

GROUNDWATER MANAGEMENT PLAN  
FOR  
BANDERA COUNTY RIVER AUTHORITY AND  
GROUNDWATER DISTRICT

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## **TEXAS WATER CODE BACKGROUND**

In 1917, an amendment to the Texas Constitution was added, Article XVI, Section 59 allowing for the creation of CONSERVATION AND DEVELOPMENT OF NATURAL RESOURCES; CONSERVATION AND RECLAMATION DISTRICTS. Through this amendment, all the various types of water districts were created. Underground water conservation districts, or groundwater conservation districts as they are currently called, have been authorized and created in Texas since 1949 by authority of Article 111, Section 52, or Article **XVI**, Section 59, of the Texas Constitution. Each water district is given specific authorities listed in their enabling legislation, addressing the needs and functions necessary for the district's region. The different authorities are stated within different chapters of the Texas Water Code.

## **BANDERA COUNTY RIVER AUTHORITY**

In 1971, the 62nd Texas Legislature created the Bandera County River Authority under House Bill 988. It was created as a conservation and reclamation district under and pursuant to Article XVI, Section 59, of the Texas Constitution. As defined by Article 8280-526, Vernon's Texas Civil Statutes, the River Authority encompassed all the territory contained in Bandera County except the territory included in the Bandera County Fresh Water Supply District No. 1 (Pebble Beach) and the Bandera County Water Control and Improvement District No. 1 (City of Bandera).

According to the provisions of the legislation, the Bandera County River Authority shall have and exercise and is hereby vested with, all of the rights, powers, privileges, authority and duties conferred and imposed by the general laws of this state now in force or hereafter enacted, applicable to water control and improvement districts created under authority of Article **XVI**, Section 59 of the Texas Constitution; but to the extent that the Provisions of any such general laws may be in conflict or inconsistent with the provisions of this Act, the provisions of this Act shall prevail. All such general laws are hereby adopted and incorporated by reference with the same effect as if incorporated in full in this Act.

## **SPRINGHILLS WATER MANAGEMENT DISTRICT**

The Bandera County River Authority was a springboard for the creation of the joint surface and groundwater district. In 1985 the River Authority Board of Directors began working with state and local officials and concerned citizens to determine the most advantageous method to manage groundwater and surface water in Bandera County. After numerous public meetings, the decision was made to pursue legislation creating a joint surface and groundwater district in Bandera County. The result was the creation and confirmation of the Springhills Water Management District.

Springhills Water Management District was created under Senate Bill 1636. The District's enabling legislation, appearing as Act of June 17, 1989, Ch. 654, 1989, Tex. Gen. Laws 2155 (Vernon), granted the District the rights, powers, privileges, authority, functions, and duties provided by Chapters 50 and 52; and the rights, powers, purposes, authority, and functions of the Bandera County River Authority.

The legislation defines the District's boundaries as all the territory contained within Bandera County. The legislation further stipulates that the Board of Directors will be composed of nine (9) directors. The directors will be elected from commissioner precincts with one director at large.

The Springhills Water Management District continued the programs and activities initiated by the River Authority, and implemented the programs required of a groundwater conservation district.

### **BANDERA COUNTY RIVER AUTHORITY AND GROUNDWATER DISTRICT**

On April 10, 2003, the TCEQ authorized changing the District's name to Bandera County River Authority and Groundwater District. The BCragd shall continue all programs and activities of Springhills Water Management. The District has the rights, powers, privileges, authority, functions and duties now provided by Chapter 36 of the Texas Water Code.

Also, the District is vested with, all rights, powers, privileges, authority and duties of the original Bandera County River Authority, conferred and imposed by the general laws of this state applicable to water control and improvement districts created under authority of Article XVI, Section 59 of the Texas Constitution.

### **TEXAS WATER CODE CHAPTERS**

At the time of the Bandera County River Authority's conception, water control and improvement districts originally fell under Chapters 50, and 51.

Ch. 50 - *Provisions Generally Applicable to Districts*, an administrative chapter.

Ch. 51 - *Water Control and Improvement Districts*, specific authority granted to water control and improvement districts.

Major portions of these Chapters were repealed and replaced by Chapters 36 and 49, which were enacted in 1995 by the 74<sup>th</sup> Legislature. Chapter 36 is the chapter applicable to Bandera County River Authority and Groundwater District when the District utilizes its water control and improvement authority.

Ch. 49 - *Provisions Applicable to All Districts*, an administrative chapter applicable to any conservation and reclamation district unless superseded by another chapter of the Texas Water Code. (This chapter is applicable to Bandera County River Authority and Groundwater District only when the water control and improvement district powers are used.

The Bandera County River Authority and Groundwater District is a dual powers District, operating under Chapters 36, 49, and 51 of the State Water Code.

## **PURPOSE OF A DISTRICT**

### **Texas Water Code, Chapter 51, Water Control and Improvement District 51.121.**

#### **Purposes of District (River Authority)**

A water control and improvement district organized under the provisions of Article **XVI**, Section 59, of the Texas Constitution, may provide for:

- (1) The control, storage, preservation, and distribution of its water and floodwater and the water of its rivers and streams for irrigation, power, and all other useful purposes;
- (2) The reclamation and irrigation of its arid, semiarid, and other land which needs irrigation;
- (3) The reclamation, drainage, conservation, and development of its forests, water, and hydroelectric power;
- (4) The navigation of its coastal and inland water;
- (5) The control, abatement, and change of any shortage or harmful excess of water;
- (6) The protection, preservation, and restoration of the purity and sanitary condition of water within the state; and
- (7) The preservation and conservation of all-natural resources of the state.

The purposes stated in Subsection (b) of this section may be accomplished by any practical means.

### **Texas Water Code, Chapter 36, Groundwater Conservation Districts 36.0015.**

#### **Purpose (Groundwater)**

In order to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater, and of groundwater reservoirs or their subdivisions, and to control subsidence caused by withdrawal of water from those groundwater reservoirs or their subdivisions, consistent with the objective of Section 59, Article XVI, Texas Constitution, groundwater conservation districts may be created as provided by this chapter. Groundwater conservation districts created as provided by this chapter are the state's preferred method of groundwater management.

## **ACTIVITIES OF THE DISTRICT**

Since the original river authority and the groundwater district were formed, programs have been implemented to collect data from the aquifers and streams to better understand the groundwater and surface water in the county. Rules have been developed and adopted to regulate, record, and inspect drilling of water wells. The following list includes programs conducted by the District:

- (1) The District registers and permits water wells. Each well is assigned a permit or registration number and is furnished with a brass well marker displaying the number, which must be placed in the well slab. The District conducts inspections before, during drilling, and after completion of the wells. The District strives to inspect 100% of completed wells upon receipt of completion paperwork submitted by the driller. The final inspection includes a comprehensive review of the well site, the completed well, the State well log, and the completion paperwork for compliance with State, local, and District rules, laws, and administrative codes. When possible, the District will also



- measure and record the static water level and collect and analyze the water quality.
- (2) The District samples surface water throughout the county to determine water quality. A water quality report is made to the local newspapers to advise the public of water conditions for recreational contact.
  - (3) The District has an established program to plug abandoned and deteriorated wells in the county. A budget is set each year to cover the cost of the plugging program.
  - (4) In addition to the administrative requirements of the District, programs are developed to distribute literature on water conservation and to inform the public on activities of the District. The District maintains a public education program that helps foster public awareness on groundwater and surface water conservation as well as drought and flood issues.
  - (5) The District's monitor well program constitutes measuring water levels and collecting water samples from designated wells twice a year. The District has wells that are dedicated to continuous monitoring. Instruments have been installed in these wells and are checked each calendar quarter.
  - (6) Rainfall data is collected daily by volunteers throughout the county. The volunteers send in the rainfall reports on a quarterly basis. The District utilizes USGS rain and river gages in both San Antonio (Medina River and Lake) and Nueces (Sabinal River) River Basins. The District also supports a USGS rainfall and groundwater monitor gage at the District's Edwards monitoring well in western Bandera County. The gages serve as a flood awareness tool for the citizens and government entities in Bandera County.
  - (7) The District investigates complaints relating to contaminants and spills from all sources of potential pollution such as petroleum, herbicides, illegal dumping, etc., to protect surface and groundwater quality, and all other natural resources within the District.
  - (8) The District maintains a lab for analysis of surface and groundwater samples. The lab serves the needs of District monitoring programs, newly drilled wells, and the public.

### **MANAGEMENT PLAN TIMELINE**

This plan becomes effective upon approval by the Texas Water Development Board (TWDB) and adoption by Bandera County River Authority and Groundwater District's Board of Directors, and remains in effect until a revised plan is approved and adopted. The plan may be revised at any time, or after five years, when the plan will be reviewed to ensure that it is consistent with applicable Regional Water Plans and the State Water Plan.

### **LOCATION AND EXTENT**

Bandera County lies in the south-central part of Texas, in the hill country region of the Edwards Plateau. The County has an aerial extent of 768 square miles, or 491,520 acres. The City of Bandera is the County seat and is centrally located at the intersection of State Highways 16 and 173. Kerr, Kendall, Bexar, Medina, Uvalde, and Real Counties bound the County, in a clockwise pattern. Bandera County River Authority and Groundwater District encompasses all of Bandera County.

### **MANAGEMENT OF GROUNDWATER SUPPLIES**

The Bandera County River Authority and Groundwater District will aim to protect and preserve the County's water and natural resources for the State of Texas. The District is also tasked with

maintaining local accountability of the County's water resources to help safeguard the property rights of the citizens of Bandera County. An observation network has been established and maintained in order to study and observe changing storage conditions of groundwater supplies within the District. The District will make a regular assessment of water supply and groundwater storage conditions and will report those conditions annually to the Board and make a report available to the public. The District will cooperate with investigations of the groundwater resource within the District and will make the results of investigations available to the public upon adoption by the Board.

The relevant factors to be considered in determining the denial of a well permit or limit groundwater withdrawals will include:

- (1) The purpose of the rules of the District;
- (2) The equitable distribution of the resource;
- (3) The economic hardship resulting from grant or denial of a permit or the terms prescribed by the permit;
- (4) The landowner's rights to the water beneath his/her property, and any changes or restrictions to the right of capture laws of the State.

As part of its mission to protect the resource, the District may require reduction of groundwater withdrawals to prevent harming the aquifer. To achieve this purpose, the District may, at the Board's discretion, reduce or revoke any permits after notice and hearing. The determination to seek the amendment of a permit by the District will be based on aquifer conditions observed by the District. The District will enforce the terms and conditions of permits and the rules of the District by enjoining the permit holder in a court of competent jurisdiction as provided for in Texas Water Code, 36.102.

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

**Water Supply Needs** - TWC § 36.1071(e)(4) The District has reviewed and considered the data on water supply needs within the District. Projected needs listed in Appendix C are municipal, irrigation and livestock based. Municipal needs in Bandera County exist for the following water user groups (WUGs): Bandera, Bandera County and Bandera County FWSD1. The majority of the water demand stems from Bandera County. From 2020 to 2070, the total needs in Bandera County are projected to increase from 4,007AF to 4,629AF.

**Water Management Strategies** – TWC § 36.1071(e)(4) The District has reviewed and considered projected water management strategies and participates in TWDB Regional Water Planning of the Edwards Plateau Texas Regional Water Planning Area (Region J) Planning Group. Projected water management strategies are: additional water groundwater wells, rainwater harvesting, drought management, water loss audit and mainline repair, water conservation education and conservation. From 2020 to 2070, the total water management strategies in Bandera County are projected to increase from 909 AF to 2,821 AF.

## **TOPOGRAPHY AND DRAINAGE**

Ashworth (1983) describes the topography within the District in the following statement:

"The land surface in Bandera County is characterized by rough and rolling terrain. The nearly flat-lying, erosion-resistive limestone rocks forming the surface of the Edwards Plateau have been deeply incised into the less resistive, marly limestone rocks of the Glen Rose Formation."

The altitude of the land surface ranges from approximately 2,330 to 1,080 feet above mean sea level.

Bandera County contains parts of three major drainage basins. The Nueces River basin occupies approximately 25 percent of the County to the west and southwest, with drainage to the south. The San Antonio River basin occupies approximately 73 percent of the County; located from the north central, to the southeastern portion of the County, where the river has been dammed to form Medina Lake. Drainage from the San Antonio River basin is to the

southeast. The Guadalupe River basin occupies approximately 2 percent of the County as a small portion of the central northern section. The two major rivers in the County are the Sabinal River, located in the Nueces River basin, and the Medina River, located in the San Antonio River Basin. The larger rivers are dominantly effluent and form wide valleys. Two dominant types characterize the smaller creeks and streams: the perennial spring-fed streams and the intermittent creeks that only transport precipitation runoff.

Wermund (1974) describes three different terrains in Bandera County as: Along the " ..... Sabinal Rivers, the terrain comprises both highly dissected divides and incised stream valleys. About the Medina and Guadalupe Rivers, most terrain lies in broad valleys and less occupies narrow divides."<sup>11</sup>

## **GROUNDWATER RESOURCES OF BANDERA COUNTY**

The Trinity Group aquifer underlies all of Bandera County, underlying the Edwards Plateau aquifer in the northwest portion of the County and extending south into Medina and Uvalde counties and east into Kendall and Bexar counties. The Trinity Group aquifer is the primary source of groundwater in Bandera County. This aquifer is divided into three groups: the Upper Trinity, Middle Trinity, and Lower Trinity. The Upper Trinity aquifer contains the Upper Glen Rose Limestone. The Middle Trinity aquifer contains the Lower Glen Rose Limestone, the Hensell Sand, and the Cow Creek Limestone. The Lower Trinity aquifer is composed of the Sligo Limestone and Hosston Sands. The Trinity Group aquifer yields groundwater from the Upper and Lower units of the Glen Rose Formation; and the Hensell, Cow Creek, Sligo, and Hosston members of the Travis Peak Formation of the Trinity Group of Cretaceous age. Downdip from the outcrop area, in the artesian pressure portion of the aquifer, groundwater production supplies water to all wells. Primary sources of recharge to the Trinity Group aquifer include the infiltration of precipitation on the outcrops to the north and northwest of Bandera County and infiltration of surface water from lakes and streams through vertical leakage from overlying formations. The Trinity Group aquifer primarily exists under water-table conditions along the outcrop and under artesian conditions downdip, where confining beds of limestone and shale bound the water-bearing units. Movement of shallow groundwater is primarily down gradient, from high to low elevations, and at right angles to the potentiometric surface contours, which denote the configuration of the water table. The overall groundwater movement is to the southeast with local movement away from groundwater highs, and along the surface drainage system, with groundwater lows that have developed as a result of production in large well fields.

Alluvial deposits are found in the flood plain of the major tributaries of streams, which make up the surface drainage system in the county. The alluvial deposits are highly permeable with a maximum thickness of approximately 50 feet and small areal extent. They yield only small amounts of good quality water. Due to the naturally occurring anhydrite and gypsum beds, the overall quality of groundwater obtained from the Upper Trinity aquifer, which contains the Upper Glen Rose formation, is of poor quality with small yield. The Middle Trinity aquifer, which contains the Lower Glen Rose Limestone, Hensell Sand, and Cow Creek Limestone formations, yields small to moderate amounts of water with a good to excellent water quality. The lower Trinity aquifer that contains the Sligo Limestone and Hosston Sand yields moderate to large quantities of water of good to excellent quality.

## **ANNUAL VOLUME OF GROUNDWATER USED IN BANDERA COUNTY**

### **Technical District Information Required by the Texas Administrative Code and Texas Water Code**

#### ***Estimate of Modeled Available Groundwater in District Based on Desired Future Conditions***

Texas Water Code § 36.001 defines modeled available groundwater 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" The joint planning process set forth in Texas Water Code § 36.108 must be collectively conducted by all groundwater conservation districts within the same GMA. The District is a member of GMA 9. GMA 9 adopted DFCs for the Edwards Group of the Edwards-Trinity (Plateau) and the Hill Country Aquifer, GAM Run 16-023 MAG, on February 28, 2017. The adopted DFCs were then forwarded to the TWDB for development of the MAG calculations. The Estimated MAG is attached as Appendix A.

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

Texas Water Code § 36.1071(e)(3)(B) requires an estimate of the amount of Groundwater used within the District annually for the last 5 years. This data is prepared by TWDB and can be found in Appendix C on page 3 of 8.

#### ***Estimate of the Annual Amount of Recharge, From Precipitation to the Groundwater Resources Within the District***

The estimated annual recharge from precipitation to the Trinity Aquifer is 47,239 Acre-Feet and the estimated annual recharge from precipitation to the Edwards Trinity Plateau Aquifer is 7,561 Acre-Feet. More information related to aquifer recharge from precipitation is available in GAM Run 22-010, which is attached as Appendix B.

#### ***Estimate Of the Volume of Water That Discharges from The Aquifer to Springs and Any Surface Water Bodies, Including Lakes, Streams and Rivers***

The estimated annual volume of water that discharges from the Trinity Aquifer is 32,750 acre-feet to springs and any surface water bodies, including lakes, streams and rivers and the estimated annual volume of water that discharges from the Edwards Trinity Plateau Aquifer is 4,141 acre-feet to springs and any surface water bodies, including lakes, streams and rivers. More information related to aquifer recharge from precipitation is available in GAM Run 22-010, which is attached as Appendix B.

#### ***Estimate Of the Projected Surface Water Supply Within the District***

The projected surface water supply within the District is 10 acre-feet annually over the next 50 years. For further information please refer to page 6 of Appendix C.

#### ***Estimate Of The Projected Total Demand For Water Within The District***

For the sum of projected total demand for water within the District, in accordance with the 2022 Texas State Water Plan please refer to page 7 of Appendix C.

#### ***water supply needs from the adopted state water plan***

For the relevant data on water supply needs from the 2022 Texas State Water Plan please refer to page 8 of Appendix C.

#### ***Water Management Strategies***

For current water management strategies in Bandera County please refer to page 9 of Appendix C.

