerald B  
Station: Recording01

Record and Return To:

BLUEBONNET GROUNDWATER CONSERVATION DISTRICT  
P.O. BOX 269  
NAVASOTA TX 77863



STATE OF TEXAS  
COUNTY OF WALKER

I hereby certify that this Instrument was FILED In the Instrument Number sequence on the date/time printed hereon, and was duly RECORDED in the Official Records of Walker County, Texas.

Kari A. French  
Walker County Clerk  
Walker County, TX



**BLUEBONNET GROUNDWATER CONSERVATION DISTRICT  
NOTICE OF HEARING AND MEETING TO RE-ADOPT DISTRICT MANAGEMENT  
PLAN**

**September 21, 2023 at 6:00 PM  
Bluebonnet Groundwater Conservation District  
District Offices  
1903 Dove Crossing Lane, Suite A  
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**FILED FOR POSTING**  
At 03:32 o'clock P.M

**AUG 23 2023**

KARI FRENCH, COUNTY CLERK  
WALKER COUNTY, TEXAS  
By *Kari French*, Deputy

# BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting  
Thursday, September 21, 2023  
6:00 PM  
Bluebonnet Groundwater Conservation District  
Board Room, Suite A  
1903 Dove Crossing Lane  
Navasota, Texas 77868

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**BLUEBONNET GROUNDWATER CONSERVATION DISTRICT  
NOTICE OF HEARING AND MEETING TO RE-ADOPT DISTRICT MANAGEMENT  
PLAN**

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**AUG 23 2023**

KARI FRENCH, COUNTY CLERK  
WALKER COUNTY, TEXAS  
By [Signature] Deputy

# BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting

Thursday, September 21, 2023

6:00 PM

Bluebonnet Groundwater Conservation District

Board Room, Suite A

1903 Dove Crossing Lane

Navasota, Texas 77868

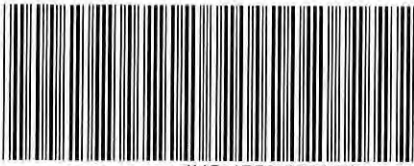
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\*VG-1753-2023-7\*

Walker County  
Kari A. French  
Walker County Clerk

Instrument Number: 7

Public Notice

PUBLIC NOTICE

Recorded On: August 23, 2023 03:37 PM

Number of Pages: 3

" Examined and Charged as Follows: "

Total Recording: \$3.00

FILED FOR POSTING

At 03:33 o'clock P.M

AUG 23 2023

KARI FRENCH, COUNTY CLERK  
WALKER COUNTY, TEXAS

By Gerald B Deputy

\*\*\*\*\* THIS PAGE IS PART OF THE INSTRUMENT \*\*\*\*\*

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File Information:

Instrument Number: 7  
Receipt Number: 20230823000076  
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Record and Return To:

BLUEBONNET GROUNDWATER CONSERVATION DISTRICT  
P.O. BOX 269  
NAVASOTA TX 77863



STATE OF TEXAS  
COUNTY OF WALKER

I hereby certify that this Instrument was FILED in the Instrument Number sequence on the date/time printed hereon, and was duly RECORDED in the Official Records of Walker County, Texas.

Kari A. French  
Walker County Clerk  
Walker County, TX

**NOTICE OF HEARING AND MEETING TO CONSIDER RULES REVISIONS  
OF THE BLUEBONNET  
GROUNDWATER CONSERVATION DISTRICT**

**September 21, 2023 at 6:00 PM  
Bluebonnet Groundwater Conservation District  
District Offices  
1903 Dove Crossing Lane, Suite A  
Navasota, Texas 77868**

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At 03:53 o'clock P.M

**AUG 23 2023**

KARI FRENCH, COUNTY CLERK  
WALKER COUNTY, TEXAS  
By [Signature] Deputy

# BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting

Thursday, September 21, 2023

6:00 PM

Bluebonnet Groundwater Conservation District

Board Room, Suite A

1903 Dove Crossing Lane

Navasota, Texas 77868

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OF THE BLUEBONNET  
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**FILED FOR POSTING**  
At 03:33 o'clock P M

**AUG 23 2023**

KARI FRENCH, COUNTY CLERK  
WALKER COUNTY, TEXAS  
By *Zach Holland* Deputy



# BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting

Thursday, September 21, 2023

6:00 PM

Bluebonnet Groundwater Conservation District

Board Room, Suite A

1903 Dove Crossing Lane

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NOT COMPARED  
AN ORIGINAL WAS

23-262 POSTED

08/23/2023 09:56:51 AM Total Pages: 2 Fee: 2.00  
Debbie Hollan, County Clerk - Waller County, TX



**BLUEBONNET GROUNDWATER CONSERVATION DISTRICT  
NOTICE OF HEARING AND MEETING TO RE-ADOPT DISTRICT MANAGEMENT  
PLAN**

**September 21, 2023 at 6:00 PM  
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## **BLUEBONNET GROUNDWATER CONSERVATION DISTRICT**

Board of Directors Special Called Meeting

Thursday, September 21, 2023

6:00 PM

Bluebonnet Groundwater Conservation District

Board Room, Suite A

1903 Dove Crossing Lane

Navasota, Texas 77868

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District Offices  
1903 Dove Crossing Lane, Suite A  
Navasota, Texas 77868**

Notice is given that the Bluebonnet Groundwater Conservation District Board of Directors will hold a public hearing on the re-adoption of the District Management Plan with proposed revisions at a special called meeting on Thursday, September 21, 2023, at 6:00 PM, at the District Office, 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868. The public hearing and special called meeting will begin about but no earlier than at 6:00 PM.