**Estimate Of the Annual Volume of Flow**

Please see the table below. For more please refer to GAM Run 22-010, which is attached as Appendix B.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual volume of flow into the district within each aquifer in the district	Trinity Aquifer	7,819 Acre-Feet
Estimated annual volume of flow into the district within each aquifer in the district	Edwards-Trinity (Plateau) Aquifer	6,109 Acre-Feet
Estimated annual volume of flow out of the district within each aquifer in the district	Trinity Aquifer	30,409 Acre-Feet
Estimated annual volume of flow out of the district within each aquifer in the district	Edwards-Trinity (Plateau) Aquifer	4,033 Acre-Feet
Estimated net annual volume of flow between each aquifer in the district	From the Edwards-Trinity (Plateau) Aquifer to the Trinity Aquifer	12,484 Acre-Feet

## **MANAGEMENT OF GROUNDWATER SUPPLIES**

The District will study, monitor, and manage the groundwater supplies within Bandera County. The District will continue the programs and activities presently being performed in the District.

The District will continue to manage and monitor the groundwater of Bandera County to provide the best use of the resources while protecting the rights of the public. The District will continue to monitor and collect data to better understand and manage the aquifers. The existing monitoring system will be improved and expanded as needed for the development of data and a report will be prepared annually and made available to the public.

The District has implemented a drought management plan to aid in groundwater conservation. This plan is based on the Palmer Index and is designed to reduce pumping during the different drought stages.

The District will strive to conserve the groundwater resources by encouraging municipal use of surface water supplies when available and promote aquifer storage and recovery and aquifer recharge where practical. The District will encourage the use of rainwater harvesting to supplement water well usage in the county to conserve groundwater. The District will support brush control programs and other programs designed to control invasive species by providing public information and interacting with other governmental or organization groups that practice best management practices for water conservation.

## **ACTION, PROCEDURES, PERFORMANCE AND AVOIDANCE FOR PLAN IMPLEMENTATION**

The District has adopted rules relating to the permitting of wells and the production of groundwater. The most recent adoption was July 14, 2022. The rules adopted by the District are pursuant to Texas Water Code Chapter 36 and the provisions of this plan. All rules will be adhered to and enforced. The promulgation and enforcement of the rules will be based on the best technical evidence available. A public hearing was held regarding the set of rules. You can find a copy of the rules here: <https://www.bcragd.org/wp-content/uploads/2022/08/BCRAGD-CH.-36-Rules.pdf>

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

The District will strive to implement the provisions of this plan and will utilize the provisions of this plan for determining the direction or priority for the District. Agreements entered into by the District and any additional planning efforts in which the District may participate will be consistent with the purposes of this plan. All activities of the District will be undertaken in cooperation and coordinated with the appropriate state, regional or local water management entities and in compliance with State and Regional Water Plans.

## **METHODOLOGY FOR TRACKING PROGRESS IN ACHIEVING MANAGEMENT GOALS**

The District will use the following methodology to track its progress toward achieving its management goals:

The District's General Manager will present an annual report to the Board of Directors on District performance and progress in achieving management goals and objectives at the April Quarterly Board meeting following the end of the fiscal year.



## **GROUNDWATER MANAGEMENT GOALS**

### **Management Goal 1**

#### **1.0.0 Manage groundwater to provide the most efficient use of groundwater resources.**

##### **1.1.1 Management Objective**

Implement a program to develop data on the aquifers for better modeling of the aquifers.

##### **1.1.2 Performance Standard**

- a. Collect pump test data from subdivision test wells after water availability studies are conducted.
- b. Collect water level data from a minimum of 10 monitor wells on a semi-annual basis.
- c. Summarize water availability studies and aquifer level data in an annual report.

##### **1.2.1 Management Objective**

Maintain a program of issuance of well permits for non-exempt wells and registrations for exempt wells.

##### **1.2.2 Performance Standard**

Maintain an ongoing program of issuance of well permits each year. Provide the number of permits issued each year and the number of registrations issued each year in an annual report to the Board of Directors.

### **Management Goal 2**

#### **2.0.0 Control and prevent the waste of groundwater.**

##### **2.1.1 Management Objective**

Provide literature to the public on the efficient use of water and water saving devices in the home.

##### **2.1.2 Performance Standard**

- a. Provide handouts with well permits and registrations to educate the public on water saving devices. The District will report the number of handouts with well permits and registrations in an annual report to the Board of Directors.
- b. Coordinate a minimum of one public presentation per year. Provide the number of shows, demonstrations, events, or educational talks at which literature or information is provided to the public, in an annual report to the Board of Directors.

##### **2.2.1 Management Objective**

Promote public awareness about preventing the waste of water resources.

##### **2.2.2 Performance Standard**

Record the number of speaking appearances and/or shows, demonstrations or events at which literature or information is provided to the public on preventing the waste of water resources. The District will report the number of aforementioned events in the annual report to the Board of Directors.

### Management Goal 3

#### 3.0.0 Control and prevent subsidence.

The district has reviewed the TWDB subsidence risk report for applicability to Bandera County. Figure 1.1 'Major aquifer subsidence risk' shows That the District has a low – medium subsidence risk. Therefore, this is not applicable.

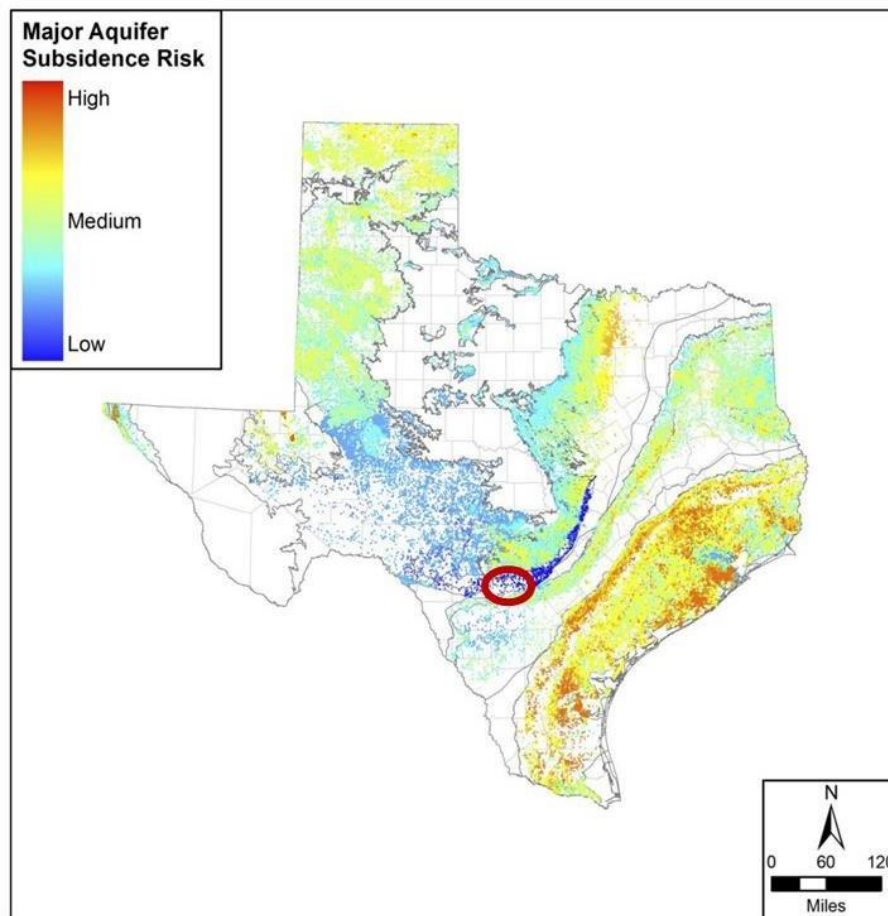


Figure 1 – Modified with a red circle highlighting the area of Bandera County from –Identification of the Vulnerability of the Major and Minor Aquifers of Texas to Subsidence with Regard to Groundwater Pumping – TWDB Contract Number 1648302062 <http://www.twdb.texas.gov/groundwater/models/research/subsidence/subsidence.asp>

Section 4.2.9 'Trinity', in the Final Report discusses the aquifer formation's high carbonate composition, low water saturated clays, and low risk for subsidence. Historically subsidence has not been observed within the District's boundaries. The District will continue to monitor for signs of subsidence and will respond to any reports of potential subsidence.

#### **4.0.0 Address conjunctive surface water management issues.**

##### **4.1.1 Management Objective**

Make at least one annual evaluation of the groundwater resources and surface water quality in Bandera County and include the results of the evaluation in the annual report to the Board of Directors.

##### **4.1.2 Performance Standard**

- a. Record the number of reports and evaluations provided to the Board of Directors on the groundwater resources and the surface water quality in the annual report.
- b. Maintain at the District Office an annual report of District activities available to the public.

##### **4.2.1 Management Objective**

Each year the District will participate in the regional planning process by attending Region J Regional Planning Group meetings.

##### **4.2.2 Performance Standard**

The attendance of a district representative at any Region J Regional Planning Group will be noted in the annual report to the Board of Directors.

#### **Management Goal 5**

#### **5.0.0 Address natural resource issues.**

##### **5.1.1 Management Objective**

The District is an active participant in the TCEQ Clean Rivers Program. This program is the gold standard in Texas for monitoring the water quality in the State.

##### **5.1.2 Performance Standard**

The District will summarize all TCEQ Clean Rivers Program activities and report them to the Board of Directors in an annual report.

##### **5.2.1 Management Objective**

The District will investigate, or refer to the proper agency, any citizen's or District initiated complaint related to surface water, groundwater, or any natural resource within the District. These investigations are a valuable tool to help the District protect the natural resources in the County.

##### **5.2.2 Performance Standard**

The General Manager will report the number of nuisance complaints, Notice of Violations issued, natural resources investigations, surface water tests, and groundwater tests to the Board of Directors in an annual report.

## Management Goal 6

### 6.0.0 Address drought conditions.

For reference please visit: <https://www.waterdatafortexas.org/drought>

#### 6.1.1 Management Objective

Record the Drought Severity Index each month, post the drought stage, and any appropriate drought restrictions at the District's office.

#### 6.1.2 Performance Standard

In conjunction with the drought index, the General Manager may utilize flow rates from the Sabinal and Medina Rivers to determine appropriate drought stages. The General Manager shall post the drought stage and any appropriate drought restrictions at the District's office each month.

#### 6.2.1 Management Objective

Evaluate groundwater availability each year by monitoring water levels of the aquifer from monitor wells within Bandera County.

#### 6.2.2 Performance Standard

Record number of wells monitored each year in the annual report to the Board of Directors.

## Management Goal 7

### 7.0.0 Address conservation

#### 7.1.1 Management Objective

Promote public awareness of the need for water conservation.

#### 7.1.2 Performance Standard

A minimum of one public water quality/conservation show, demonstration, event, or educational talk will be held each year. The number of events, shows, or talks should be reported in the annual report to the Board of Directors.

#### 7.2.1 Management Objective

The District will provide information on efficient use of groundwater to students in Bandera County.

#### 7.2.2 Performance Standard

The General Manager will report the instances that educational conservation information was given to students in Bandera County in the annual report to the Board.

## Management Goal 8

### 8.0.0 Address rainwater harvesting

#### 8.1.1 Management Objective

The District will promote rainwater harvesting and provide advice, information, and literature regarding the benefits of rainwater harvesting.

#### 8.1.2 Performance Standard

Provide Rainwater Harvesting material to the public in handouts. Each year provide rainwater harvesting information on at least one occasion by one of the following methods and include it in an annual report to the Board of Directors:

- article to local newspapers
- distribution of conservation literature handouts
- public presentation by District Staff
- information on District website
- District exhibit/display booth at a public event

## **Management Goal 9**

### **9.0.0 Address recharge enhancement**

The District does not currently have the financial resources to buy property and construct recharge structures; therefore, this goal is not applicable to the District at this time.

## **Management Goal 10**

### **10.0.0 Address precipitation enhancement**

Precipitation enhancement over Bandera County is financed by the Edward Aquifer Authority and operates from Pleasanton, Texas; therefore, this goal is not applicable to the District at this time.

## **Management Goal 11**

### **11.0.0 Address brush control.**

#### **11.1.1 Management Objective**

Provide to the public available information on brush control including riparian health, along with native and invasive plant species management.

#### **11.1.2 Performance Standard**

Each year provide brush control, including riparian health, along with native and invasive plant species management information on at least one occasion by one of the following methods and include it in an annual report to the Board of Directors:

- article to local newspapers
- distribution of conservation literature handouts
- public presentation by District Staff
- information on District website
- District exhibit/display booth at a public event

## **Management Goal 12**

### **12.0.0 Addressing water quality.**

#### **12.1.1 Management Objective**

Continue the existing program to monitor groundwater quality in the District.

#### **12.1.2 Performance Standard**

Continue to monitor water quality from wells in the monitoring system on a semi-annual basis, and from newly drilled wells when samples can be obtained. Report the number of samples obtained to the Board of Directors in an annual report.

#### **12.2.1 Management Objective**

Continue the existing program to monitor surface water quality in the District.

#### **12.2.2 Performance Standard**

Continue to monitor water quality from a minimum of 6 locations in the county from the Sabinal and Medina River basins on a quarterly basis. Report the number of samples obtained to the Board of Directors in an annual report.

### **Management Goal 13**

#### **13.0.0 Addressing the Desired Future Conditions.**

##### **13.1.1 Management Objective**

To achieve the Desired Future Condition adopted by GMA 9  
For the Edwards Group of the Edwards Trinity (Plateau) and the Hill Country Trinity  
Aquifer.

##### **13.1.2 Performance Standard**

Groundwater Management Area 9 has adopted a Desired Future Condition (DFC) for the Edwards Trinity Plateau and the Hill Country Trinity aquifer.

District rules do not allow permitted wells in the Edwards Trinity Plateau Aquifer. The District has established a monitor well in the Edwards Aquifer and is monitoring the water level and rainfall on a real-time basis. A comparison of the annual water level measurements and the cumulative water level trend to the adopted Desired Future Condition will be made annually. The water levels will be included in the District database and a discussion of the water level trend-Desired Future Condition comparison will be reported to the Board of Directors on an annual basis and documented in the annual report.

The District will notate the Hill Country Trinity Aquifer water level trends from the District's Monitor Wells in order to track the District's progress in complying with the average drawdown as stated in GAM Run 16-023 MAG for Bandera County. The General Manager will report annually to the District Board of Directors the progress of achieving the Desired Future Condition. The General Manager will complete an annual groundwater report that details groundwater production from non-exempt wells combined with exempt well pumping estimates supplied by the Texas Water Development Board. This report will be included in the annual report provided to the District's Board of Directors.

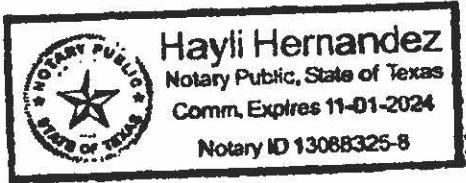
I, the undersigned, do hereby certify that this Management Plan was formally adopted by the District Board and will be effective on the date of signature.

Signed this 20 day of December, 2022.

Don Sloan  
Don Sloan, Board President

Sworn to and subscribed before me this 20 day of December, 2022.

Hayli Hernandez  
Signature of Notary Public



Hayli Hernandez  
Printed Name of Notary Public

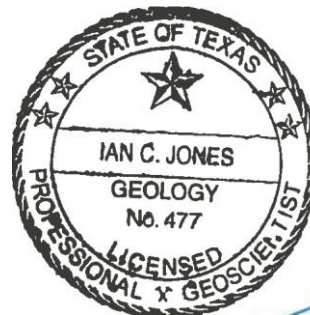
# APPENDIX A



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**GAM RUN 16-023 MAG:  
MODELED AVAILABLE GROUNDWATER  
FOR THE AQUIFERS IN GROUNDWATER  
MANAGEMENT AREA 9**

Ian C. Jones, Ph.D., P.G.  
Texas Water Development Board  
Groundwater Division  
Groundwater Availability Modeling Section  
(512) 463-6641  
February 28, 2017



A handwritten signature in blue ink, appearing to read "I. C. Jones", located below the professional seal.

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# **GAM RUN 16-023 MAG: MODELED AVAILABLE GROUNDWATER FOR THE AQUIFERS IN GROUNDWATER MANAGEMENT AREA 9**

Ian C. Jones, Ph.D., P.G.  
Texas Water Development Board  
Groundwater Division  
Groundwater Availability Modeling Section  
(512) 463-6641  
February 28, 2017

## ***EXECUTIVE SUMMARY:***

We have prepared estimates of the modeled available groundwater for the relevant aquifers of Groundwater Management Area 9—the Trinity, Edwards Group of the Edwards-Trinity (Plateau), Ellenburger-San Saba, and Hickory aquifers. The estimates are based on the desired future conditions for these aquifers adopted by the groundwater conservation districts in Groundwater Management Area 9 on April 28, 2016. The explanatory report and other materials submitted to the Texas Water Development Board (TWDB) were determined to be administratively complete on November 23, 2016.

The modeled available groundwater values are summarized by decade for the groundwater conservation districts (Tables 1, 3, 5, and 7) and for use in the regional water planning process (Tables 2, 4, 6, and 8). The modeled available groundwater estimates are 2,208 acre-feet per year in the Edwards Group of the Edwards-Trinity (Plateau) Aquifer, up to 75 acre-feet per year in the Ellenburger-San Saba Aquifer, 140 acre-feet per year in the Hickory Aquifer, and range from approximately 93,000 acre-feet per year in 2010 to about 90,500 acre-feet per year in 2060 in the Trinity Aquifer. Please note that the Trinity Aquifer includes both the Trinity Aquifer as defined by the TWDB and the Trinity Group of the Edwards-Trinity (Plateau) Aquifer. The modeled available groundwater estimates were extracted from results of model runs using the groundwater availability models for the Hill Country portion of the Trinity Aquifer version 2.01 (Jones and others, 2011), and the minor aquifers of the Llano Uplift Area (Shi and others, 2016).

## ***REQUESTOR:***

Mr. Ronald Fieseler, chair of Groundwater Management Area 9 districts.

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

In a letter dated April 25, 2016, Mr. Ronald Fieseler provided the TWDB with the desired future conditions of the Trinity, Edwards Group of the Edwards-Trinity (Plateau), Ellenburger-San Saba, and Hickory aquifers in Groundwater Management Area 9. Mr.

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Fieseler provided additional clarifications for baseline years for each desired future condition, areas not covered by the models, assumed climatic conditions, and spatial pumping distributions through emails to the TWDB on June 8, 2016, August 15, 2016 and September 9, 2016. Mr. Fieseler also clarified the water level drawdown for the Ellenburger-San Saba Aquifer in Kendall County in a letter dated October 19, 2016.

The final adopted desired future conditions for the aquifers in Groundwater Management Area 9 are:

- Trinity Aquifer [*Upper, Middle, and Lower undifferentiated*] - Allow for an increase in average drawdown of approximately 30 feet through 2060 (throughout GMA-9) consistent with “Scenario 6” in TWDB GAM Task 10-005.
- Edwards Group of Edwards-Trinity (Plateau) [*Aquifer*] in Kendall and Bandera counties - Allow for no net increase in average drawdown in Bandera and Kendall counties through 2070.
- Ellenburger-San Saba Aquifer in Kendall County - Allow for an increase in average drawdown of no less than 7 feet in Kendall County through 2070.
- Hickory Aquifer in Kendall County - Allow for an increase in average drawdown of no more than 7 Feet in Kendall County through 2070.

The Trinity Aquifer includes both the Trinity Aquifer as defined by the TWDB and the Trinity Group of the Edwards-Trinity (Plateau) Aquifer.

Additionally, districts in Groundwater Management Area 9 voted to declare that the following aquifers or parts of aquifers be classified as non-relevant for the purposes of joint planning:

- Edwards Group of the Edwards-Trinity (Plateau) Aquifer in Kerr and Blanco counties.
- Ellenburger-San Saba Aquifer in Blanco and Kerr counties.
- Hickory Aquifer in Blanco, Hays, Kerr, and Travis counties.
- Marble Falls Aquifer in Blanco County.
- Edwards (Balcones Fault Zone) Aquifer in Bexar, Comal, Hays, and Travis counties.

### ***METHODS:***

As defined in Chapter 36 of the Texas Water Code, “modeled available groundwater” is the estimated average amount of water that may be produced annually to achieve a desired future condition. Groundwater conservation districts are required to consider modeled

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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.

The desired future condition for the Trinity Aquifer is identical to the one adopted in 2010 and the associated modeled available groundwater is based on a specific model run and scenario—Scenario 6 in GAM Task 10-005 (Hutchison, 2010) and GAM Task 10-050 (Hassan, 2012). Trinity Aquifer water-level drawdown is based on 2008 water levels.

For other relevant aquifers—the Edwards Group of the Edwards-Trinity (Plateau), Ellenburger-San Saba, and Hickory aquifers—the groundwater availability models for the Hill Country portion of the Trinity Aquifer version 2.01 (Jones and others, 2011), and the minor aquifers of the Llano Uplift Area (Shi and others, 2016) were used to simulate the desired future conditions outlined in the explanatory report (GMA 9 and others, 2016) and further clarified as noted in the previous section. Water level drawdown calculations were based on the water levels simulated in final years of the historical versions of the respective models. These final years are 1997 in the groundwater availability model for the Hill Country portion of the Trinity Aquifer and 2010 in the groundwater availability model for the minor aquifers of the Llano Uplift Area. The predictive model runs retain pumping rates from the historic period—1980 through 1997—except in the aquifer or area of interest. In those areas, pumping rates are varied such that they produce the desired future average water level drawdown conditions. Pumping rates were reported on 10-year intervals from 2010 through 2060 (for the Trinity Aquifer) and 2010 through 2070 (for all other relevant aquifers). The groundwater availability estimates for 2070 for the Trinity Aquifer will be determined by the regional water planning groups.

Water level drawdown averages were calculated for the relevant portions of each aquifer. Drawdown for model cells which became dry during the simulation (water level dropped below the base of the cell) were excluded from the averaging. Estimates of modeled available groundwater therefore decrease over time as continued simulated pumping predicts the development of dry model cells in areas of Hays, Kerr, and Travis counties. The calculated water-level drawdown averages were compared with the desired future conditions to verify that the pumping scenario achieved the desired future conditions.

Modeled available groundwater values for the Trinity Aquifer and the Edwards Group of the Edwards-Trinity (Plateau) Aquifer were determined by extracting pumping rates by decade from the model results using ZONEBUDGET Version 3.01 (Harbaugh, 2009). For the Ellenburger-San Saba and Hickory aquifers, modeled available groundwater values were determined by extracting pumping rates by decade from the model results using ZONBUDUSG Version 1.01 (Panday and others, 2013).

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

### **Trinity and Edwards-Trinity (Plateau) Aquifers**

We used the groundwater availability model (version 2.01) for the Hill Country portion of the Trinity Aquifer developed by Jones and others (2009) to determine modeled available groundwater in the Trinity Aquifer and the Edwards Group of the Edwards-Trinity (Plateau) Aquifer. See Jones and others (2009) for details on model construction, recharge, discharge, assumptions, and limitations. The parameters and assumptions for the groundwater availability model for the Hill Country portion of the Trinity Aquifer are described below:

- The model has four layers:
  - Layer 1 represents mostly the Edwards Group of the Edwards-Trinity (Plateau) Aquifer and larger portions of the Edwards Group not classified as an aquifer,
  - Layer 2 represents the Upper Trinity Aquifer,
  - Layer 3 represents the Middle Trinity Aquifer, and
  - Layer 4 represents the Lower Trinity Aquifer.
- The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).
- Parts of Bandera, Blanco, and Kerr counties are not included in the model and consequently are not included in the modeled available groundwater calculations.
- Drawdown for cells with water levels below the base elevation of the cell (“dry” cells) were excluded from calculation of average drawdown and the modeled available groundwater values.
- In separate model runs, modeled available groundwater was calculated for the Trinity Aquifer and the Edwards Group of the Edwards-Trinity (Plateau) Aquifer. The Trinity Aquifer is defined as the Trinity Group occurring within Groundwater Management Area 9, irrespective of whether it forms part of the Trinity Aquifer or Edwards-Trinity (Plateau) Aquifer.
- The results for the Trinity Aquifer presented in this report are based on Scenario 6 of GAM Task 10-005 (Hutchison, 2010). See Hutchison (2010) for a full description of the methods, assumptions, and results of the model simulations. Each scenario in GAM Task 10-005 consisted of a series of 387 separate 50-year

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model simulations, each with a different recharge configuration. Though the pumping input to the model was the same for each of the 387 simulations, the pumping output differed depending on the occurrence of inactive (or dry) cells. Because the analysis was statistical any baseline year may be assumed, therefore average drawdown is based on 2008 conditions as noted in the Groundwater Management Area 9 explanatory report.

- The results for the Edwards Group of the Edwards-Trinity (Plateau) Aquifer are based on a single model run using historic pumping rates in all parts of the model area except the Edwards Group of Kendall and Bandera counties and average recharge from GAM Task 10-005. Recharge used in this model run represents the average recharge taken from the 387 simulations (Run 169) used in Trinity Aquifer model runs. Average drawdown was calculated based on the last historic stress period (1997).

### **Minor aquifers of the Llano Uplift Area**

We used version 1.01 of the groundwater availability model for the minor aquifers in the Llano Uplift Area. See Shi and others (2016) for assumptions and limitations of the model. The parameters and assumptions for the groundwater availability model for the minor aquifers of the Llano Uplift Area are described below:

- The model contains eight layers:
  - Layer 1 (the Trinity Aquifer, Edwards-Trinity (Plateau) Aquifer, and younger alluvium deposits),
  - Layer 2 (confining units),
  - Layer 3 (the Marble Falls Aquifer and equivalent units),
  - Layer 4 (confining units),
  - Layer 5 (Ellenburger-San Saba Aquifer and equivalent units),
  - Layer 6 (confining units),
  - Layer 7 (the Hickory Aquifer and equivalent units), and
  - Layer 8 (Precambrian units).
- The model was run with MODFLOW-USG beta (development) version (Panday and others, 2013).

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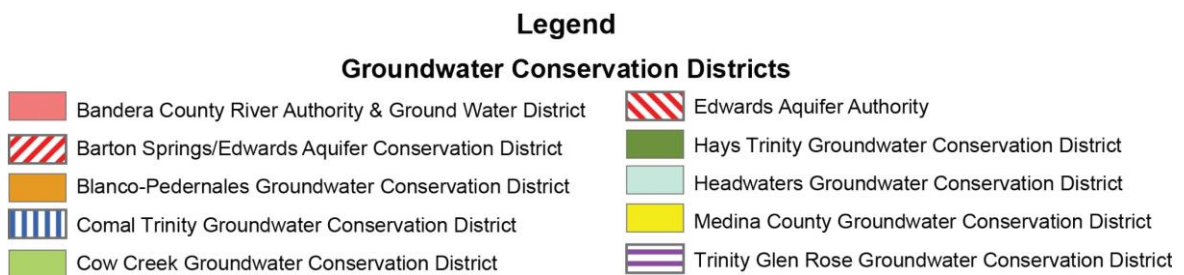
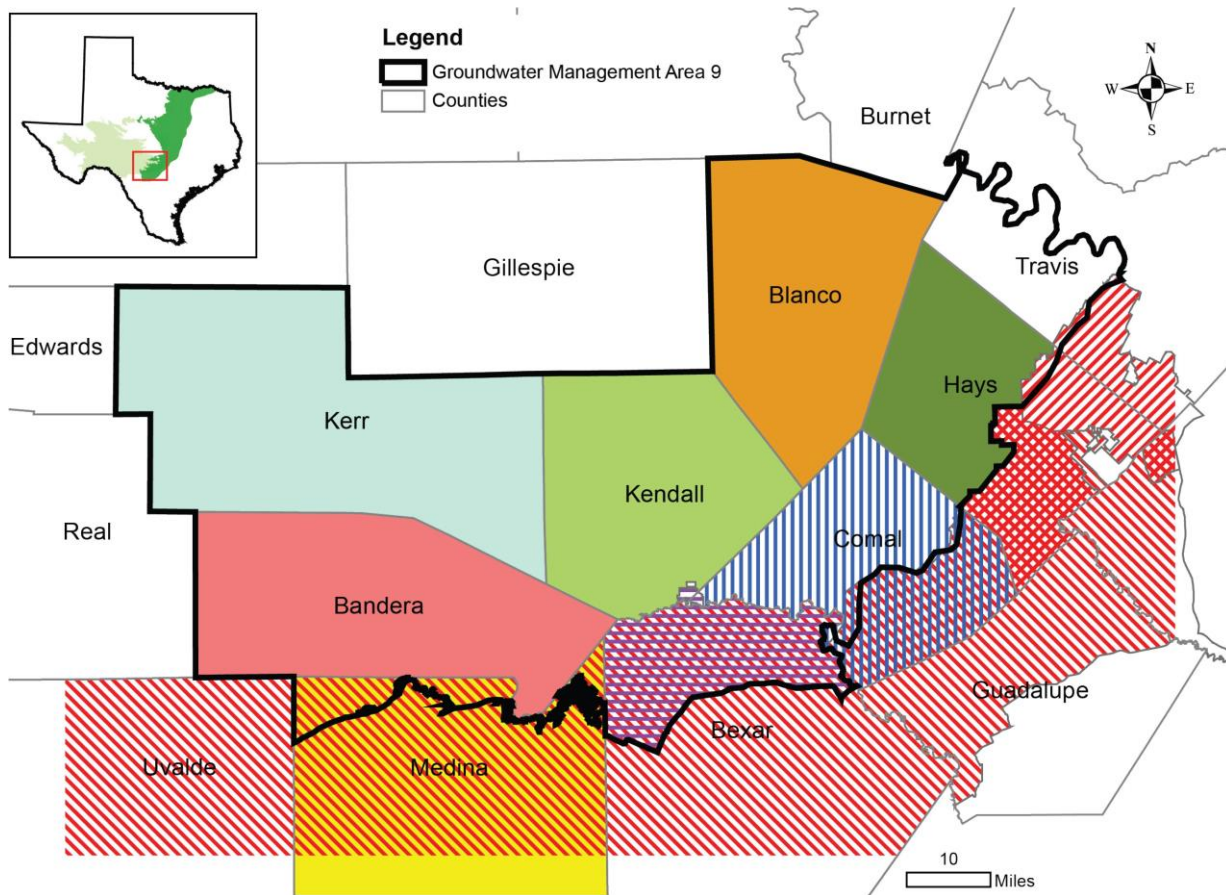
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- Perennial rivers and reservoirs were simulated using the MODFLOW-USG river package. Springs were simulated using the MODFLOW-USG drain package.
- There is no historic pumping information available for the Ellenburger-San Saba and Hickory aquifers of Kendall County. Consequently, we used uniformly distributed pumping to simulate the desired future condition and determine the modeled available groundwater.

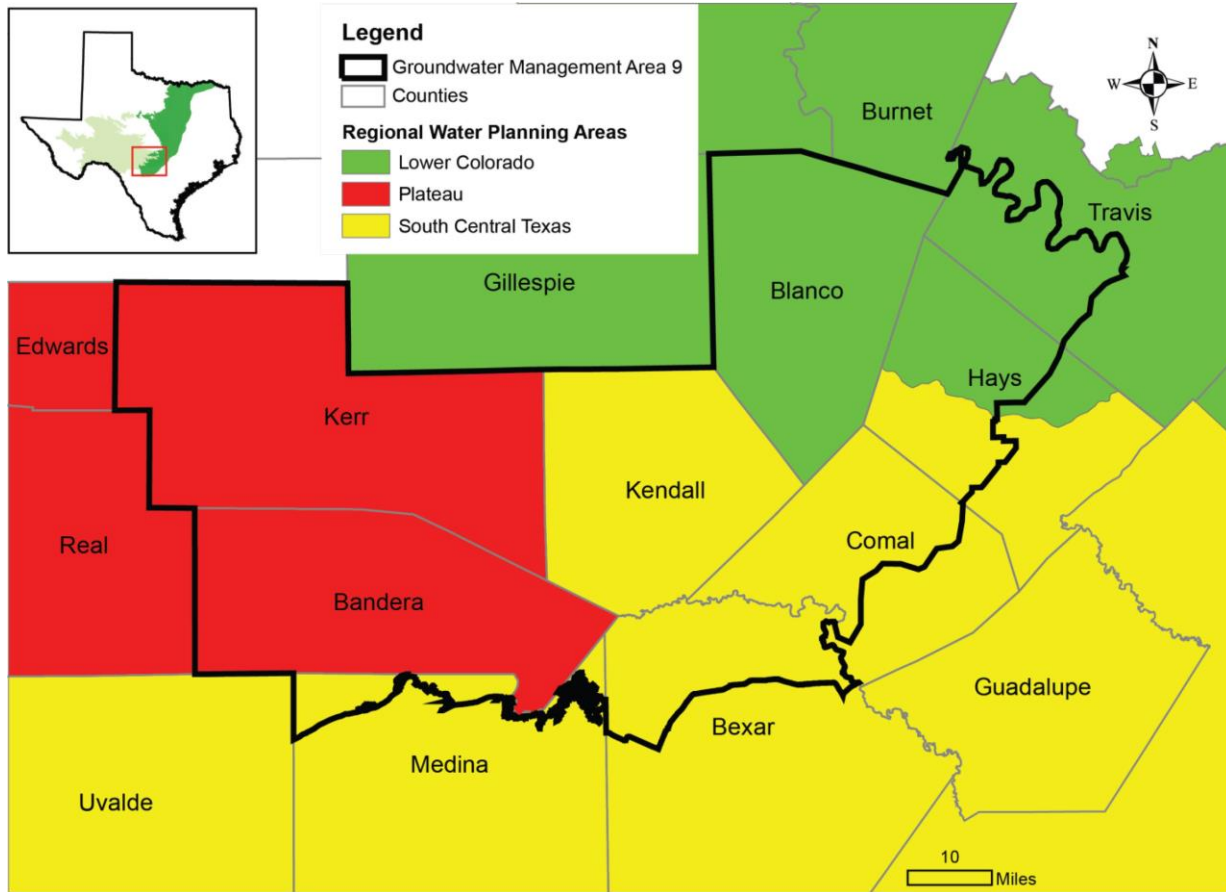
### ***RESULTS:***

The modeled available groundwater for the Trinity Aquifer that achieves the desired future conditions adopted by districts in Groundwater Management Area 9 decreases from 93,052 to 90,503 acre-feet per year between 2010 and 2060 (Tables 1 and 2). This decline is attributable to the occurrence of increasing numbers of dry model cells over time in parts of Hays, Kerr, and Travis counties. The modeled available groundwater for the Edwards Group of the Edwards-Trinity (Plateau), Ellenburger-San Saba, and Hickory aquifers are 2,208, 75, and 140 acre-feet per year, respectively (Tables 3 through 8). The modeled available groundwater for the respective aquifers has been summarized by aquifer, county, and groundwater conservation district (Tables 1, 3, 5, and 7). The modeled available groundwater is also summarized by county, regional water planning area, river basin, and aquifer for use in the regional water planning process (Tables 2, 4, 6, and 8).