A copy of the proposed District Management Plan is available for inspection at the District Office 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868 and may be downloaded and copied from the District's website at <http://www.bluebonnetgroundwater.org/regulations/management-plan/>.

All questions or requests for additional information regarding the District Management Plan may be submitted to Bluebonnet GCD General Manager Zach Holland at [zholland@bluebonnetgroundwater.org](mailto:zholland@bluebonnetgroundwater.org); 936-825-7303; P.O. Box 269; or 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868. Written public comment may be sent to the General Manager no later than 5:00 PM September 14, 2023. The Board will also accept public comment at the September 21, 2023, Special Called Board Meeting.

## BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting  
Thursday, September 21, 2023  
6:00 PM  
Bluebonnet Groundwater Conservation District  
Board Room, Suite A  
1903 Dove Crossing Lane  
Navasota, Texas 77868

### AGENDA

1. Call to order
2. Public Comment  
(Public comment is limited to a maximum of 3 minutes per speaker and/or 30 minutes total time for all speakers)
3. Public Hearing on Management Plan to commence at 6:00PM –. A copy of the draft Management Plan is available for review at the District Office at the address described above and on the District's webpage at <http://www.bluebonnetgroundwater.org/regulations/management-plan/>.
4. Discussion and possible action to re-adopt District Management Plan.
5. Adjourn

Agenda items may be considered, discussed and/or acted upon in a different order than the order set forth above.

### Executive Session

The Board of Directors of the Bluebonnet Groundwater Conservation District reserves the right to adjourn into Executive (Closed) Session at any time during the course of this meeting to discuss any of the items listed on this agenda, as authorized by the Texas Government Code, Sections 551.071 (Consultations with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices), and 551.086 (Economic Development). No final action will be taken in Executive Session.

**NOT COMPARED  
AN ORIGINAL WAS**

**23-263 POSTED**  
08/23/2023 09:56:51 AM Total Pages: 2 Fee: 2.00  
Debbie Hollan, County Clerk - Waller County, TX

**NOTICE OF HEARING AND MEETING TO CONSIDER RULES REVISIONS  
OF THE BLUEBONNET  
GROUNDWATER CONSERVATION DISTRICT**

**September 21, 2023 at 6:00 PM  
Bluebonnet Groundwater Conservation District  
District Offices  
1903 Dove Crossing Lane, Suite A  
Navasota, Texas 77868**

The Bluebonnet Groundwater Conservation District (BGCD) will hold a public hearing on the proposed revisions to BGCD Rules (Rules) at a special called meeting on Thursday, September 21, 2023 at the District Offices located at 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868. The public hearing and special called meeting will begin about but no earlier than 6:00 PM.

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## BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting

Thursday, September 21, 2023

6:00 PM

Bluebonnet Groundwater Conservation District

Board Room, Suite A

1903 Dove Crossing Lane

Navasota, Texas 77868

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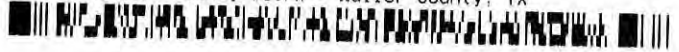
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## BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting

Thursday, September 21, 2023

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Bluebonnet Groundwater Conservation District

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Navasota, Texas 77868

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Bluebonnet Groundwater Conservation District  
1903 Dove Crossing Lane, Suite A, PO Box 269  
Navasota, Texas 77868-0269  
Phone: 936 825-7303 Fax: 936 825-7331  
[www.bluebonnetgroundwater.org](http://www.bluebonnetgroundwater.org)

August 22, 2023

Ms. Vanessa Burzynski  
Grimes County Clerk  
270 FM 149  
Anderson, Texas 77830

Re: Public Hearing and Special Board Meeting Notice Posting for Bluebonnet Groundwater Conservation District.

Dear Ms. Burzynski:

Enclosed, please find copies of the notice for September 21, 2023 public hearing and special board meeting for posting. Please note there are two separate notices, one for the Management Plan and one for District Rules. Also, a check accompanies the items to cover the allocated costs of posting.

Please post the meeting notice posting as soon as possible. If you would also mail the receipt and stamped copy of the original posted in the stamped and addressed envelope, I would be greatly appreciative.

If you have questions concerning this letter or the notices, please contact me at 936-825-7303.