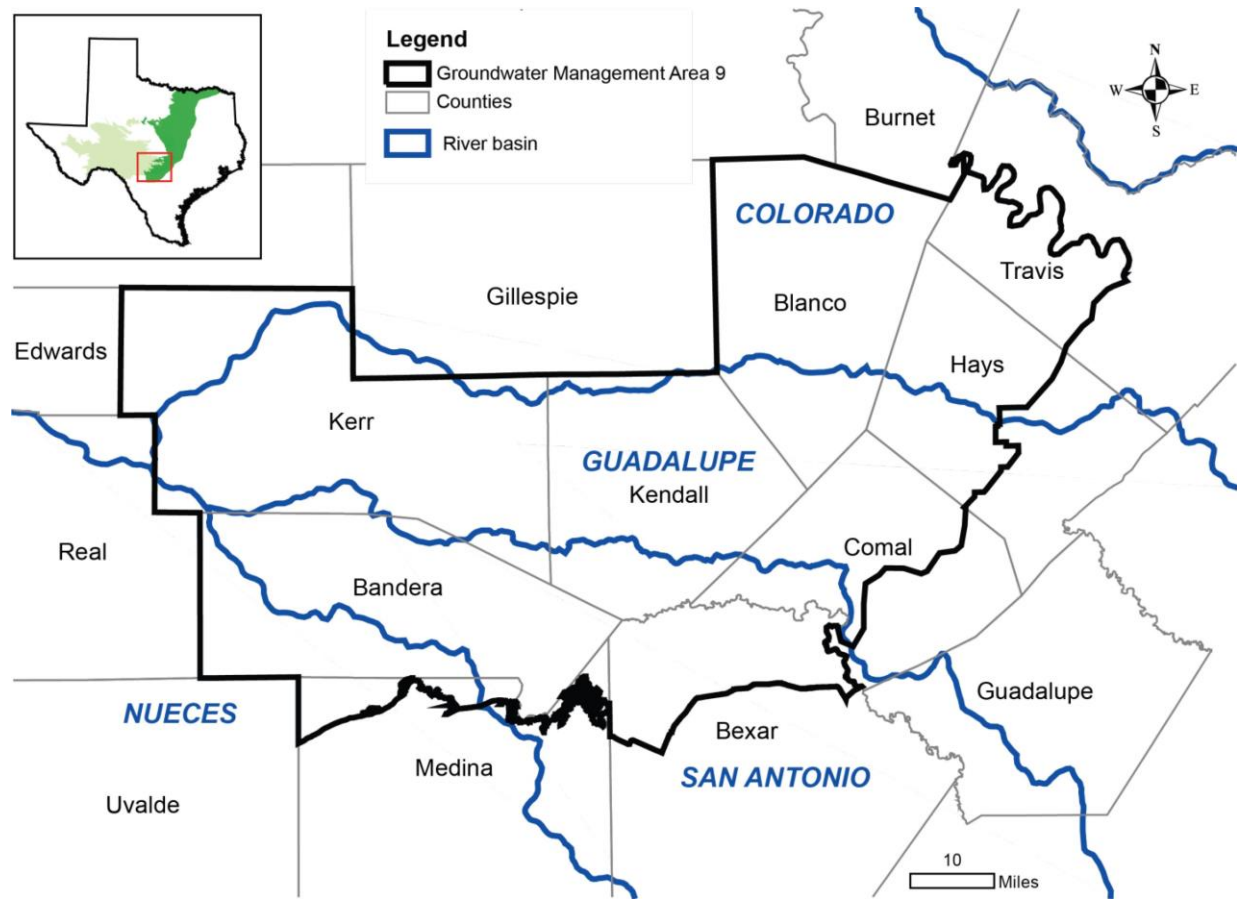




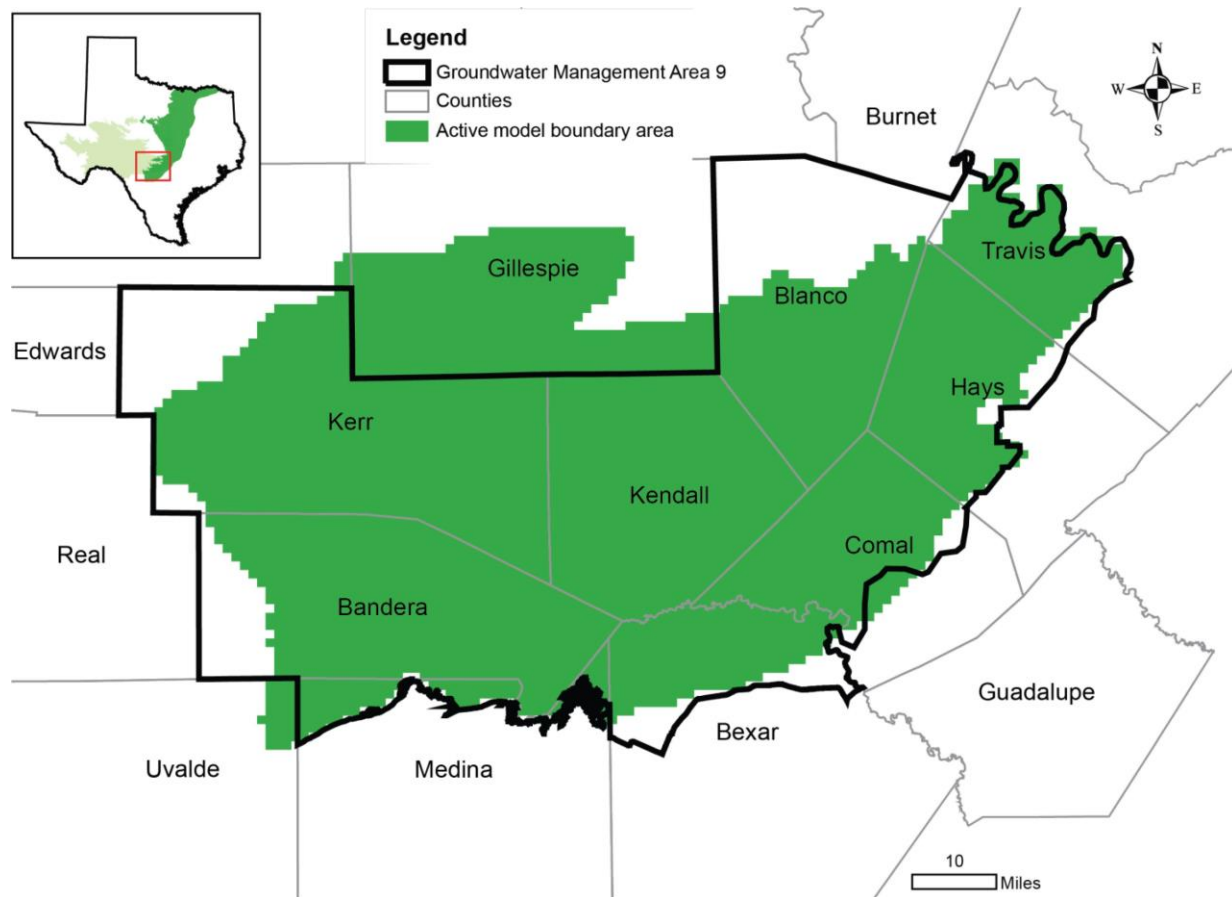
**FIGURE 1. MAP SHOWING THE GROUNDWATER CONSERVATION DISTRICTS IN GROUNDWATER MANAGEMENT AREA 9. NOTE: THE BOUNDARIES OF THE EDWARDS AQUIFER AUTHORITY OVERLAP WITH THE MEDINA COUNTY, TRINITY GLEN ROSE, AND COMAL TRINITY GROUNDWATER CONSERVATION DISTRICTS AND THE BARTON SPRINGS/EDWARDS AQUIFER CONSERVATION DISTRICT.**



**FIGURE 2. MAP SHOWING REGIONAL WATER PLANNING AREAS IN GROUNDWATER MANAGEMENT AREA 9.**



**FIGURE 3. MAP SHOWING RIVER BASINS IN GROUNDWATER MANAGEMENT AREA 9. THESE INCLUDE PARTS OF THE COLORADO, GUADALUPE, SAN ANTONIO, AND NUECES RIVER BASINS.**



**FIGURE 4. MAP SHOWING THE AREAS COVERED BY THE TRINITY AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE HILL COUNTRY PORTION OF THE TRINITY AQUIFER IN GROUNDWATER MANAGEMENT AREA 9.**



**TABLE 1. CONTINUED.**

District	County	Year					
		2010	2020	2030	2040	2050	2060
Trinity Glen Rose Groundwater Conservation District	Bexar	24,856	24,856	24,856	24,856	24,856	24,856
Trinity Glen Rose Groundwater Conservation District	Comal	138	138	138	138	138	138
Trinity Glen Rose Groundwater Conservation District	Kendall	517	517	517	517	517	517
<b>Trinity Glen Rose Groundwater Conservation District Total</b>		<b>25,511</b>	<b>25,511</b>	<b>25,511</b>	<b>25,511</b>	<b>25,511</b>	<b>25,511</b>
<b>No district Total</b>	<b>Travis</b>	<b>8,920</b>	<b>8,672</b>	<b>8,655</b>	<b>8,643</b>	<b>8,627</b>	<b>8,598</b>
<b>GMA 9</b>	<b>Total</b>	<b>93,052</b>	<b>91,276</b>	<b>91,183</b>	<b>90,881</b>	<b>90,548</b>	<b>90,503</b>

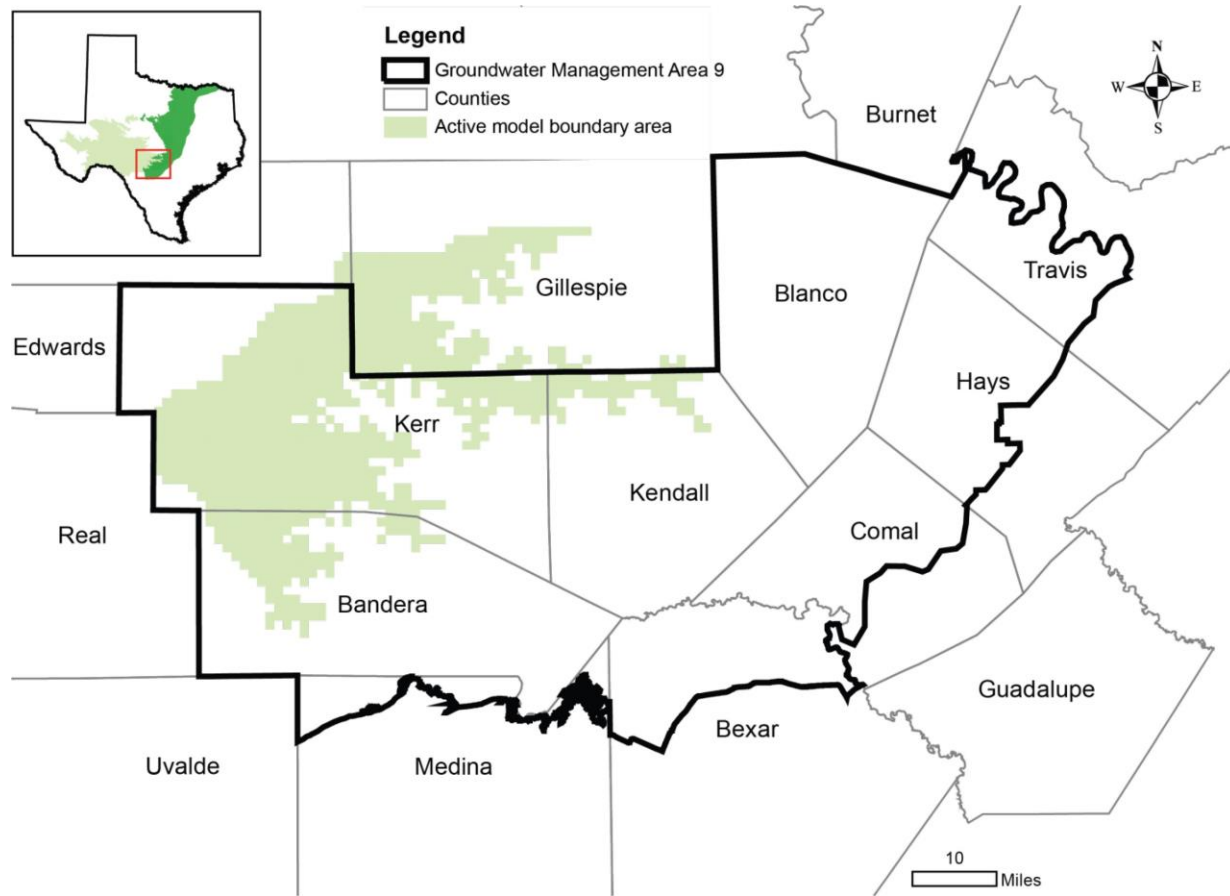






**TABLE 2. CONTINUED.**

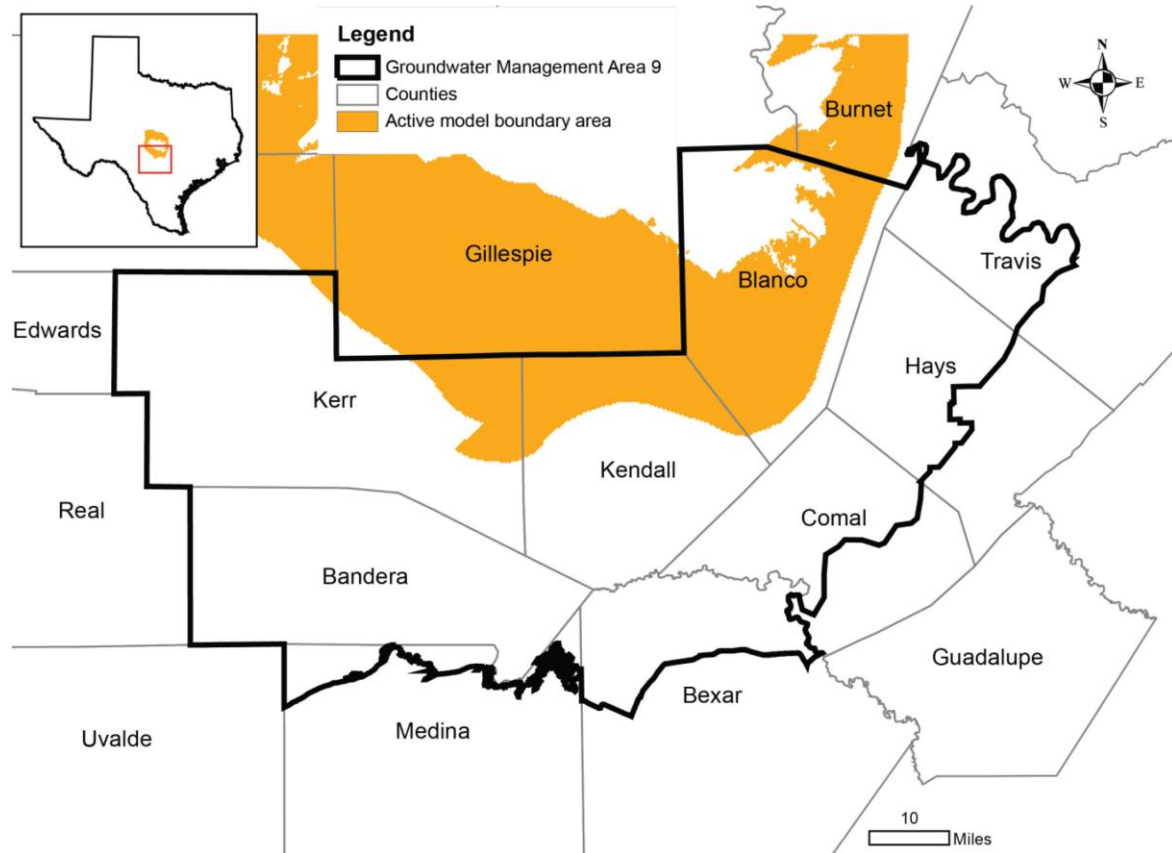
County	RWPA	River Basin	Year					
			2010	2020	2030	2040	2050	2060
Travis	K	Colorado (Total)	8,920	8,672	8,655	8,643	8,627	8,598
<b>GMA 9</b>			<b>93,052</b>	<b>91,276</b>	<b>91,183</b>	<b>90,881</b>	<b>90,548</b>	<b>90,503</b>



**FIGURE 5. MAP SHOWING THE AREAS COVERED BY THE EDWARDS GROUP OF THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE HILL COUNTRY PORTION OF THE TRINITY AQUIFER IN GROUNDWATER MANAGEMENT AREA 9.**

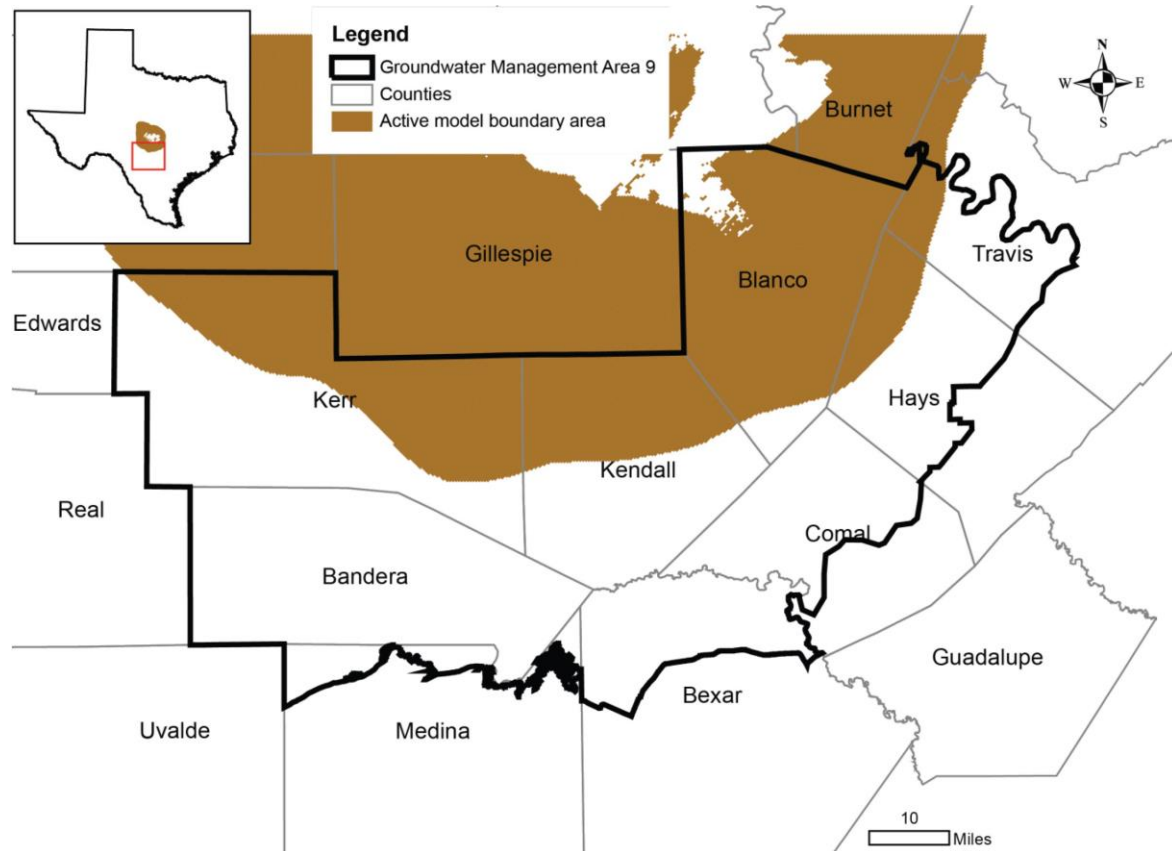






**FIGURE 6. MAP SHOWING THE AREAS COVERED BY THE ELLENBURGER-SAN SABA AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE MINOR AQUIFERS OF THE LLANO UPLIFT AREA IN GROUNDWATER MANAGEMENT AREA 9.**





**FIGURE 7. MAP SHOWING AREAS COVERED BY THE HICKORY AQUIFER IN THE GROUNDWATER AVAILABILITY MODEL FOR THE MINOR AQUIFERS OF THE LLANO UPLIFT AREA IN GROUNDWATER MANAGEMENT AREA 9.**





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### **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.

### **Model “Dry” Cells**

The predictive model run for this analysis results in water levels in some model cells dropping below the base elevation of the cell during the simulation. In terms of water level,

the cells have gone dry. However, as noted in the model assumptions the transmissivity of the cell remains constant and will produce water.

A total of 18 cells out of 23,805 active cells simulating the Trinity Aquifer cells go “dry” during the predictive period through 2060. These dry cells are located in western Travis County, central Hays County and Kerr County. These dry cells are associated either with areas of high pumping or thin parts of the Trinity Aquifer.

### ***REFERENCES:***

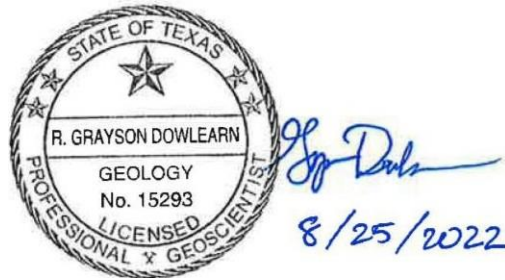
- Groundwater Management Area 9 (GMA 9) Joint Planning Committee, Blanton and Associates, Inc., and LBG-Guyton Associates, 2016, Groundwater Management Area 9 explanatory report for desired future conditions: major and minor aquifers, April 2016, 189 p.
- Harbaugh, A. W., 2009, Zonebudget Version 3.01, A computer program for computing subregional water budgets for MODFLOW ground-water flow models, U.S. Geological Survey Groundwater Software.
- Harbaugh, A. W.; and McDonald, M. G., 1996, User’s documentation for MODFLOW-96, an update to the U.S. Geological Survey modular finite-difference ground-water flow model: U.S. Geological Survey Open-File Report 96-485, 56 p
- Hassan, M. M., 2012, GAM Run 10-050 MAG: Texas Water Development Board GAM Run Report 10-050, v. 2, 10 p.
- Hutchison, W. R., 2010, GAM Task 10-005: Texas Water Development Board GAM Task Report 10-005, 13 p.
- National Research Council, 2007, Models in Environmental Regulatory Decision Making Committee on Models in the Regulatory Decision Process, National Academies Press, Washington D.C., 287 p., [http://www.nap.edu/catalog.php?record\\_id=11972](http://www.nap.edu/catalog.php?record_id=11972).
- Panday, S., Langevin, C. D., Niswonger, R. G., Ibaraki, M., and Hughes, J. D., 2013, MODFLOW-USG version 1: An unstructured grid version of MODFLOW for simulating groundwater flow and tightly coupled processes using a control volume finite-difference formulation: U.S. Geological Survey Techniques and Methods, book 6, chap. A45, 66 p.
- Shi, J., Boghici, R., Kohlrenken, W., and Hutchison, W., 2016, Numerical model report: minor aquifers of the Llano Uplift Region of Texas (Marble Falls, Ellenburger-San Saba, and Hickory): Texas Water Development Board published report, 400 p.
- Texas Water Code, 2011, <http://www.statutes.legis.state.tx.us/docs/WA/pdf/WA.36.pdf>

# APPENDIX B

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**GAM RUN 22-010: BANDERA COUNTY RIVER  
AUTHORITY & GROUNDWATER DISTRICT  
GROUNDWATER MANAGEMENT PLAN**

Yi-An Lin, Ph.D. and Grayson Dowlearn, P.G.  
Texas Water Development Board  
Groundwater Division  
Groundwater Modeling Department  
512-475-2054  
August 25, 2022



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# **GAM RUN 22-010: BANDERA COUNTY RIVER AUTHORITY & GROUNDWATER DISTRICT GROUNDWATER MANAGEMENT PLAN**

Yi-An Lin, Ph.D. and Grayson Dowlearn, P.G.  
Texas Water Development Board  
Groundwater Division  
Groundwater Modeling Department  
512-475-2054  
August 25, 2022

## ***EXECUTIVE SUMMARY:***

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

The TWDB provides data and information to the Bandera County River Authority and Groundwater 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. for each aquifer within the district, the annual volume of water that discharges from the aquifer to springs and any surface-water bodies, including lakes, streams, and rivers; and
3. the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

The groundwater management plan for the Bandera County River Authority and Groundwater District should be adopted by the district on or before December 15, 2022 and submitted to the Executive Administrator of the TWDB on or before January 14, 2023.

The current management plan for the Bandera County River Authority and Groundwater District expires on March 15, 2023.

We used the groundwater availability model for the Edwards-Trinity (Plateau) and Pecos Valley Aquifers version 1.01 (Anaya and Jones, 2009) to estimate the management plan information for the aquifers within the Bandera County River Authority and Groundwater District.

This report replaces the results of GAM Run 17-004 (Anaya, 2017). The approach used for analyzing model results in GAM Run 22-010 has been refined to better delineate groundwater flow. Additionally, we updated the spatial grid files used to define county, groundwater conservation district, and aquifer boundaries, which also impacted the water budget. Tables 1 and 2 summarize the groundwater availability model data required by statute. Figures 1 and 3 show the area of the model from which the values in the tables were extracted. Figures 2 and 4 provide generalized diagrams of the groundwater flow components provided in Tables 1 and 2. If, after review of the figures, the Bandera County River Authority and Groundwater District determines that the district boundaries used in the assessment do not reflect current conditions, please notify the TWDB at your earliest convenience.

### ***METHODS:***

In accordance with the provisions of the Texas State Water Code, Section 36.1071, Subsection (h), the groundwater availability model mentioned above was used to estimate information for the Bandera County River Authority and Groundwater District management plan. Water budgets were extracted for the historical model periods for the Trinity and Edwards-Trinity (Plateau) aquifers (1981 through 2000) 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:***

#### ***Trinity and Edwards-Trinity (Plateau) aquifers***

- We used version 1.01 of the groundwater availability model for the Edwards-Trinity (Plateau) and Pecos Valley Aquifers to analyze the Trinity and Edwards-Trinity (Plateau) aquifers. See Anaya and Jones (2009) for assumptions and limitations of the model.

- The groundwater availability model for the Edwards-Trinity (Plateau) and Pecos Valley Aquifers contains 2 layers: within Bandera County River Authority and Groundwater District, these generally represent the Edwards Group and equivalent limestone hydrostratigraphic units of the Edwards-Trinity (Plateau) Aquifer (Layer 1) and the undifferentiated Trinity Group hydrostratigraphic units or equivalent units of the Edwards-Trinity (Plateau) Aquifer (Layer 2).
- An individual water budget for the district was determined for the Edwards-Trinity (Plateau) Aquifer (Layers 1 and 2, combined) and the Trinity Aquifer (Layer 2). The Pecos Valley Aquifer does not occur within Bandera County River Authority and Groundwater District and therefore no groundwater budget values are included for it in this report.
- We used the groundwater availability model for the Edwards-Trinity (Plateau) Aquifer instead of the groundwater availability model for the Hill Country portion of the Trinity Aquifer because the Edwards-Trinity (Plateau) Aquifer model covers the entire geographical area of the district. Both groundwater availability models are aligned with different model grid orientations which prevent combining the results from each without double accounting or omitting important water budget information.
- Water budget terms were averaged for the period 1981 to 2000 (stress periods 2 through 21)
- The model was run with MODFLOW-96 (Harbaugh and others, 1996).



## ***RESULTS:***

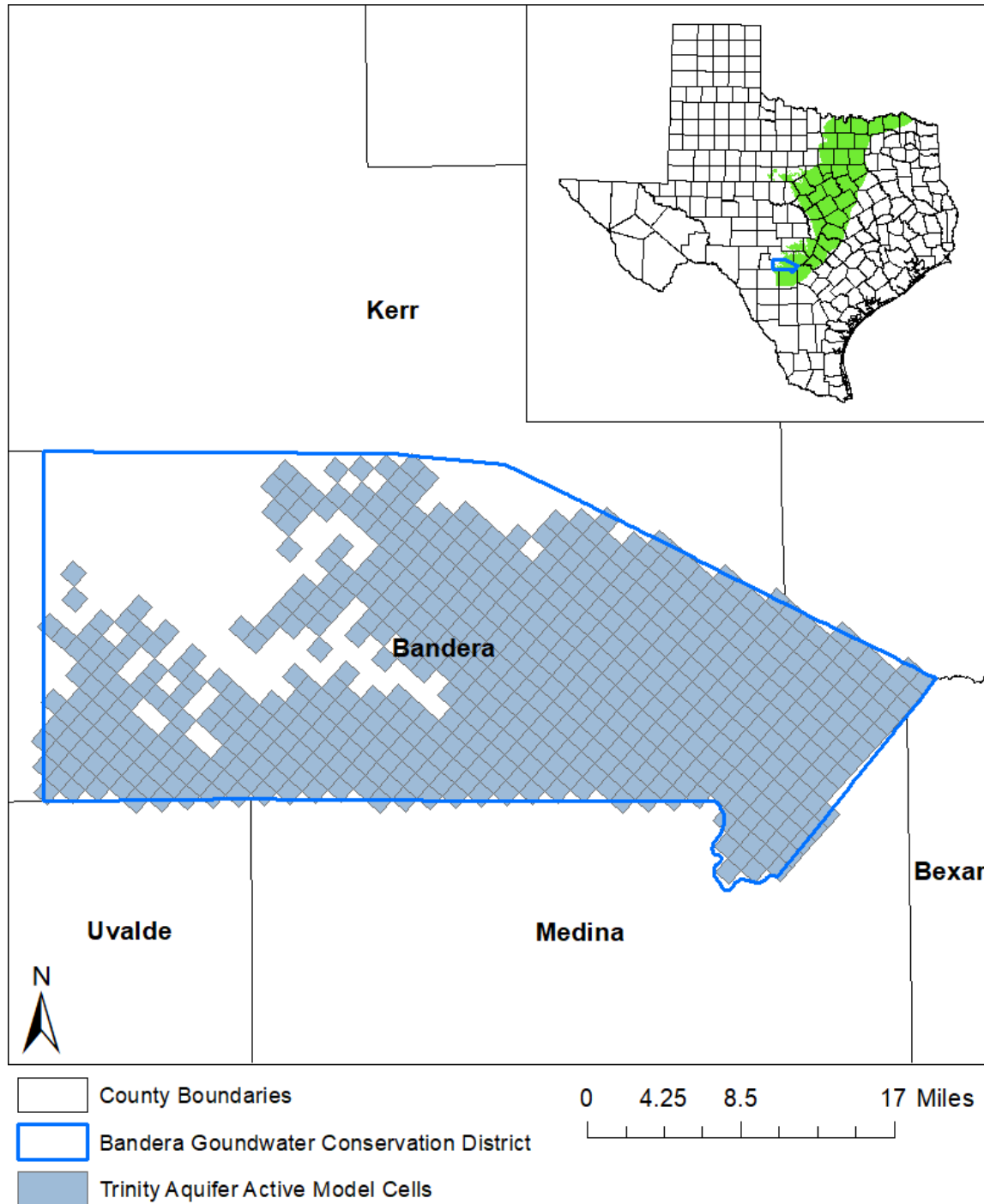
A groundwater budget summarizes the amount of water entering and leaving the aquifers according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the groundwater availability model results for the Trinity and Edwards-Trinity (Plateau) aquifers located within Bandera County River Authority and Groundwater District and averaged over the historical calibration periods, as shown in Tables 1 and 2.

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.

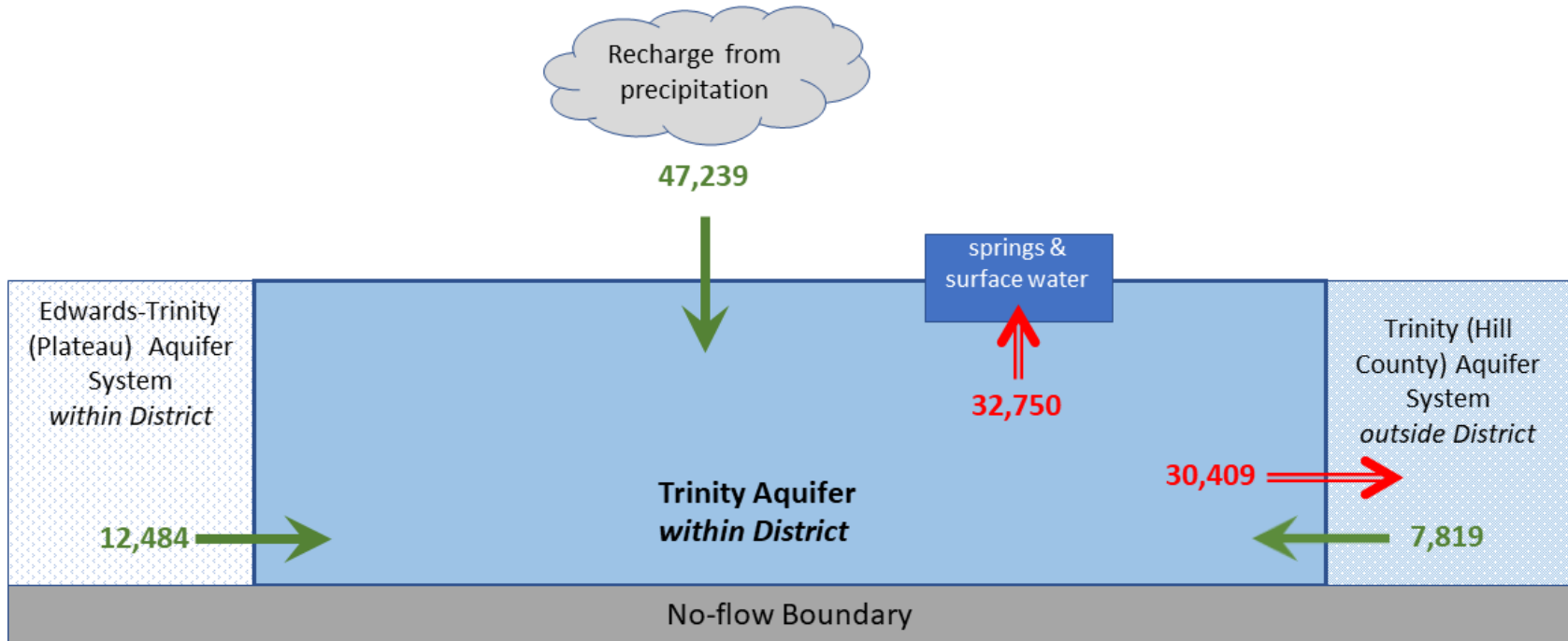
The information needed for the district's management plan is summarized in Tables 1 and 2. It is important to note that sub-regional water budgets are not exact. This is due to the size of the model cells and the approach used to extract data from the model. To avoid double accounting, a model cell that 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 TRINITY AQUIFER THAT IS NEEDED FOR THE BANDERA COUNTY RIVER AUTHORITY AND GROUNDWATER DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.**

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Trinity Aquifer	47,239
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Trinity Aquifer	32,750
Estimated annual volume of flow into the district within each aquifer in the district	Trinity Aquifer	7,819
Estimated annual volume of flow out of the district within each aquifer in the district	Trinity Aquifer	30,409
Estimated net annual volume of flow between each aquifer in the district	To the Trinity Aquifer from the Edwards-Trinity (Plateau) Aquifer	12,484



**FIGURE 1: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE EDWARDS-TRINITY (PLATEAU) AND PECOS VALLEY AQUIFERS FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE TRINITY AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).**