Many thanks,

Zach Holland, General Manager  
Bluebonnet Groundwater Conservation District

Enclosures

#334942

**BLUEBONNET GROUNDWATER CONSERVATION DISTRICT  
NOTICE OF HEARING AND MEETING TO RE-ADOPT DISTRICT MANAGEMENT  
PLAN**

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**FILED FOR RECORD**

At 1:32 O'Clock P M

AUG 23 2023

VANESSA BURZYNSKI  
COUNTY CLERK, GRIMES COUNTY, TX  
By Mary Ann Hargrave Deputy

# BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting

Thursday, September 21, 2023

6:00 PM

Bluebonnet Groundwater Conservation District

Board Room, Suite A

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\*VG-1108-2023-334942\*

**Grimes County  
Vanessa Burzynski  
Grimes County Clerk**

**Instrument Number: 334942**

Public Notice

Recorded On: August 23, 2023 01:32 PM

Number of Pages: 3

**" Examined and Charged as Follows: "**

Total Recording: \$8.00

**\*\*\*\*\* THIS PAGE IS PART OF THE INSTRUMENT \*\*\*\*\***

Any provision herein which restricts the Sale, Rental or use of the described REAL PROPERTY because of color or race is invalid and unenforceable under federal law.

**File Information:**

Document Number: 334942  
Receipt Number: 20230823000019  
Recorded Date/Time: August 23, 2023 01:32 PM  
User: Mary H  
Station: Clerk03

**Record and Return To:**

BLUEBONNET GROUNDWATER CONSRVATION  
p o box 269  
  
NAVASOTA TX 77868



**STATE OF TEXAS  
Grimes County**

**I hereby certify that this Instrument was filed in the File Number sequence on the date/time printed hereon, and was duly recorded in the Official Records of Grimes County, Texas**

Vanessa Burzynski  
Grimes County Clerk  
Grimes County, TX

# 334943

**NOTICE OF HEARING AND MEETING TO CONSIDER RULES REVISIONS  
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**FILED FOR RECORD**  
At 1:32 O'Clock P M

AUG 23 2023

VANESSA BURZYNSKI  
COUNTY CLERK, GRIMES COUNTY, TX  
By Mary Ann Hargrave Deputy

# BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting

Thursday, September 21, 2023

6:00 PM

Bluebonnet Groundwater Conservation District

Board Room, Suite A

1903 Dove Crossing Lane

Navasota, Texas 77868

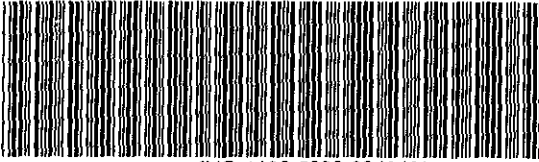
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\*VG-1108-2023-334943\*

Grimes County  
Vanessa Burzynski  
Grimes County Clerk

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Instrument Number: 334943

Public Notice

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**Record and Return To:**

BLUEBONNET GROUNDWATER CONSRVATION  
p o box 269

NAVASOTA TX 77868



STATE OF TEXAS  
Grimes County

I hereby certify that this Instrument was filed in the File Number sequence on the date/time printed hereon, and was duly recorded in the Official Records of Grimes County, Texas

Vanessa Burzynski  
Grimes County Clerk  
Grimes County, TX

*Vanessa Burzynski*



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FILED

2023 AUG 23 PM 2: 41

*Andrea Cardenas*  
COUNTY CLERK  
AUSTIN COUNTY CLERK

# BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting

Thursday, September 21, 2023

6:00 PM

Bluebonnet Groundwater Conservation District

Board Room, Suite A

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COUNTY CLERK  
AUSTIN COUNTY, CLERK

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**Affidavit of Publication**

STATE OF TEXAS }  
COUNTY OF WALKER } SS

, being duly sworn, says:

That she is Newspaper Representative of the The Huntsville Item, a daily newspaper of general circulation, printed and published in Huntsville, Walker County, Texas; that the publication, a copy of which is attached hereto, was published in the said newspaper on the following dates:

August 26, 2023

That said newspaper was regularly issued and circulated on those dates.

SIGNED:

*[Handwritten Signature]*  
\_\_\_\_\_  
Newspaper Representative

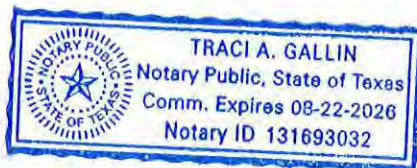
Subscribed to and sworn to me this 26th day of August 2023.

*[Handwritten Signature]*  
\_\_\_\_\_  
Traci A. Gallin, Notary Public, Walker County, Texas

My commission expires: August 22, 2026

00010671 00017078

\*\*\* LEGALS III \*\*\*



BLUEBONNET GROUNDWATER CONSERVATION DISTRICT  
NOTICE OF HEARING AND MEETING TO RE-ADOPT  
DISTRICT MANAGEMENT PLAN

September 21, 2023 at 6:00 PM  
Bluebonnet Groundwater Conservation District  
District Offices  
1903 Dove Crossing Lane, Suite A  
Navasota, Texas 77868

Notice is given that the Bluebonnet Groundwater Conservation District Board of Directors will hold a public hearing on the re-adoption of the District Management Plan with proposed revisions at a special called meeting on Thursday, September 21, 2023, at 6:00 PM, at the District Office, 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868. The public hearing and special called meeting will begin about but no earlier than at 6:00 PM.

A copy of the proposed District Management Plan is available for inspection at the District Office 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868 and may be downloaded and copied from the District's website at <http://www.bluebonnetgroundwater.org/regulations/management-plan/>.