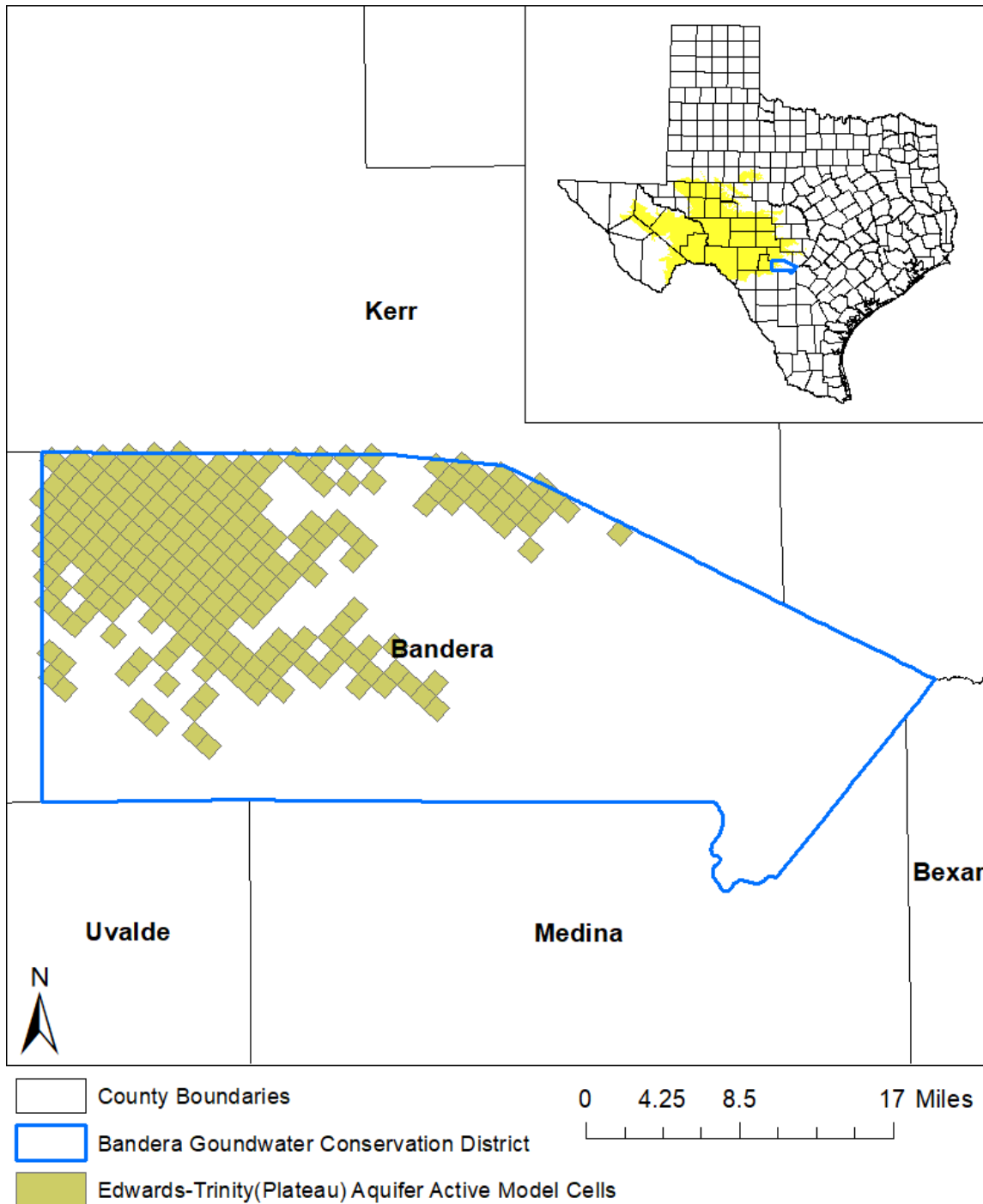


*Caveat: This diagram only includes the water budget items provided in Table 1. A complete water budget would include additional inflows and outflows. If the District requires values for additional water budget items, please contact TWDB.*

**FIGURE 2. GENERALIZED DIAGRAM OF THE SUMMARIZED BUDGET INFORMATION FROM TABLE 1, REPRESENTING DIRECTIONS OF FLOW FOR THE TRINITY AQUIFER WITHIN BANDERA COUNTY RIVER AUTHORITY AND GROUNDWATER DISTRICT. FLOW VALUES EXPRESSED IN ACRE-FEET PER YEAR (AFY).**

**TABLE 2: SUMMARIZED INFORMATION FOR THE EDWARDS-TRINITY (PLATEAU) AQUIFER THAT IS NEEDED FOR THE BANDERA COUNTY RIVER AUTHORITY AND GROUNDWATER DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.**

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Edwards-Trinity (Plateau) Aquifer	7,561
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Edwards-Trinity (Plateau) Aquifer	4,141
Estimated annual volume of flow into the district within each aquifer in the district	Edwards-Trinity (Plateau) Aquifer	6,109
Estimated annual volume of flow out of the district within each aquifer in the district	Edwards-Trinity (Plateau) Aquifer	4,033
Estimated net annual volume of flow between each aquifer in the district	From the Edwards-Trinity (Plateau) Aquifer to the Trinity Aquifer	12,484

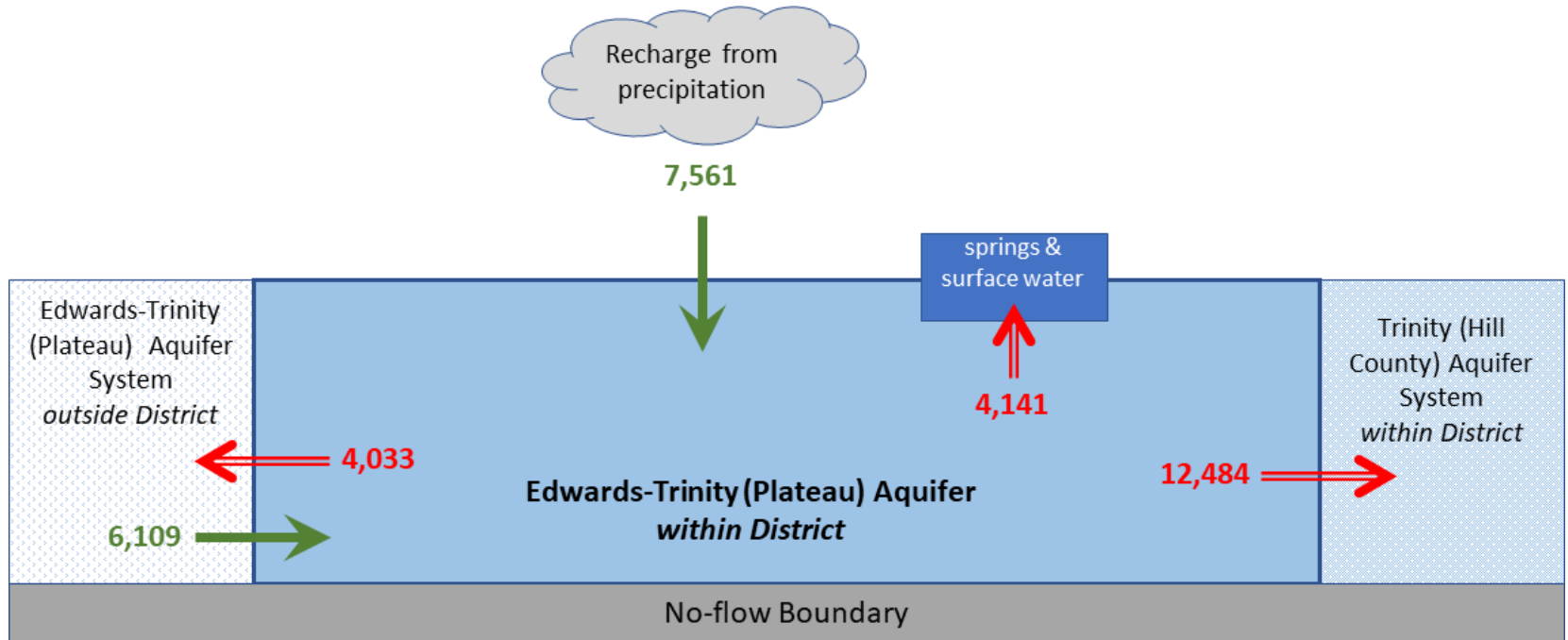


County Boundary 07.03.2019

GCD Boundary 06.26.2020

eddt\_p\_grid 01.06.2020

**FIGURE 3: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE EDWARDS-TRINITY (PLATEAU) AND PECOS VALLEY AQUIFERS FROM WHICH THE INFORMATION IN TABLE 2 WAS EXTRACTED (THE EDWARDS-TRINITY (PLATEAU) 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. If the District requires values for additional water budget items, please contact TWDB.*

**FIGURE 4. GENERALIZED DIAGRAM OF THE SUMMARIZED BUDGET INFORMATION FROM TABLE 2, REPRESENTING DIRECTIONS OF FLOW FOR THE EDWARDS-TRINITY (PLATEAU) AQUIFER WITHIN BANDERA COUNTY RIVER AUTHORITY AND GROUNDWATER DISTRICT. FLOW VALUES EXPRESSED IN ACRE-FEET PER YEAR (AFY).**

### ***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 historic pumping is as important as evaluating the volume of groundwater flow into and out of the district, between aquifers within the district (as applicable), interactions with surface water (as applicable), recharge to the aquifer system (as applicable), and other metrics that describe the impacts of that pumping. In addition, assumptions regarding precipitation, recharge, and interaction with streams are specific to particular historic time periods.

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

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



***REFERENCES:***

Anaya, R., 2017, GAM Run 17-004: Bandera County River Authority & Groundwater District Management Plan, 12 p.,

<https://www.twdb.texas.gov/groundwater/docs/GAMruns/GR17-004.pdf>.

Anaya, R., and Jones, I., 2009, Groundwater availability model for the Edwards-Trinity (Plateau) and Pecos Valley Aquifers of Texas: Texas Water Development Board, Report 373, 103 p.

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

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

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

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

# APPENDIX C

# Estimated Historical Water Use And 2022 State Water Plan Datasets: Bandera County River Authority and Groundwater District

Texas Water Development Board  
Groundwater Division  
Groundwater Technical Assistance Section  
stephen.allen@twdb.texas.gov  
(512) 463-7317  
August 8, 2022

## ***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 Water Use (checklist item 2)  
*from the TWDB Historical Water Use Survey (WUS)*
2. Projected Surface Water Supplies (checklist item 6)
3. Projected Water Demands (checklist item 7)
4. Projected Water Supply Needs (checklist item 8)
5. Projected Water Management Strategies (checklist item 9)  
*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 will receive, this report from the Groundwater Availability Modeling Section. Questions about the GAM can be directed to Dr. Shirley Wade, shirley.wade@twdb.texas.gov, (512) 936-0883.

***DISCLAIMER:***

The data presented in this report represents the most up-to-date WUS and 2022 SWP data available as of 8/8/2022. 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 in order to ensure approval of their groundwater management plan.

The WUS dataset can be verified at this web address:

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

The 2022 SWP dataset can be verified by contacting Sabrina Anderson (sabrina.anderson@twdb.texas.gov or 512-936-0886).

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

# Estimated Historical Water Use

## TWDB Historical Water Use Survey (WUS) Data

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

### **BANDERA COUNTY**

All values are in acre-feet

<b>Year</b>	<b>Source</b>	<b>Municipal</b>	<b>Manufacturing</b>	<b>Mining</b>	<b>Steam Electric</b>	<b>Irrigation</b>	<b>Livestock</b>	<b>Total</b>
2019	GW	2,147	0	0	0	1,206	153	3,506
	SW	0	0	0	0	0	51	51
2018	GW	2,150	0	0	0	1,626	153	3,929
	SW	0	0	0	0	0	51	51
2017	GW	2,159	0	0	0	788	147	3,094
	SW	0	0	0	0	12	48	60
2016	GW	2,073	0	0	0	656	176	2,905
	SW	0	0	0	0	7	59	66
2015	GW	2,098	0	0	0	578	174	2,850
	SW	0	0	0	0	16	57	73
2014	GW	2,246	0	0	0	797	162	3,205
	SW	0	0	0	0	34	54	88
2013	GW	2,462	0	0	0	778	149	3,389
	SW	0	0	0	0	15	50	65
2012	GW	2,696	0	0	0	824	154	3,674
	SW	0	0	0	0	0	51	51
2011	GW	2,849	0	0	0	1,396	224	4,469
	SW	0	0	0	0	1	73	74
2010	GW	2,600	0	0	0	887	224	3,711
	SW	0	0	0	0	0	73	73
2009	GW	2,590	0	0	0	888	196	3,674
	SW	0	0	0	0	0	66	66
2008	GW	2,658	0	0	0	374	184	3,216
	SW	0	0	0	0	0	61	61
2007	GW	2,421	0	0	0	365	209	2,995
	SW	0	0	0	0	0	70	70
2006	GW	2,780	0	0	0	284	197	3,261
	SW	0	0	0	0	0	66	263
2005	GW	2,542	0	0	0	246	197	2,985
	SW	106	0	0	0	5	66	177
2004	GW	2,352	0	0	0	266	114	2,732
	SW	106	0	0	0	5	139	250

# Projected Surface Water Supplies

## TWDB 2022 State Water Plan Data

### **BANDERA COUNTY**

All values are in acre-feet

<b>RWPG</b>	<b>WUG</b>	<b>WUG Basin</b>	<b>Source Name</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
J	County-Other, Bandera	Nueces	Nueces Run-of-River	0	0	0	0	0	0
J	County-Other, Bandera	San Antonio	Nueces Run-of-River	0	0	0	0	0	0
J	County-Other, Bandera	San Antonio	San Antonio Run-of-River	0	0	0	0	0	0
J	Irrigation, Bandera	Nueces	Nueces Run-of-River	5	5	5	5	5	5
J	Irrigation, Bandera	San Antonio	Guadalupe Run-of-River	3	3	3	3	3	3
J	Irrigation, Bandera	San Antonio	San Antonio Run-of-River	2	2	2	2	2	2
<b>Sum of Projected Surface Water Supplies (acre-feet)</b>				<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</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.

### **BANDERA COUNTY**

All values are in acre-feet

<b>WUG</b>	<b>RWPG</b>	<b>WUG Basin</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
J	Bandera	San Antonio	342	383	404	413	419	423
J	Bandera County FWSD 1	San Antonio	141	158	167	171	174	175
J	County-Other, Bandera	Guadalupe	13	14	15	15	15	15
J	County-Other, Bandera	Nueces	116	129	136	138	140	141
J	County-Other, Bandera	San Antonio	2,206	2,457	2,582	2,627	2,664	2,686
J	Irrigation, Bandera	Nueces	182	182	182	182	182	182
J	Irrigation, Bandera	San Antonio	764	764	764	764	764	764
J	Livestock, Bandera	Guadalupe	11	11	11	11	11	11
J	Livestock, Bandera	Nueces	47	47	47	47	47	47
J	Livestock, Bandera	San Antonio	185	185	185	185	185	185
<b>Sum of Projected Water Demands (acre-feet)</b>			<b>4,007</b>	<b>4,330</b>	<b>4,493</b>	<b>4,553</b>	<b>4,601</b>	<b>4,629</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.

### **BANDERA COUNTY**

All values are in acre-feet

<b>RWPG</b>	<b>WUG</b>	<b>WUG Basin</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
J	Bandera	San Antonio	192	151	130	121	115	111
J	Bandera County FWSD 1	San Antonio	-66	-83	-92	-96	-99	-100
J	County-Other, Bandera	Guadalupe	21	20	19	19	19	19
J	County-Other, Bandera	Nueces	321	308	301	299	297	296
J	County-Other, Bandera	San Antonio	2,711	2,460	2,335	2,290	2,253	2,231
J	Irrigation, Bandera	Nueces	102	102	102	102	102	102
J	Irrigation, Bandera	San Antonio	-75	-75	-75	-75	-75	-75
J	Livestock, Bandera	Guadalupe	-2	-2	-2	-2	-2	-2
J	Livestock, Bandera	Nueces	-3	-3	-3	-3	-3	-3
J	Livestock, Bandera	San Antonio	11	11	11	11	11	11
<b>Sum of Projected Water Supply Needs (acre-feet)</b>			<b>-146</b>	<b>-163</b>	<b>-172</b>	<b>-176</b>	<b>-179</b>	<b>-180</b>



# Projected Water Management Strategies

## TWDB 2022 State Water Plan Data

### BANDERA COUNTY

#### WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
<b>Bandera, San Antonio (J)</b>							
City of Bandera - Additional Middle Trinity Wells Within City Water Infrastructure Area	Trinity Aquifer [Bandera]	161	161	161	161	161	161
City of Bandera - Promote, Design and Install Rainwater Harvesting Systems on Public Buildings	Rainwater Harvesting [Bandera]	0	1	1	1	1	1
City of Bandera - Reuse Treated Wastewater Effluent for Irrigation of Public Spaces	Direct Reuse [Bandera]	0	310	310	310	310	310
City of Bandera - Surface Water Acquisition, Treatment and ASR	Trinity Aquifer ASR [Bandera]	0	1,500	1,500	1,500	1,500	1,500
		<b>161</b>	<b>1,972</b>	<b>1,972</b>	<b>1,972</b>	<b>1,972</b>	<b>1,972</b>
<b>Bandera County FWSD 1, San Antonio (J)</b>							
Bandera County Other (FWSD 1) - Additional Groundwater Well	Trinity Aquifer [Bandera]	100	100	100	100	100	100
		<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>County-Other, Bandera, Nueces (J)</b>							
Bandera County Other - Drought Management (BCRAGD) (Nueces)	DEMAND REDUCTION [Bandera]	23	26	27	28	28	28
		<b>23</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>28</b>	<b>28</b>
<b>County-Other, Bandera, San Antonio (J)</b>							
Bandera County Other (Bandera River Ranch 1) - Water Loss Audit and Main-Line Repair	DEMAND REDUCTION [Bandera]	4	4	4	4	4	4
Bandera County Other (Enchanted River Estates) - Water Loss Audit and Main-Line Repair	DEMAND REDUCTION [Bandera]	1	1	1	1	1	1
Bandera County Other (FWSD 1) - Public Conservation Education	DEMAND REDUCTION [Bandera]	2	2	2	2	2	2
Bandera County Other (Lake Medina Shores) - Public Conservation Education	DEMAND REDUCTION [Bandera]	3	3	3	3	3	3
Bandera County Other (Medina WSC) - Additional Groundwater Well	Trinity Aquifer [Bandera]	55	55	55	55	55	55
Bandera County Other (Medina WSC) - Public Conservation Education	DEMAND REDUCTION [Bandera]	1	1	1	1	1	1
Bandera County Other - Drought Management (BCRAGD) (San Antonio)	DEMAND REDUCTION [Bandera]	441	491	516	525	533	537
		<b>507</b>	<b>557</b>	<b>582</b>	<b>591</b>	<b>599</b>	<b>603</b>
<b>Irrigation, Bandera, San Antonio (J)</b>							
Bandera County Irrigation - Additional Groundwater Wells (San Antonio)	Trinity Aquifer [Bandera]	75	75	75	75	75	75

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

*Bandera County River Authority and Groundwater District*

*August 8, 2022*

*Page 7 of 8*

Bandera County Irrigation - Irrigation Scheduling	DEMAND REDUCTION [Bandera]	36	36	36	36	36	36
		<b>111</b>	<b>111</b>	<b>111</b>	<b>111</b>	<b>111</b>	<b>111</b>
<b>Livestock, Bandera, Guadalupe (J)</b>							
Bandera County Livestock - Additional Groundwater Well (Guadalupe)	Trinity Aquifer [Bandera]	2	2	2	2	2	2
Bandera County Livestock - Conservation (Guadalupe)	DEMAND REDUCTION [Bandera]	1	1	1	1	1	1
		<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>Livestock, Bandera, Nueces (J)</b>							
Bandera County Livestock - Additional Groundwater Well (Nueces)	Trinity Aquifer [Bandera]	3	3	3	3	3	3
Bandera County Livestock - Conservation (Nueces)	DEMAND REDUCTION [Bandera]	1	1	1	1	1	1
		<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>
<b>Sum of Projected Water Management Strategies (acre-feet)</b>		<b>909</b>	<b>2,773</b>	<b>2,799</b>	<b>2,809</b>	<b>2,817</b>	<b>2,821</b>

# APPENDIX D



# Bandera County

## River Authority and Groundwater District

Protecting & Preserving our Natural Resources

### Board of Directors

Don Sloan  
President

Bob Williams  
Vice-President

Neil Boultinghouse  
Secretary-Treasurer

Ernest DeWinne  
Director

Conrad Striegl  
Director

Bruce Hayes  
Director

Rebeca Gibson  
Director

Rachel Mulherin  
Director

General Manager  
Dave Mauk

P.O. Box 177  
440 FM3240  
Bandera, Texas  
78003

### NOTICE

Phone: (830)796-7260

www.bcragd.org

**BANDERA COUNTY RIVER AUTHORITY AND GROUNDWATER DISTRICT**

### PUBLIC HEARING

### GROUNDWATER MANAGEMENT PLAN

**July 14, 2022**

Notice is hereby given that a Public Hearing of the Board of Directors for Bandera County River Authority and Groundwater District will be held on Thursday, July 14, 2022, for the Proposed Groundwater Management Plan immediately following the Public Hearing on Proposed Ch. 36 Rule Changes which starts at 10:00 am at 440 FM 3240, Bandera County, Texas, at which time the following items will be discussed and possible action taken, to wit:

### AGENDA

- I. Call to Order, Roll Call, Pledge of Allegiance, Certification of Quorum, and Compliance with the Texas Open Meetings Law.
- II. Public Comments on BCRA GD Proposed Groundwater Management Plan.
- III. Adjournment.