All questions or requests for additional information regarding the District Management Plan may be submitted to Bluebonnet GCD General Manager Zach Holland at [zholland@bluebonnetgroundwater.org](mailto:zholland@bluebonnetgroundwater.org); 936-825-7303; P.O. Box 269; or 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868. Written public comment may be sent to the General Manager no later than 5:00 PM September 14, 2023. The Board will also accept public comment at the September 21, 2023, Special Called Board Meeting.

BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting  
Thursday, September 21, 2023  
6:00 PM  
Bluebonnet Groundwater Conservation District  
Board Room, Suite A  
1903 Dove Crossing Lane  
Navasota, Texas 77868

AGENDA

1. Call to order
  2. Public Comment  
(Public comment is limited to a maximum of 3 minutes per speaker and/or 30 minutes total time for all speakers)
  3. Public Hearing on Management Plan to commence at 6:00PM – A copy of the draft Management Plan is available for review at the District Office at the address described above and on the District's webpage at <http://www.bluebonnetgroundwater.org/regulations/management-plan/>.
  4. Discussion and possible action to re-adopt District Management Plan.
  5. Adjourn
- Agenda items may be considered, discussed and/or acted upon in a different order than the order set forth above.

Executive Session

The Board of Directors of the Bluebonnet Groundwater Conservation District reserves the right to adjourn into Executive (Closed) Session at any time during the course of this meeting to discuss any of the items listed on this agenda, as authorized by the Texas Government Code, Sections 551.071 (Consultations with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices), and 551.086 (Economic Development). No final action will be taken in Executive Session.

NOTICE OF HEARING AND MEETING

**Affidavit of Publication**

STATE OF TEXAS }  
COUNTY OF WALKER } SS

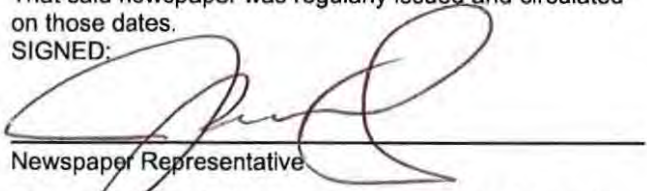
, being duly sworn, says:

That she is Newspaper Representative of the The Huntsville Item, a daily newspaper of general circulation, printed and published in Huntsville, Walker County, Texas; that the publication, a copy of which is attached hereto, was published in the said newspaper on the following dates:

August 26, 2023

That said newspaper was regularly issued and circulated on those dates.

SIGNED:

  
\_\_\_\_\_  
Newspaper Representative

Subscribed to and sworn to me this 26th day of August 2023.

  
\_\_\_\_\_  
Traci A. Gallin, Notary Public, Walker County, Texas

My commission expires: August 22, 2026

00010671 00017077

\*\*\* LEGALS III \*\*\*



NOTICE OF HEARING AND MEETING TO CONSIDER RULES REVISIONS OF THE BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

September 21, 2023 at 6:00 PM  
Bluebonnet Groundwater Conservation District  
District Offices  
1903 Dove Crossing Lane, Suite A  
Navasota, Texas 77868

The Bluebonnet Groundwater Conservation District (BGCD) will hold a public hearing on the proposed revisions to BGCD Rules (Rules) at a special called meeting on Thursday, September 21, 2023 at the District Offices located at 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868. The public hearing and special called meeting will begin about but no earlier than 6:00 PM.

The Board of Directors (Board) will consider revising the Rules at the Board special called meeting following the public hearing. The revisions reflect legislative changes made during the 88th Legislative Session including municipal and county authority of groundwater availability certification of subdivisions; exemption for a well for temporary use to supply water for a rig that is actively engaged in drilling a groundwater production well permitted by the District; water use export fees and use of fees; hearing continuance; request for rehearing or findings of fact and conclusions of law; decision when final after a contested case before SOAH; petition for adoption or modification of rules; and include revisions for typos, formatting, and clarity.

Copies of the revised draft BGCD Rules can be found at <http://www.bluebonnetgroundwater.org/regulations/rules/> or the BGCD Offices located at 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868.

Comments on the Rule revisions may be submitted orally at the hearing or in writing. Written comment should be addressed to the General Manager and must be received no later than 5:00 p.m. on September 19, 2023 by hand delivery to the BGCD Offices located at 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868; via email at [zholland@bluebonnetgroundwater.org](mailto:zholland@bluebonnetgroundwater.org); or, mailed to PO Box 269, Navasota, Texas 77868. If you have any questions or comments concerning the proposed revised draft BGCD Rules, please contact Zach Holland, General Manager at 936-825-7303 or [zholland@bluebonnetgroundwater.org](mailto:zholland@bluebonnetgroundwater.org).

BLUEBONNET GROUNDWATER CONSERVATION DISTRICT

Board of Directors Special Called Meeting  
Thursday, September 21, 2023  
6:00 PM  
Bluebonnet Groundwater Conservation District  
Board Room, Suite A  
1903 Dove Crossing Lane  
Navasota, Texas 77868

AGENDA

- 1. Call to order
- 2. Public Comment  
(Public comment is limited to a maximum of 3 minutes per speaker and/or 30 minutes total time for all speakers)
- 3. Public Hearing on proposed revisions to District Rules to commence at 6:00PM – Proposed revisions reflect legislative changes made during the 88th Legislative Session including municipal and county authority of groundwater availability certification of subdivisions; exemption for a well for temporary use to supply water for a rig that is actively engaged in drilling a groundwater production well permitted by the District; water use export fees and use of fees; hearing continuance; request for rehearing or findings of fact and conclusions of law; decision when final after a contested case before SOAH; petition for adoption or modification of rules; and include revisions for typos, formatting, and clarity. A copy of the draft District Rules is available for review at the District Office at the address described above and on the District's webpage at

<http://www.bluebonnetgroundwater.org/regulations/rules/> .

4. Discussion and possible action to adopt District Rules.

5. Adjourn

Agenda items may be considered, discussed and/or acted upon in a different order than the order set forth above.

#### Executive Session

The Board of Directors of the Bluebonnet Groundwater Conservation District reserves the right to adjourn into Executive (Closed) Session at any time during the course of this meeting to discuss any of the items listed on this agenda, as authorized by the Texas Government Code, Sections 551.071 (Consultations with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices), and 551.086 (Economic Development). No final action will be taken in Executive Session.

# AFFIDAVIT OF PUBLICATION

STATE OF TEXAS  
COUNTY OF WALLER

Bluebonnet Groundwater  
Conservation District  
Notice of Hearing and Meeting  
to Consider Rules Revisions

Before me, the undersigned authority, on this day personally appeared Stephen Johnson, who being by me duly sworn, deposes and says that he is the Publisher of The Waller Times; that said newspaper is regularly published in Waller, Texas and generally circulated in Waller County; that the attached notice was published in said newspaper on the following date(s):

August 30, 2023



(Newspaper Representative's Signature)

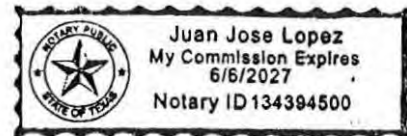
Subscribed and sworn to before me this the 30 day of August, 2023.

  
Notary Public Signature

Juan J. Lopez  
Print Name of Notary Public

Commission Expires 06/06/27

Notary Seal:





# AFFIDAVIT OF PUBLICATION

STATE OF TEXAS  
COUNTY OF WALLER

Bluebonnet Groundwater  
Conservation District  
Notice of Hearing and Meeting  
to Re-Adopt District Mgmt

Before me, the undersigned authority, on this day personally appeared Stephen Johnson, who being by me duly sworn, deposes and says that he is the Publisher of The Waller Times; that said newspaper is regularly published in Waller, Texas and generally circulated in Waller County; that the attached notice was published in said newspaper on the following date(s):

August 30, 2023



(Newspaper Representative's Signature)

Subscribed and sworn to before me this the 30 day of August, 2023.

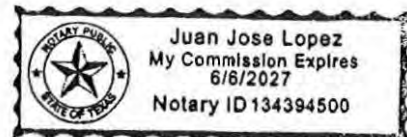


Notary Public Signature

Juan J. Lopez  
Print Name of Notary Public

Commission Expires 06/06/27

Notary Seal:





AFFIDAVIT OF PUBLICATION

STATE OF TEXAS:

Before me, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared, the Newspaper Representative at the HOUSTON CHRONICLE, a daily newspaper published in Harris County, Texas, and generally circulated in the Counties of: HARRIS, TRINITY, WALKER, GRIMES, POLK, SAN JACINTO, WASHINGTON, MONTGOMERY, LIBERTY, AUSTIN, WALLER, CHAMBERS, COLORADO, BRAZORIA, FORT BEND, GALVESTON, WHARTON, JACKSON, and MATAGORDA and that the publication, of which the annexed herein, or attached to, is a true and correct copy, was published to-wit:

BLUEBONNET GCD  
 RAN A LEGAL NOTICE  
 SIZE BEING: 3 x72 L  
 Product  
 HOU Chronicle

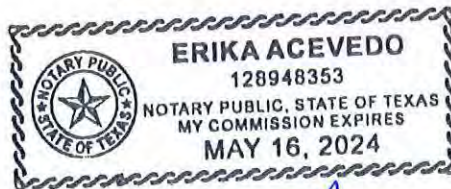
0034292663

Date	Class	Page
Aug 30 2023	Legal Notices	A 11

*Victoria Bond*

NEWSPAPER REPRESENTATIVE

Sworn and subscribed to before me, this 30th Day of August A.D. 2023



*Erika Acevedo*

Notary Public in and for the State of Texas

**BLUEBONNET GROUNDWATER CONSERVATION DISTRICT  
NOTICE OF HEARING AND MEETING TO RE-ADOPT DISTRICT  
MANAGEMENT PLAN**

**September 21, 2023 at 6:00 PM**  
Bluebonnet Groundwater Conservation District  
District Offices  
1903 Dove Crossing Lane, Suite A  
Navasota, Texas 77868

Notice is given that the Bluebonnet Groundwater Conservation District Board of Directors will hold a public hearing on the re-adoption of the District Management Plan with proposed revisions at a special called meeting on Thursday, September 21, 2023, at 6:00 PM, at the District Office, 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868. The public hearing and special called meeting will begin about but no earlier than at 6:00 PM.