This notice is published pursuant to the Texas Open Meetings Act, Texas Government Code Chapter 551. Dated this 7th day of July, 2022.

David Mauk, General Manager

The Board of Directors of Bandera County River Authority and Groundwater District reserves the right to adjourn into Executive Session at any time in the course of this meeting as authorized by the Open Meetings Act, Texas Government Code Chapter Session under Texas Government Code § 551.071, "Consultation with Attorney". I hereby certify that the above Notice of Meeting of the Board of Directors for Bandera County River Authority and Groundwater District is a true and correct copy of said Notice; that a true and correct copy of said Notice was posted on July 7, 2022 before 4:30 pm, in its administrative office in Bandera, Bandera County, Texas at a place convenient and readily accessible to the general public at all times; that a true and correct copy of said Notice was furnished to the County Clerk of Bandera County; and that a copy of said Notice was furnished to each director.

David Mauk, General Manager

FILED  
AT 46 0001  
JUL 07 2022  
TANDIE MAXFIELD, COUNTY CLERK  
BANDERA COUNTY, TEXAS  
BY [Signature] DEPUTY

The principle mission of the Bandera County River Authority & Groundwater District is to protect and preserve the County's water and natural resources for the State of Texas. The District is also tasked with maintaining local accountability of the County's resources to help safeguard the property rights of the citizens of Bandera County.

## Our Mission



# Bandera County

## River Authority and Groundwater District

*Protecting & Preserving our Natural Resources*

JUL 07 2022  
 AT 1:46 P.M. ON  
 TANDI MANSFIELD, COUNTY CLERK  
 BANDERA COUNTY, TEXAS  
 BY [Signature] DEPUTY

### Board of Directors

Don Sloan  
*President*

Bob Williams  
*Vice-President*

Neil Boultinghouse  
*Secretary-Treasurer*

Ernest DeWinne  
*Director*

Conrad Striegl  
*Director*

Bruce Hayes  
*Director*

Rebeca Gibson  
*Director*

Rachel Mulherin  
*Director*

General Manager  
Dave Mauk

P.O. Box 177  
440 FM3240

Bandera, Texas  
78003

Phone: (830)796-7260

www.bcragd.org

### NOTICE

#### BANDERA COUNTY RIVER AUTHORITY AND GROUNDWATER DISTRICT QUARTERLY MEETING

**July 14, 2022**

Notice is hereby given that a Quarterly Meeting of the Board of Directors for Bandera County River Authority and Groundwater District will be held on Thursday, July 14, 2022 immediately after the BCragd public hearings at 10:00 am at 440 FM 3240, Bandera, Texas 78003, at which time the following items will be discussed and possible action taken, to wit:

#### AGENDA

- I. Call to Order, Roll Call, Pledge of Allegiance, Certification of Quorum, and Compliance with the Texas Open Meetings Law.
- II. Public Comment.
- III. Discuss and Consider for Action: Approval of May 19, 2022 Called Meeting and Public Hearing Minutes, June 2, 2022 Called Meeting and Public Hearing Minutes, and June 20, 2022 Called Meeting Minutes.
- IV. Discuss and Consider for Action: Chapter 36 Rules.
- V. Discuss and Consider for Action: BCragd Groundwater Management Plan.
- VI. Discuss and Consider for Action: 2022 Contract for Election Services Between the Election Officials of Bandera County and Bandera County River Authority and Groundwater District, State of Texas.
- VII. Discuss and Consider for Action: Approval of Water Well Permit for Tina and Daryl Richardson for an Instantaneous Rate of 10 GPM with an Annual Production Limit of 0.25 Acre-Feet.
- VIII. Discuss and Consider for Action: Approval of Water Well Permit for Roman Syvatetskiy for an Instantaneous Rate of 10 GPM with an Annual Production Limit of 0.25 Acre-Feet.
- IX. Discuss and Consider for Action: BCragd Quarterly Budget Report / Public Funds Report.
- X. General Manager Report: Activities of the District – 2nd Quarter FY 2022.
- XI. Informational Item – Drought Stage, Water Conservation Handouts, Rainwater Harvesting Materials, Future Meeting Date.
- XII. Adjournment.

This notice is published pursuant to the Texas Open Meetings Act, Texas Government Code Chapter 551. Dated this 7th day of July 2022.

David Mauk, General Manager

The Board of Directors of Bandera County River Authority and Groundwater District reserves the right to adjourn into Executive Session at any time in the course of this meeting as authorized by the Open Meetings Act, Texas Government Code Chapter Session under Texas Government Code § 551.071, "Consultation with Attorney".

I hereby certify that the above Notice of Meeting of the Board of Directors for Bandera County River Authority and Groundwater District is a true and correct copy of said Notice; that a true and correct copy of said Notice was posted on July 7th, 2022 before 4:30 p.m., in its administrative office in Bandera, Bandera County, Texas at a place convenient and readily accessible to the general public at all times; that a true and correct copy of aid Notice was furnished to the County Clerk of Bandera County; and that a copy of said Notice was furnished to each director.

David Mauk, General Manager

The principle mission of the Bandera County River Authority & Groundwater District is to protect and preserve the County's water and natural resources for the State of Texas. The District is also tasked with maintaining local accountability of the County's resources to help safeguard the property rights of the citizens of Bandera County.

## Our Mission



# Bandera County

## River Authority and Groundwater District

Protecting & Preserving our Natural Resources

### Board of Directors

Don Sloan  
President

Bob Williams  
Vice-President

Neil Boultinghouse  
Secretary-Treasurer

Ernest DeWinne  
Director

Conrad Striegl  
Director

Bruce Hayes  
Director

Rebeca Gibson  
Director

Andrea King  
Director

Melissa Checkovage  
Director

General Manager  
Dave Mauk

P.O. Box 177  
440 FM3240  
Bandera, Texas  
78003

Phone: (830)796-7260

**NOTICE** [www.bcragd.org](http://www.bcragd.org)

**BANDERA COUNTY RIVER AUTHORITY AND GROUNDWATER DISTRICT**

**PUBLIC HEARING**

**GROUNDWATER MANAGEMENT PLAN**

**December 20, 2022**

Notice is hereby given that a Public Hearing of the Board of Directors for Bandera County River Authority and Groundwater District will be held on Tuesday, December 20, 2022, for the Proposed Groundwater Management Plan at 11:00 am at 440 FM 3240, Bandera County, Texas, at which time the following items will be discussed and possible action taken, to wit:

### AGENDA

- I. Call to Order, Roll Call, Pledge of Allegiance, Certification of Quorum, and Compliance with the Texas Open Meetings Law.
- II. Public Comments on BCRA GD Proposed Groundwater Management Plan.
- III. Adjournment.

This notice is published pursuant to the Texas Open Meetings Act, Texas Government Code Chapter 551. Dated this 6th day of December, 2022.

  
David Mauk, General Manager

The Board of Directors of Bandera County River Authority and Groundwater District reserves the right to adjourn into Executive Session at any time in the course of this meeting as authorized by the Open Meetings Act, Texas Government Code Chapter Session under Texas Government Code § 551.071, "Consultation with Attorney". I hereby certify that the above Notice of Meeting of the Board of Directors for Bandera County River Authority and Groundwater District is a true and correct copy of said Notice; that a true and correct copy of said Notice was posted on December 6, 2022 before 4:30 pm, in its administrative office in Bandera, Bandera County, Texas at a place convenient and readily accessible to the general public at all times; that a true and correct copy of said Notice was furnished to the County Clerk of Bandera County; and that a copy of said Notice was furnished to each director.

David Mauk, General Manager

**FILED**  
 AT 1:25 P.M. ON  
**DEC 06 2022**  
 TANDIE MANSFIELD, COUNTY CLERK  
 BY [Signature] DEPUTY

The principle mission of the Bandera County River Authority & Groundwater District is to protect and preserve the County's water and natural resources for the State of Texas. The District is also tasked with maintaining local accountability of the County's resources to help safeguard the property rights of the citizens of Bandera County.

## Our Mission

*Bandera County River Authority and Groundwater District*  
Quarterly Meeting  
July 14, 2022

**START TIME: 10:02 A.M.**

**PRESENT:** D. Sloan, C. Striegl, E. DeWinne, B. Hayes, N. Boultinghouse, R. Mulherin, B. Williams

**ABSENT:** R. Gibson

General Manager: D. Mauk

BCRAGD Staff: H. Hernandez, L. Whitmire

**I. Call to Order, Roll Call, Pledge of Allegiance, Certification of Quorum, and Compliance with the Texas Open Meetings Law.**

D. Sloan called the meeting to order at 10:02am and N. Boultinghouse, Secretary-Treasurer, announced that a quorum was present.

**II. Public Comment.**

Michelle Reiche spoke to the board regarding Medina Lake and congratulated the board on their settlement of the lawsuit against the BMA. However, she stated that reaching the agreement does not fix the wasteful operations of the BMA around Lake Medina and stated that these issues need to be addressed by TCEQ and the Legislature.

**III. Discuss and Consider for Action: Approval of May 19, 2022 Called Meeting and Public Hearing Minutes, June 2, 2022 Called Meeting and Public Hearing Minutes, and June 20, 2022 Called Meeting Minutes.**

E. DeWinne motioned to approve the May 19, 2022 Called Meeting and Public Hearing Minutes, June 2, 2022 Called Meeting and Public Hearing Minutes, and June 20, 2022 Called Meeting Minutes and R. Mulherin seconded the motion. Motion passed 7-0.

**IV. Discuss and Consider for Action: Chapter 36 Rules.**

D. Mauk stated that these were the same proposed changes from the previous meeting, with a September 1st effective date. D. Mauk mentioned that the County Subdivision Rules require 5 acre tracts of land. The proposed rules allow for no pumping into vanity ponds without approval from TCEQ as it is considered waste under Chapter 36 of the Texas Water Code.

E. DeWinne discussed formatting corrections for the rules.

E. DeWinne made a motion to approve the Chapter 36 Rules with correct formatting and R. Mulherin seconded the motion. Motion passed 7-0.

**V. Discuss and Consider for Action: BCragd Groundwater Management Plan.**

D. Mauk stated that the Groundwater Management Plan expires every 5 years and that the District will likely be redoing this in March 2023 when the new GAM models are available.

B. Williams motioned to approve the BCragd Groundwater Management Plan, and R. Mulherin seconded the motion. Motion passed 7-0.

**VI. Discuss and Consider for Action: 2022 Contract for Election Services Between the Election Officials of Bandera County and Bandera County River Authority and Groundwater District, State of Texas.**

D. Mauk stated that this contract is for the November 2022 election should we need to hold one.

E. DeWinnie motioned to approve the 2022 Contract for Election Services Between the Election Officials of Bandera County and Bandera County River Authority and Groundwater District, State of Texas and R. Mulherin seconded the motion. Motion passed 7-0.

**VII. Discuss and Consider for Action: Approval of Water Well Permit for Tina and Daryl Richardson for an Instantaneous Rate of 10 GPM with an Annual Production Limit of 0.25 Acre-Feet.**

D. Mauk stated that this was for a domestic well that was on a tract of land just under 5 acres.

E. DeWinne made a motion to approve the Water Well Permit for Tina and Daryl Richardson for an Instantaneous Rate of 10 GPM with an Annual Production Limit of 0.25 Acre-Feet and R. Mulherin seconded the motion. Motion passed 7-0.

**VIII. Discuss and Consider for Action: Approval of Water Well Permit for Roman Syvatetskiy for an Instantaneous Rate of 10 GPM with an Annual Production Limit of 0.25 Acre-Feet.**

D. Mauk stated that this was for a domestic well that was on a tract of land just under 5 acres.

E. DeWinne made a motion to approve the Water Well Permit for Roman Syvatetskiy for an Instantaneous Rate of 10 GPM with an Annual Production Limit of 0.25 Acre-Feet and B. Williams seconded the motion. Motion passed 7-0.

**IX. Discuss and Consider for Action: BCragd Quarterly Budget Report / Public Funds Report.**

D. Mauk stated that Hondo Bank needs to be changed to Texas National Bank and that they would look to amend after the new budget was approved.



The total of cash accounts is \$359,063 and designated funds total \$71,282 with \$10,000 for the state auditor, \$35,000 for Well Monitoring and Water Availability, \$382 for Scientific Studies, and \$25,900 for Building, Property Improvement and Maintenance

**X. General Manager Report: Activities of the District – 2nd Quarter FY 2022.**

D. Mauk stated that the management plan will be expiring soon and that there is only one proposed change, which is removing the requirement to contract the education portion with the Nueces River Authority.

R. Gibson motioned to approve the BCRA GD Groundwater Management Plan and B. Hayes seconded the motion. Motion passed 7-0.

**XI. Informational Item – Drought Stage, Water Conservation Handouts, Rainwater Harvesting Materials, Future Meeting Date.**

D. Mauk stated that the District will be reviewing the Ch. 51 Rules next and the committee for that is Rebeca, Ernie and Bob.

**XII. Adjournment.**

E. DeWinne motioned to adjourn the meeting and N. Boultinghouse seconded the motion. Motion passed 7-0. Meeting adjourned at 10:40 am.

**Approved by:**

Don Sloan  
Don Sloan (BCRAGD President)

8/11/2022  
Date

Neil Boultinghouse  
Neil Boultinghouse (BCRAGD Secretary/Treasurer)

8/11/2022  
Date

*Bandera County River Authority and Groundwater District*  
Public Hearing on BCragD Groundwater Management Plan  
July 14, 2022

**START TIME: 10:01 A.M.**

**PRESENT:** D. Sloan, C. Striegl, E. DeWinne, B. Hayes, N. Boultinghouse, R. Mulherin, B. Williams

**ABSENT:** R. Gibson

**General Manager:** D. Mauk

**BCRAGD Staff:** H. Hernandez, L. Whitmire

**I. Call to Order, Roll Call, Pledge of Allegiance, Certification of Quorum, and Compliance with the Texas Open Meetings Law.**

D. Sloan called the meeting to order at 10:00am and N. Boultinghouse, Secretary-Treasurer, announced that a quorum was present.

**II. Public Comment.**

None

**III. Adjournment.**

E. DeWinne motioned to adjourn the meeting and N. Boultinghouse seconded the motion. Motion passed 7-0. Meeting adjourned at 10:02 am.

**Approved by:**

  
\_\_\_\_\_  
Don Sloan (BCRAGD President)

8/11/2022  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Neil Boultinghouse (BCRAGD Secretary/Treasurer)

8/11/2022  
\_\_\_\_\_  
Date

**PUBLISHER'S AFFIDAVIT**

State of Texas

County of Bandera

The Bandera Bulletin  
P O Box 697  
Bandera, TX 78003  
(830) 796-3718

Before me, the undersigned authority, on this day personally appeared Daniel Tudak who being duly sworn, deposes and says that he is the general manager/editor of the Bandera Bulletin, that said newspaper is regularly published in Bandera County, Texas, and generally circulated in

\_\_\_\_\_ Counties, Texas; and that the notice, a copy of which is hereto attached, was published in said newspaper on the following:

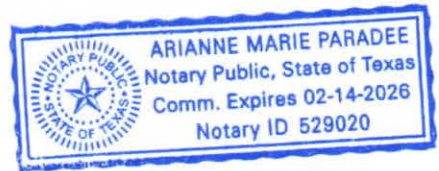
DAY(S): 6.15.22 ; 6.22.22

[Signature]  
General Manager Signature

Sworn and subscribed before me on this the 29 day of June, 2022.