A copy of the proposed District Management Plan is available for inspection at the District Office 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868 and may be downloaded and copied from the District's website at <http://www.bluebonnetgroundwater.org/regulations/management-plan/>.

All questions or requests for additional information regarding the District Management Plan may be submitted to Bluebonnet GCD General Manager Zach Holland at [zholland@bluebonnetgroundwater.org](mailto:zholland@bluebonnetgroundwater.org); 936-825-7303; P.O. Box 269; or 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868. Written public comment may be sent to the General Manager no later than 5:00 PM September 14, 2023. The Board will also accept public comment at the September 21, 2023, Special Called Board Meeting.

**BLUEBONNET GROUNDWATER CONSERVATION DISTRICT**

Board of Directors Special Called Meeting  
Thursday, September 21, 2023  
6:00 PM

Bluebonnet Groundwater Conservation District  
Board Room, Suite A  
1903 Dove Crossing Lane  
Navasota, Texas 77868

**AGENDA**

1. Call to order
2. Public Comment  
(Public comment is limited to a maximum of 3 minutes per speaker and/or 30 minutes total time for all speakers)
3. Public Hearing on Management Plan to commence at 6:00PM -.  
A copy of the draft Management Plan is available for review at the District Office at the address described above and on the District's webpage at <http://www.bluebonnetgroundwater.org/regulations/management-plan/>.
4. Discussion and possible action to re-adopt District Management Plan.
5. Adjourn

Agenda items may be considered, discussed and/or acted upon in a different order than the order set forth above.

**Executive Session**

The Board of Directors of the Bluebonnet Groundwater Conservation District reserves the right to adjourn into Executive (Closed) Session at any time during the course of this meeting to discuss any of the items listed on this agenda, as authorized by the Texas Government Code, Sections 551.071 (Consultations with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices), and 551.086 (Economic Development). No final action will be taken in Executive Session.



AFFIDAVIT OF PUBLICATION

STATE OF TEXAS:

Before me, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared, the Newspaper Representative at the HOUSTON CHRONICLE, a daily newspaper published in Harris County, Texas, and generally circulated in the Counties of: HARRIS, TRINITY, WALKER, GRIMES, POLK, SAN JACINTO, WASHINGTON, MONTGOMERY, LIBERTY, AUSTIN, WALLER, CHAMBERS, COLORADO, BRAZORIA, FORT BEND, GALVESTON, WHARTON, JACKSON, and MATAGORDA and that the publication, of which the annexed herein, or attached to, is a true and correct copy, was published to-wit:

BLUEBONNET GCD 0034292662  
RAN A LEGAL NOTICE  
SIZE BEING: 3 x87 L  
Product Date Class Page  
HOU Chronicle Aug 30 2023 Legal Notices A 10

*Victoria Bond*  
NEWSPAPER REPRESENTATIVE

Sworn and subscribed to before me, this 30th Day of August A.D. 2023

*Erika Acevedo*  
Notary Public in and for the State of Texas



**NOTICE OF HEARING AND MEETING TO CONSIDER RULES REVISIONS  
OF THE BLUEBONNET  
GROUNDWATER CONSERVATION DISTRICT**

**September 21, 2023 at 6:00 PM**  
Bluebonnet Groundwater Conservation District  
District Offices  
1903 Dove Crossing Lane, Suite A  
Navasota, Texas 77868

The Bluebonnet Groundwater Conservation District (BGCD) will hold a public hearing on the proposed revisions to BGCD Rules (Rules) at a special called meeting on Thursday, September 21, 2023 at the District Offices located at 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868. The public hearing and special called meeting will begin about but no earlier than 6:00 PM.

The Board of Directors (Board) will consider revising the Rules at the Board special called meeting following the public hearing. The revisions reflect legislative changes made during the 88th Legislative Session including municipal and county authority of groundwater availability certification of subdivisions; exemption for a well for temporary use to supply water for a rig that is actively engaged in drilling a groundwater production well permitted by the District; water use expert fees and use of fees; hearing continuance; request for rehearing or findings of fact and conclusions of law; decision when final after a contested case before SOAH; petition for adoption or modification of rules; and include revisions for typos, formatting, and clarity.

Copies of the revised draft BGCD Rules can be found at <http://www.bluebonnetgroundwater.org/regulations/rules/>, or the BGCD Offices located at 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868.

Comments on the Rule revisions may be submitted orally at the hearing or in writing. Written comment should be addressed to the General Manager and must be received no later than 5:00 p.m. on September 19, 2023 by hand delivery to the BGCD Offices located at 1903 Dove Crossing Lane, Suite A, Navasota, Texas 77868; via email at [zholland@bluebonnetgroundwater.org](mailto:zholland@bluebonnetgroundwater.org); or, mailed to PO Box 269, Navasota, Texas 77868. If you have any questions or comments concerning the proposed revised draft BGCD Rules, please contact Zach Holland, General Manager at 936-825-7303 or [zholland@bluebonnetgroundwater.org](mailto:zholland@bluebonnetgroundwater.org)

**BLUEBONNET GROUNDWATER CONSERVATION DISTRICT**

Board of Directors Special Called Meeting  
Thursday, September 21, 2023  
6:00 PM  
Bluebonnet Groundwater Conservation District  
Board Room, Suite A  
1903 Dove Crossing Lane  
Navasota, Texas 77868

**AGENDA**

1. Call to order
2. Public Comment  
(Public comment is limited to a maximum of 3 minutes per speaker and/or 30 minutes total time for all speakers)
3. Public Hearing on proposed revisions to District Rules to commence at 6:00PM - Proposed revisions reflect legislative changes made during the 88th Legislative Session including municipal and county authority of groundwater availability certification of subdivisions; exemption for a well for temporary use to supply water for a rig that is actively engaged in drilling a groundwater production well permitted by the District; water use expert fees and use of fees; hearing continuance; request for rehearing or findings of fact and conclusions of law; decision when final after a contested case before SOAH; petition for adoption or modification of rules; and include revisions for typos, formatting, and clarity. A copy of the draft District Rules is available for review at the District Office at the address described above and on the District's webpage at <http://www.bluebonnetgroundwater.org/regulations/rules/>.
4. Discussion and possible action to adopt District Rules.
5. Adjourn

Agenda items may be considered, discussed and/or acted upon in a different order than the order set forth above.

**Executive Session**

The Board of Directors of the Bluebonnet Groundwater Conservation District reserves the right to adjourn into Executive (Closed) Session at any time during the course of this meeting to discuss any of the items listed on this agenda, as authorized by the Texas Government Code, Sections 551.071 (Consultations with Attorney), 551.072 (Deliberations about Real Property), 551.073 (Deliberations about Gifts and Donations), 551.074 (Personnel Matters), 551.076 (Deliberations about Security Devices), and 551.086 (Economic Development). No final action will be taken in Executive Session.

**PUBLISHER'S AFFIDAVIT**

State of Texas

County of Grimes

Before me, the undersigned authority, on this day personally appeared Ana Cosino who being duly sworn, deposes and says that he/she is the publisher/agent of the Navasota Examiner, that said newspaper is regularly published in Grimes County, Texas, and generally circulated in Navasota, Texas; and that the notice, a copy of which is hereto attached, was published in said newspaper on the following:

DAY(S): Wednesday August 30, 2023

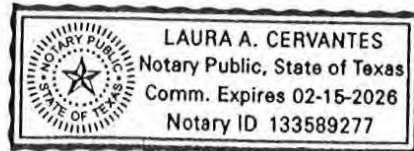
Ana I. Cosino  
Publisher/Agent Signature

Sworn and subscribed before me on this the 30<sup>th</sup> day of August, 2023.

Laura A. Cervantes  
Notary Public Signature

Laura A. Cervantes  
Printed Name of Notary Public

My commission expires 02-15-2026. (Affix Notary Seal Above)



**PUBLISHER'S AFFIDAVIT**

State of Texas

County of Grimes

Before me, the undersigned authority, on this day personally appeared Ana Cosino who being duly sworn, deposes and says that he/she is the publisher/agent of the Navasota Examiner, that said newspaper is regularly published in Grimes County, Texas, and generally circulated in Navasota, Texas; and that the notice, a copy of which is hereto attached, was published in said newspaper on the following:

DAY(S): Wednesday, August 30, 2023

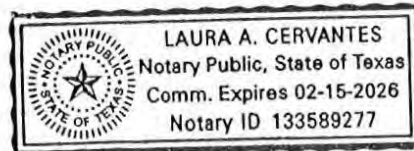
Ana Cosino  
Publisher/Agent Signature

Sworn and subscribed before me on this the 30<sup>th</sup> day of August, 2023.

Laura A. Cervantes  
Notary Public Signature

Laura A. Cervantes  
Printed Name of Notary Public

My commission expires 2-15-2026. (Affix Notary Seal Above)



**PUBLISHER'S AFFIDAVIT**

STATE OF TEXAS §

COUNTY OF Austin §

Before me, the undersigned authority, on this day personally appeared Angie Grawunder, who being by me duly  
(name of person representing newspaper)

sworn, deposes and says that (s)he is the AD Manager  
(title of person representing newspaper)

of the Belville Times; that this newspaper is  
(name of newspaper)

a newspaper of largest circulation in Austin County, Texas,  
(name of county)

or is a newspaper of general circulation in Bellville, Texas,  
(name of municipality)

and that the enclosed notice was published in said newspaper on the following date(s):

Aug. 31, 2023  
(date or dates, of publication in the newspaper)

Angie Grawunder  
Newspaper Representative's Signature

Subscribed and sworn to before me this the 31<sup>st</sup> day of August,  
2023, to certify which witness my hand and seal of office.