[Signature]  
Notary Public Signature

Arianne Marie Paradee  
Printed Name of Notary Public



# CLASSIFIEDS

**DEADLINE: FRIDAY BY NOON**

**PHONE:** (830) 796-3718 • **E-MAIL:** [Arienne.Paradee@banderabulletin.com](mailto:Arienne.Paradee@banderabulletin.com)  
**WEB:** [www.banderabulletin.com](http://www.banderabulletin.com)

CLASSIFIED INDEX			
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20 For Rent	90 Autos	150 Auctions	
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26 Commercial Lease	95 Motorcycles	160 Misc. For Sale	
30 Wanted to Rent	100 Recreational Vehicles	165 Furniture	
40 Mnf. Homes	110 Boats	170 Farm & Ranch	
50 Hunt Lease	120 Services Offered	180 Lost & Found	
60 Hunting & fishing	125 Child Care	190 Animals	

### DEADLINE TIMES

Please note, Class Display ads, those other than just words, are due by Thursday at 3 p.m. Class Word ads have a Friday by noon deadline

### 20 FOR RENT

2Bed 1Bath House \$1050.00/water plus security deposit. Bandera area 830 796 8916.

### 70 HELP WANTED

Bandera Family Practice is seeking Medical Assistant or LVN. Experience in all aspects of patient care. Please e-mail resume to [banderafamilypractice@gmail.com](mailto:banderafamilypractice@gmail.com).

OST Restaurant is hiring immediately for cashier, line cook, dishwasher. Apply within 311 Main Street, Bandera

Nanny wanted: Three girls ( 15m, 3 , 4 ) Call Maria 361-461-5899 Paid semi-monthly, not hourly.

### 130 WANTED

GOLF CARS & CARE: We buy and sell used golf cars and chargers. 830-896-4455

Scrap Metal Hauler: All types of metal (appliances), old farm equipment, aluminum cans, etc. Cars & Trucks with clear titles call Satch 210-449-8790.

**HUNTING LEASE WANTED!**  
**\$5,000 FOR 100 ACRES!!**  
Land wanted in Bandera/Medina/Tarpley.  
Need leases from 30 to 1000 acres  
Call (830) 589-2497

**BANDERA ISD**  
SMALLER. BETTER. BANDERA.

**BUS DRIVERS NEEDED**  
Pay Starting at \$17 HR & Paid Training

Call 830-460-3897  
Or apply online at [www.banderaisd.net](http://www.banderaisd.net)

S	P	I	K				G	N	A	R					
S	T	A	T	U	S		H	I	S	S	E	D			
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	A	D	P	S		S	E	I	Z	E	S				
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**PUBLIC AUCTION NOTICE**  
**POLLY PEAK STORAGE**  
4017 HWY. 16 S.  
PROPERTY IS BEING SOLD TO SATISFY LANDLORDS LIEN.  
UNITS CONTAIN HOUSEHOLD ITEMS  
DEVIN CIPOLLONI UNIT # 66  
LISA LANZO UNIT # 75  
SHAWN SCHAEFER UNIT # 78  
JENNIFER MAIER UNIT # G10  
**SALE WILL BE ON 6/20/22 AT 8:00 A.M.**

### NOTICE TO THE PUBLIC

Bandera County River Authority and Groundwater District  
**PUBLIC HEARING**  
**July 14, 2022**

The Board of Directors of the Bandera County River Authority and Groundwater District will consider repeal of existing District Chapter 36 Rules and the adoption of a new set of District Rules. The public hearing on the proposed Chapter 36 Rule changes will be as follows:  
**Time, Date and Location:** Beginning at 10:00am on Thursday, July 14, 2022 at the District Office, 440 FM 3240, Bandera, Texas.

**Agenda:** Public comment on the Proposed Rule Changes  
Copies of the proposed changes are available at the District Office and on the District website: [www.bcragd.org](http://www.bcragd.org)

The District encourages public feedback on the proposed Rule changes. In order to ensure that written questions, comments and suggestions are considered, they should be submitted to the District by 5:00pm on Tuesday, July 12, 2022. Written comments may be delivered to the District in person; emailed to [hhernandez@bcragd.org](mailto:hernandez@bcragd.org); or mailed to P.O. Box 177, Bandera, Texas 78003.

Additionally, the public will be provided with an opportunity to give oral comments and make suggestions on the proposed Rule changes at the Public Hearing.

If you have any questions or would like a copy of the proposed Rule changes emailed to you please contact the District Office by phone (830)796-7260; or by email [hhernandez@bcragd.org](mailto:hhernandez@bcragd.org).

David Mauk, General Manager

The Board of Directors of Bandera County River Authority and Groundwater District reserves the right to adjourn into Executive Session at any time in the course of this meeting as authorized by the Open Meetings Act, Texas Government Code Chapter Session under Texas Government Code § 551.071, "Consultation with Attorney". I hereby certify that the above Notice of Meeting of the Board of Directors for Bandera County River Authority and Groundwater District is a true and correct copy of said Notice; that a true and correct copy of said Notice was posted on June 10, 2022 before 4:30 pm, in its administrative office in Bandera, Bandera County, Texas at a place convenient and readily accessible to the general public at all times; that a true and correct copy of said Notice was furnished to the County Clerk of Bandera County; and that a copy of said Notice was furnished to each director.

### 160 MISC FOR SALE

For sale: 55-gallon ink drums \$10, wood pallets \$5, and end rolls \$10. Call Granite Printing, (512) 352-3687 OR COME BY 2675 CR 374, Cirdeville, TX 76574.

### 190 ANIMALS

7wks old male Border Collie/Aussie puppy. Has his shots & heart worm meds. \$300 Call 830-460-0925.

Pug Puppies! 8weeks shots up to date. 154 Hillside Rd Bandera. 830 460-8275.

### PUBLIC NOTICE

Notice is hereby given that on June 23, 2022 at 10:00 a.m. the Commissioners Court of Bandera County will hold a Public Hearing and consider for action a request to replat Lots 59 and 60, Goat Hill Estates Subdivision Unit 1, as recorded in Volume 6, Pages 130-135 of the Map and Plat Records of Bandera County, Texas, into a single lot.

### CITATION BY PUBLICATION

THE STATE OF TEXAS: TO ALL PERSONS INTERESTED IN THE ESTATE OF:

### SIMON DAVID WILLETT, Deceased

**EMELIE ANNETTE WILLETT** in the above numbered and entitled estate filed an Application to Determine Heirship and Declare who are the Heirs and Unknown Heirs and their respective shares and interests in this estate and an Application for Independent Administration and Letters of Administration of the said **SIMON DAVID WILLETT, DECEASED.**

Said application may be heard and acted on by said Court at any call of the docket on or after the 9 day of JUNE 2022, at 10 o'clock A.M., that being the first Monday next after the expiration of ten days from date of publication of this citation, at the County Courthouse, 500 Main Street, Bandera, Texas.

All interested persons in said estate are hereby cited to appear before said Honorable Court by filing a written contest or answer to this application should they desire to do so. To ensure its consideration, you or your attorney must file any objection, intervention, or response in writing with the County Clerk of Bandera County, Texas on or before the above-noted date and time.

The officer executing this writ shall promptly serve the same according to requirements of law, and the mandates hereof and make due return as the law directs.

ISSUED UNDER MY HAND AND THE SEAL OF SAID COURT at the office in Bandera County, Texas, this the 9 day of JUNE, 2022.



### Notice of Virtual Public Hearing—San Antonio District Department Policies Affecting Bicycle Use on the State Highway System

In accordance with Texas Administrative Code, Title 43, Part 1, Chapter 25, Subchapter D, Rule §25.55 (a) and (b), the Texas Department of Transportation (TxDOT) San Antonio District is partnering with the Alamo Area Metropolitan Planning Organization (AAMPO) to offer a virtual public hearing on district transportation projects, programs, and policies affecting bicycle use on the state highway system. The virtual public hearing will begin on **Thursday, June 30, 2022 at 5 p.m. This is not a live event. The materials and presentations can be viewed any time beginning Thursday, June 30 at 5 p.m. through Thursday, July 14, 2022 at 11:59 p.m.** To log into the virtual public hearing, go to [www.txdot.gov](http://www.txdot.gov). Search for keywords "San Antonio annual bicycle project hearing". Pre-recorded video presentations will include both audio and visual components. Additional materials, including written transcripts of the presentations, exhibits and supporting documents will also be available. **Please note that the materials will not be available until June 30, 2022.**

The purpose of this hearing is to provide information and to receive public comments. This would be for transportation projects that might affect bicycle use, plans, policies, and programs for the TxDOT San Antonio District and for the AAMPO.

Comments from the public regarding the district transportation projects, programs, and policies affecting bicycle use on the state highway system are requested and can be submitted online via survey at the project website, by email to [Ivonne.DeLaRosa@txdot.gov](mailto:Ivonne.DeLaRosa@txdot.gov), or by mail to **TxDOT San Antonio District Office, Attn: Ivonne De La Rosa, 4615 NW Loop 410 San Antonio, Texas 78229**. Verbal comments may be submitted by calling and leaving a voicemail at (833) 933-0444. All comments must be received or postmarked on or before **Thursday, July 14, 2022**. Responses to written comments received and public testimony provided will be made available online at [www.txdot.gov](http://www.txdot.gov) once they have been processed.

The virtual public hearing will be conducted in English. If you need an interpreter or document translator because English is not your primary language or have difficulty communicating effectively in English, one will be provided to you. If you have a disability and need assistance, special arrangements can be made to accommodate most needs. If you need interpretation or translation services or are a person with a disability who requires an accommodation to attend and participate in the virtual public hearing, please contact **Darcie Schipull at (210)615-5902 or Darcie.Schipull@txdot.gov** no later than **4 p.m. CT, Thursday, June 23, 2022**. Please be aware that advance notice is required as some services and accommodations may require time for TxDOT to arrange.

For additional information or to be added to the mailing list of individuals or organizations interested in bicycle use on the state system, or if you have any general questions or concerns regarding the virtual hearing, please contact **Ivonne De La Rosa at (210)615-5977 or Ivonne.DeLaRosa@txdot.gov**.

### NOTICE TO THE PUBLIC

Bandera County River Authority and Groundwater District  
**PUBLIC HEARING**  
**July 14, 2022**

The Board of Directors of the Bandera County River Authority and Groundwater District will consider repeal of the existing District Groundwater Management Plan and the adoption of a new District Groundwater Management Plan. The public hearing on the proposed Chapter 36 Rule changes will be as follows:  
**Time, Date and Location:** Beginning immediately after the Public Hearing on District Proposed Rule Changes at 10:00am on Thursday, July 14, 2022 at the District Office, 440 FM 3240, Bandera, Texas.

**Agenda:** Public comment on the Proposed Groundwater Management Plan Changes.  
Copies of the proposed changes are available at the District Office and on the District website: [www.bcragd.org](http://www.bcragd.org)

The District encourages public feedback on the proposed Groundwater Management Plan changes. In order to ensure that written questions, comments and suggestions are considered, they should be submitted to the District by 5:00pm on Tuesday, July 12, 2022. Written comments may be delivered to the District in person; emailed to [hhernandez@bcragd.org](mailto:hernandez@bcragd.org); or mailed to P.O. Box 177, Bandera, Texas 78003.

Additionally, the public will be provided with an opportunity to give oral comments and make suggestions on the proposed Rule changes at the Public Hearing.

If you have any questions or would like a copy of the proposed Groundwater Management Plan changes emailed to you please contact the District Office by phone (830)796-7260; or by email [hhernandez@bcragd.org](mailto:hhernandez@bcragd.org).

David Mauk, General Manager

The Board of Directors of Bandera County River Authority and Groundwater District reserves the right to adjourn into Executive Session at any time in the course of this meeting as authorized by the Open Meetings Act, Texas Government Code Chapter Session under Texas Government Code § 551.071, "Consultation with Attorney". I hereby certify that the above Notice of Meeting of the Board of Directors for Bandera County River Authority and Groundwater District is a true and correct copy of said Notice; that a true and correct copy of said Notice was posted on June 10, 2022 before 4:30 pm, in its administrative office in Bandera, Bandera County, Texas at a place convenient and readily accessible to the general public at all times; that a true and correct copy of said Notice was furnished to the County Clerk of Bandera County; and that a copy of said Notice was furnished to each director.

### NOTICE OF PUBLIC MEETING TO DISCUSS BUDGET AND PROPOSED TAX RATE

The \_\_\_\_\_ BANDERA ISD \_\_\_\_\_ will hold a public meeting at \_\_\_\_\_ 5:45 PM JUNE 27, 2022 \_\_\_\_\_ in \_\_\_\_\_ CENTRAL OFFICE BOARD ROOM \_\_\_\_\_ 815 PECAN STREET BANDERA, TEXAS \_\_\_\_\_ The purpose of this meeting is to discuss the school district's budget that will determine the tax rate that will be adopted. Public participation in the discussion is invited.

The tax rate that is ultimately adopted at this meeting or at a separate meeting at a later date may not exceed the proposed rate shown below unless the district publishes a revised notice containing the same information and comparisons set out below and holds another public meeting to discuss the revised notice.

Maintenance Tax	\$ _____ .8546 _____ /\$100 (Proposed rate for maintenance and operations)
School Debt Service Tax	\$ _____ .1238 _____ /\$100 (proposed rate to pay bonded indebtedness)

#### Comparison of Proposed Budget with Last Year's Budget

The applicable percentage increase or decrease (or difference) in the amount budgeted in the preceding fiscal year and the amount budgeted for the fiscal year that begins during the current tax year is indicated for each of the following expenditure categories:

Maintenance and operations	5.79	% increase	or	_____	% (decrease)
Debt service	1.84	% increase	or	_____	% (decrease)
Total expenditures	5.39	% increase	or	_____	% (decrease)

#### Total Appraised Value and Total Taxable Value (as calculated under Tax Code Section 26.04)

	Preceding Tax Year	Current Tax Year
Total appraised value* of all property	\$ 2,520,689,903	\$ 3,079,457,254
Total appraised value* of new property**	\$ 44,837,201	\$ 147,142,387
Total taxable value*** of all property	\$ 2,037,831,522	\$ 2,619,927,548
Total taxable value*** of new property**	\$ 42,099,589	\$ 144,442,156

\* "Appraised value" is the amount shown on the appraisal roll and defined by Tax Code Section 1.04(8).  
\*\* "New property" is defined by Tax Code Section 26.012(17).  
\*\*\* "Taxable value" is defined by Tax Code Section 1.04(10).

#### Bonded Indebtedness

Total amount of outstanding and unpaid bonded indebtedness\* \$ \_\_\_\_\_ 12,630,000 \_\_\_\_\_

\* Outstanding principal.

#### Comparison of Proposed Rates with Last Year's Rates

	Maintenance & Operations	Interest & Sinking Fund*	Total	Local Revenue Per Student	State Revenue Per Student
Last Year's Rate	\$ .8720	\$ .1238*	\$ .99580	\$ 8,659	\$ 885
Rate to Maintain Same Level of Maintenance & Operations Revenue & Pay Debt Service	\$ .80466	\$ .07271 *	\$ .87737	\$ 9,447	\$ 448
Proposed Rate	\$ .85460	\$ .12380 *	\$ .97840	\$ 9,138	\$ 610

\* The Interest & Sinking Fund tax revenue is used to pay for bonded indebtedness on construction, equipment, or both. The bonds, and the tax rate necessary to pay those bonds, were approved by the voters of this district.

#### Comparison of Proposed Levy with Last Year's Levy on Average Residence

	Last Year	This Year
Average Market Value of Residences	\$ 205,855	\$ 293,924
Average Taxable Value of Residences	\$ 171,566	\$ 201,739
Last Year's Rate Versus Proposed Rate per \$100 Value	\$ .99580	\$ .97840
Taxes Due on Average Residence	\$ 1,708.45	\$ 1,973.81
Increase (Decrease) in Taxes		\$ 265.36

Under state law, the dollar amount of school taxes imposed on the residence homestead of a person 65 years of age or older or of the surviving spouse of such a person, if the surviving spouse was 55 years of age or older when the person died, may not be increased above the amount paid in the first year after the person turned 65, regardless of changes in tax rate or property value.

**Notice of Voter-Approval Rate:** The highest tax rate the district can adopt before requiring voter approval at an election is \_\_\_\_\_ .97840 \_\_\_\_\_. This election will be automatically held if the district adopts a rate in excess of the voter-approval rate of \_\_\_\_\_ .97840 \_\_\_\_\_.

#### Fund Balances

The following estimated balances will remain at the end of the current fiscal year and are not encumbered with or by a corresponding debt obligation, less estimated funds necessary for operating the district before receipt of the first state aid payment:

Maintenance and Operations Fund Balance(s)	\$ 12,573,021
Interest & Sinking Fund Balance(s)	\$ 3,051,543

A school district may not increase the district's maintenance and operations tax rate to create a surplus in maintenance and operations tax revenue for the purpose of paying the district's debt service.

1	8	7	2	4	9	6	5	3
2	6	3	8	5	1	7	4	9
9	4	5	7	3	6	8	2	1
3	1	4	5	6	8	9	7	2
8	7	9	1	2	4	3	6	5
5	2	6	3	9	7	1	8	4
6	9	1	4	7	5	2	3	8
7	5	2	9	8	3	4	1	6
4	3	8	6	1	2	5	9	7

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**THE BANDERA BULLETIN CLASSIFIEDS**



Hayli Hernandez &lt;hphillips@bcragd.org&gt;

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## BCRAGD Groundwater Management Plan

1 message

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**Hayli Hernandez** <hphillips@bcragd.org>

Wed, Dec 21, 2022 at 11:23 AM

To: jbyrum@nueces-ra.org, City Admin &lt;cityadmin@cityofbandera.org&gt;

Cc: Dave Mauk &lt;dmauk@bcragd.org&gt;

Good Morning,

As is required by the Texas Water Code and Texas Water Development Board, attached is the BCragd Groundwater Management Plan. You are receiving this document as you are a surface water entity within our District.

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Sincerely,

**Hayli Hernandez***Intergovernmental Affairs Manager**Bandera County River Authority and Groundwater District*

(830)796-6201

[www.bcragd.org](http://www.bcragd.org)

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**BCRAGD Groundwater Management Plan.pdf**

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