(Seal)

Margaret Schneider  
Notary Public in and for the State of Texas



Margaret Schneider  
Print or Type Name of Notary Public  
Commission Expires 1/22/2026



**PUBLISHER'S AFFIDAVIT**

STATE OF TEXAS §

COUNTY OF Austin §

Before me, the undersigned authority, on this day personally appeared Angie Grawunder, who being by me duly  
(name of person representing newspaper)

sworn, deposes and says that (s)he is the AD Manager  
(title of person representing newspaper)

of the Bellville Times; that this newspaper is  
(name of newspaper)

a newspaper of largest circulation in Austin County, Texas,  
(name of county)

or is a newspaper of general circulation in Bellville, Texas,  
(name of municipality)

and that the enclosed notice was published in said newspaper on the following date(s):  
Aug. 31, 2023  
(date or dates, of publication in the newspaper)

Angie Grawunder  
Newspaper Representative's Signature

Subscribed and sworn to before me this the 31<sup>st</sup> day of August,  
2023, to certify which witness my hand and seal of office.

(Seal) Margaret Schneider  
Notary Public in and for the State of Texas



Margaret Schneider  
Print or Type Name of Notary Public  
My Commission Expires 1/22/2026

**PUBLISHER'S AFFIDAVIT**

STATE OF TEXAS §

COUNTY OF Austin §

Before me, the undersigned authority, on this day personally appeared

Bruce White, who being by me duly  
(name of person representing newspaper)

sworn, deposes and says that (s)he is the Publisher  
(title of person representing newspaper)

of the The Bellville Times; that this newspaper is  
(name of newspaper)

a newspaper of largest circulation in Austin County, Texas,  
(name of county)

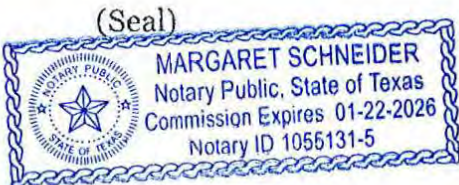
or is a newspaper of general circulation in Bellville, Texas,  
(name of municipality)

and that the enclosed notice was published in said newspaper on the following date(s):

8-24-23  
(date or dates, of publication in the newspaper)

Bruce White  
Newspaper Representative's Signature

Subscribed and sworn to before me this the 24<sup>th</sup> day of August,  
2023, to certify which witness my hand and seal of office.



Margaret Schneider  
Notary Public in and for the State of Texas

Margaret Schneider  
Print or Type Name of Notary Public

My Commission Expires 1/22/2026

**From:** [Ed Shackelford](#)  
**To:** [zholland@bluebonnetgroundwater.org](mailto:zholland@bluebonnetgroundwater.org); [DavidC@Brazos.org](mailto:DavidC@Brazos.org); [wardk@trinityra.org](mailto:wardk@trinityra.org)  
**Cc:** [Stephen Allen](#); [Robert Bradley](#); [Bill Hutchison](#)  
**Subject:** RE: Bluebonnet GCD Re-Adopted Management Plan 2023  
**Date:** Tuesday, September 26, 2023 5:55:12 PM  
**Attachments:** [image001.png](#)

---

**External: Beware of links/attachments.**

Zach,

Thank you for sending your management plan. We will review and advise if we have any questions.

Ed

**Ed Shackelford, PE**  
Acting General Manager/Director of Operations



**Main: (936) 588-3111**  
**Cell: (832) 754-2074**  
**[eshackelford@sjra.net](mailto:eshackelford@sjra.net)**

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**From:** [zholland@bluebonnetgroundwater.org](mailto:zholland@bluebonnetgroundwater.org) <[zholland@bluebonnetgroundwater.org](mailto:zholland@bluebonnetgroundwater.org)>  
**Sent:** Monday, September 25, 2023 9:55 AM  
**To:** [DavidC@Brazos.org](mailto:DavidC@Brazos.org); [wardk@trinityra.org](mailto:wardk@trinityra.org); Ed Shackelford <[eshackelford@sjra.net](mailto:eshackelford@sjra.net)>  
**Cc:** [Stephen.Allen@twdb.texas.gov](mailto:Stephen.Allen@twdb.texas.gov); [Robert.Bradley@twdb.texas.gov](mailto:Robert.Bradley@twdb.texas.gov); 'Bill Hutchison' <[billhutch@texasgw.com](mailto:billhutch@texasgw.com)>  
**Subject:** Bluebonnet GCD Re-Adopted Management Plan 2023

Good morning all,

Bluebonnet GCD has been working through the pre-review process prescribed by TWDB prior to adoption and submittal of a final management plan. On September 21, 2023 the Bluebonnet GCD Board of Directors held a public hearing to receive comments on the draft management plan and business meeting to re-adopt the District's Management Plan. Brazos River Authority, San Jacinto River Authority, and Trinity River Authority are the surface water entities Bluebonnet GCD overlays as identified by TWDB. Per requirements, I am contacting each of you and providing a copy, attached, of the adopted Management Plan. If you have any questions, please let me know.

I greatly appreciate each of you and all that you do.

Zach

*Zach Holland*

General Manager  
Bluebonnet Groundwater Conservation District  
1903 Dove Crossing Lane, Suite A  
P.O. Box 269  
Navasota, Texas 77868  
O: 936-825-7303  
F: 936-825-7331  
[www.bluebonnetgroundwater.org](http://www.bluebonnetgroundwater.org)